D4.5: Public views on artificial intelligence and robots across 11 EU and non-EU countries

WP4 – AI and robotics: ethical, legal and social analysis

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This report has been developed as a part of the SIENNA project funded by the European Commission; for the period October 2017 to March 2021 (http://www.sienna-project.eu). SIENNA involves the study of the ethical, legal and social issues (ELSI) of three different technology areas, namely Artificial Intelligence/Robotics, Human Enhancement and Human Genomics. The ELSI study of each of these technology areas was predominantly conducted by performing seven distinct tasks presented in as many reports. Herein is presented the results of one of these tasks, namely the quantitative investigation of public views and awareness of the three SIENNA technologies.

This report has been predominantly developed by a social and policy research company, Kantar (www.kantar.com/public), which was subcontracted to conduct this task for each technology area. Kantar conducted the fieldwork (e.g. pilot questionnaire, conduct telephone survey), while the academic partners provided, to varying degrees, the content for the questions for the telephone survey. Kantar performed the analyses and were responsible for the reports.

Important context: Obtaining lay publics' views on novel technologies poses many challenges; trying to obtain views on the ELSI of novel technologies is even more difficult and while the exercise may provide some insights on non-expert views it also has important limitations. First, challenges are related to the use of empirical approaches in Bioethics, which unfortunately often lack strong underlying methodology and critical review given the inter- and multidisciplinary nature of the field. This is particularly true here, as all three technological areas are large and ELSI studies are by definition multidisciplinary. Second, these characteristics also make the scientific and ethical issues discussed challenging to grasp to the broader public. Thirdly, using telephone interviews (aimed to last approximately 15 for all three technology areas) meant that very little time was available for obtaining respondents' answers (in some cases, five minutes or less were available for one technology area). Hence, due to time constraints, participants may not have had the time required to reflect on the questions posed. This should be considered when interpreting the results of this survey.

Due to space constraints, not all methodological details could be included to necessarily satisfy readers with different areas of expertise. To fully understand the results and their meaning, further analysis is needed, and it may be conducted by one of the academic partners in the project and communicated through academic publications.

Finally, it is important to emphasize that the results of empirical research about publics' views and preferences are not meant to answer policy questions, and we caution against the over-interpretation of these results outside of the research context. Indeed, we see such results as being able to inform policy questions (refine them, add to them, guide them) but not as answers per se since this is not the context in which the questions were posed.

Prof. Philip Brey, SIENNA Coordinator

Abstract

Based on a telephone survey of 1,000 people in each of 11 countries (*EU*: France, Germany, Greece, Netherlands, Poland, Spain, Sweden; *non-EU*: Brazil, South Africa, South Korea, USA), this report provides a snapshot of opinions in 2019 on intelligent machines and their impact on society. Across most countries, most people had heard of robotic and AI applications, though relatively small proportions felt well-informed. In most countries, people anticipated widescale changes over the next 20 years in development of the capabilities of intelligent machines and their effect on societies. People also recognised that these technologies brought risks. In most countries, people were more negative than positive about the potential for robots to take on more human features, and for more widespread use of intelligent machines to widen inequalities and result in people having less control. Despite this, people were on balance more positive than negative about the overall impact of intelligent machines in society. There were wide variations by country, with South Korea and Brazil most positive, and South Africa most polarised. No single country stood as especially negative, though France, Greece, Spain and Germany were all more negative than average on two or more measures.

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Information in this report that may influence other SIENNA tasks

Linked task	Points of relevance
Task 2.7: Proposal for an ethical framework	Survey results will be consulted in the development of the ethical framework
Task 5.2: A code of responsible conduct for researchers in AI and robots	Survey results will be consulted in the development of the Code.
Task 6.5: Reconcile needs of researchers and the legitimate concerns of citizens	The survey results will be used as input for task 6.5.

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Executive summary

Introduction

As part of the SIENNA project[1], a public opinion survey was conducted in 11 countries, including seven EU countries and four countries outside Europe (Brazil, France, Germany, Greece, Netherlands, Poland, Spain, South Africa, South Korea, Sweden, USA). Kantar, Public division, conducted c. 1,000 telephone interviews within each country in March and April 2019.

As one of three topics covered, this survey aimed to determine levels of awareness of artificial intelligence and robotics among the public and to assess the level of public acceptance of these technologies in relation to a range of applications.

Awareness of robots and artificial intelligence (AI)

Based on an all-country average[2], overall a half of all respondents said that they had heard or read either 'a lot' or 'a fair amount' about robots (51%) and artificial intelligence (50%).

Levels of self-reported knowledge about these technologies varied considerably by country. The proportion who had heard or read at least a fair amount about robotic or AI technologies was highest in South Korea and Germany (awareness in the range 66%-72%) and lowest in South Africa, Spain and Poland (awareness in the range 32%-41%).

South Africa stood apart from all other countries in terms of the proportion who lacked any awareness of these technologies. Based on the all-country average, almost all respondents had at least heard of robots (96%) and AI (93%). However, a substantial minority of respondents in South Africa had never heard of these technologies at all (24% had never heard of robots and 23% had never heard of AI).

For both types of technology, self-reported awareness was higher among men and more educated respondents. These differences were consistent across almost all survey countries.

Public acceptability towards robots developing human-like features

Across most survey countries, respondents were more negative than positive about the idea that robots should start to take on more human-like features. Based on an all-country average, 29% supported the idea that robots in the workplace and public places should be made to look like humans, while 52% opposed this. There was even more widespread rejection of the idea that people should be allowed to have a robot as a romantic partner, with only 12% overall supporting this and 72% opposing it.

[1] http://www.sienna-project.eu
[2] The average result across the 11 countries surveyed. This means that all 11 countries surveyed contribute equally towards the average, regardless of the number of surveys completed in that country or the population total of the country.

South Korea stood out as the only country surveyed which was more favourable than unfavourable (52% vs 25%) about the concept of human-like robots in workplaces and public places. The countries with the most negative perceptions towards this were France (17% favourable vs 69% unfavourable) and Spain (19% vs 55%). South Africa was the most polarised on this measure (33% vs 58%).

Respondents in the Netherlands were the most accepting of robots in the role of romantic partner (30% favourable vs 45% unfavourable) while the countries with the most negative perceptions towards this were Brazil, Spain, France, Poland and Greece (less than 10% having a favourable opinion). Greece and Brazil were the most strongly opposed to this, with almost eight in ten in disagreeing strongly that this would be an acceptable development.

Across all countries, the level of acceptance towards robots looking and behaving like robots in workplaces and public places was related to gender and, in most countries, to knowledge about robots. In all countries, men were more accepting than women and, in most countries, those who knew at least a fair amount about robots were more accepting than those who knew hardly anything or nothing at all.

Across most countries, acceptability of robots acting in the role of a romantic partner was related to age (younger respondents more accepting than older respondents) and religion (those who considered religion to be an important part of their life were less accepting than those who did not).

Perceived likelihood of intelligent machines developing enhanced abilities in the next 20 years

Respondents were asked about their expectations of the future of intelligent machines. The term "intelligent machines" was explained to respondents as including both robots and AI. In almost all countries, more respondents thought it likely, rather than unlikely, that intelligent machines will understand and communicate as well as humans within the next 20 years. An all-country average of 63% thought that this would 'definitely' or 'probably' happen.

However, a lower proportion envisaged a future in which intelligent machines would be able to replace professionals such as scientists, teachers, doctors and lawyers. Based on an all-country average, respondents were slightly more likely (53%) than unlikely (45%) to think this will happen within the next two decades.

Compared with all other surveyed countries, South Koreans predict the most rapid advancement of intelligent technology: 78% think intelligent machines will understand and communicate as well as humans and 72% think they will be able to replace skilled professionals.

On the other hand, respondents in Germany and Sweden tended to be the most cautious about the likelihood that machines will develop these types of capabilities in the next 20 years. About a half of Germans and Swedes (54%, 50% respectively) anticipated the development of communications technology on a par with humans, while around three in ten (31%, 32% respectively) thought that intelligent machines will be able to replace skilled professionals.

There were no consistent patterns by demographic subgroups in terms of the proportion who thought that intelligent machines would communicate as well as humans or replace skilled professionals in the next 20 years.

Perceived impact of intelligent machines on society

Across all countries, a clear majority felt that more widespread use of intelligent machines would lead to changes within their country. Based on the all-country average, 80% predicted that society would be different: 31% 'completely different' and 49% 'somewhat different'.

Respondents from South Africa and the USA anticipated the greatest degree of societal change, with 54% and 44% respectively feeling that their country would be 'completely different'.

An all-country average of 61% expected that more widespread use of intelligent machines in the workplace would lead to greater levels of inequality between rich and poor than today. In almost all countries, this was the majority opinion. The only exception was South Africa, where a half (50%) thought this. Compared with the all-country average (11%), South Africans were twice as likely (21%) to consider that increased use of intelligent machines in the workplace would in fact *reduce* inequalities.

Based on an all-country average, just over half (55%) of respondents thought that increased use of intelligent machines across society would lead to people having *less* control over their decisions and actions, 13% thought it would lead to people having *more* control, and 28% felt there would be no change compared to now.

Germans (66%) and South Africans (62%) were more likely than average (55%) to feel that increased use of intelligent machines would lead to *less control.* On the other hand, Brazilians (22%) and South Koreans (29%) were more likely than average (13%) to feel this would lead to *more control*.

Overall opinion about the impact of intelligent machines on society

When asked to summarise, on a scale of 0 to 10, their overall opinion of the future impact of intelligent machines on their country, some surveyed countries were more positive than others. Overall, based on the all-country average, respondents were more positive than negative (46% gave a positive score, 30% a negative score, and 23% a neutral score). Countries with the most positive outlook, as measured by the proportion who gave a 6-10 rating, were the Netherlands (61%), South Korea (55%), and Brazil (53%). Countries with the most negative outlook, as measured by the proportion who gave a 0 to 4 rating were France (43%) and the USA (41%).

Across most countries, positive scores were higher among men vs women; respondents aged 18-34 vs respondents aged 55+; those with university-level vs lower levels of education; and those who considered themselves to be knowledgeable about AI vs those who knew little or nothing.

In many countries, those who had an overall negative opinion of intelligent machines were also more likely to feel that increased use of intelligent machines would lead to widened inequalities and to people having less control over their decisions and actions.

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Table 1: List of acronyms/abbreviations

Abbreviation	Explanation
AI	Artificial intelligence
CATI	Computer Assisted Telephone Interviewing
EC	European Commission
EU	European Union
RDD	Random digit dialling
SIENNA	Stakeholder-informed ethics for new technologies with high socio-economic and human rights impact

Glossary of terms

Table 2: Glossary of terms

Term	Explanation
All country average	The average result across the 11 countries surveyed. This means that all 11 countries surveyed contribute equally towards the average, regardless of the number of surveys completed in that country or the population total of the country.
Artificial intelligence	The science and engineering of machines with capabilities that are considered intelligent (i.e. intelligent by the standard of *human* intelligence). The following text was used in the survey questionnaire to introduce artificial intelligence to respondents: "Now a question about artificial intelligence, which refers to computer programs that can do tasks normally performed by people. For example, personal assistants in smartphones, like Siri, software used in in self-driving cars, and computer programs that can learn to recognize faces."
CATI surveys	A survey conducted by telephone (CATI stands for 'Computer Assisted Telephone Interviewing').
Cognitive testing	A qualitative questionnaire testing technique that examines how well questions perform when asked of respondents. It aims to explore how respondents understand, mentally process and respond to questions and identify where problems are experienced.
Confidence interval	The range of values that is likely to include the true population value of a survey estimate. For example, if a survey estimate is 50% and a confidence interval is +/- 4%, then based on a 95% confidence interval, we can be 95% certain that the true population value is between 46% and 54%. The size of the confidence interval is impacted by the size of the survey sample and the impact of weighting on the results.
Demographic subgroup	A sub-sample without the overall survey sample based on demographic characteristics – for example, women, 35 to 54-year olds or people with a university degree.
Design effect	A value which shows the impact of weighting on the survey results.
Design weighting	A stage of weighting that corrects for different probabilities of selection. For this survey this was based on telephone types the respondent had access to (landline/mobile) and the number of adults aged 18+ living in the household.
Dual frame	A telephone survey sample design that includes both landline and mobile phone

design	numbers.
EU average	The average result across the 7 EU countries surveyed. This means that all 7 EU countries surveyed contribute equally towards the average, regardless of the number of surveys completed in that country or the population total of the country.
Intelligent machines	A collective description to refer to both artificial intelligence and robots in the survey questionnaire.
Pilot	A fieldwork test of the survey with a small number of respondents conducted prior to the main fieldwork period.
Random digit dialling (RDD)	A method for selecting people for involvement in telephone surveys by generating numbers at random (for this survey, using country numbering plans as a frame).
Response rate	The number of respondents to complete a survey divided by the total sample of phone numbers attempted (excluding any numbers known to be eligible).
Rim weighting	A stage of weighting that adjusts key sample demographics (e.g. age band, gender, level of education) to be reflective of the target population.
Rizzo method	An approach to select one adult at random in sampled households commonly used in telephone surveys.
Robotics	The field of science and engineering that deals with the design, construction, operation, and application of robots.
Robot	Electro-mechanical machines with sensors and actuators that can move, either entirely or a part of their construction, within their environment and perform intended tasks autonomously or semi-autonomously. The following text was used in the survey questionnaire to introduce robots to respondents: “Firstly, some questions about robots, which are machines designed to perform tasks automatically and by themselves. For example, robots that can perform surgery, or clean the house.”
Significance test	A statistical test which determines whether relationships (e.g. differences) observed between two survey variables or groups are likely to exist in the population from which the sample is drawn.
Weighting	An adjustment to the survey data to account for different probabilities of selection and differences in likelihood to complete the survey between different population groups.

1. Introduction

1.1 Background: overview of the SIENNA project

SIENNA (Stakeholder-informed ethics for new technologies with high socio-economic and human rights impact) is a three-and-a-half-year project (October 2017 – March 2021) that has received funding under the European Union's H2020 research and innovation programme under grant agreement No 741716. It has 11 core partners and 2 associate partners. The project focusses on ethical and human rights challenges posed by human genomics, human enhancement and AI and robotics.

While technologies used in human genomics, human enhancement and AI and robotics might offer significant benefits to individuals and society, they also present significant ethical challenges, e.g., in relation to human autonomy, equality, personal liberty, privacy, and accountability. In collaboration with a variety of stakeholders, SIENNA is identifying and assessing the ethical and socio-economic issues, public opinions, legal and human rights implications of each of these technology areas.

SIENNA will produce a framework for each of the three technologies that will form the basis for the development of research ethics protocols, professional ethical codes, and better ethical and legal frameworks. Before developing their recommendations, the partners are gathering views of experts and citizens towards the three technologies in four ways: (1) a major survey of citizens in 11 countries within and outside the EU; (2) panels of citizens in five countries; (3) interviews with experts and stakeholders; (4) workshops with stakeholders including scientists, ethicists, research ethics committees, professional organisations, civil society organisations, industry and policy makers. This report presents the results of the survey.

1.2 Objectives of the survey

A key feature of the SIENNA project is that stakeholders, including the general public, will be engaged throughout the process. The involvement of the general public is particularly important; research and innovation into new and emerging technologies carries an ongoing risk of being in tension with public concerns. It is therefore crucial to gain insights into and consider such concerns. One method of exploring the general publics' views of the SIENNA project is through empirical research.

SIENNA commissioned Kantar to conduct telephone public opinion surveys in 11 countries.[3] This included seven EU countries (France, Germany, Greece, Netherlands, Poland, Spain and Sweden) and four countries outside of Europe (Brazil, South Africa, South Korea and the United States). The survey aimed to obtain information about the publics' perceptions of human genomics, human

[3] We explain the reasons for selecting these 11 countries in section 2.2.

enhancement and AI and robotics in relation to a range of applications as well as self-reported levels of awareness.

1.3 Structure of the report

This report sets out the findings from the public opinion survey on artificial intelligence (AI) and robotics across 11 countries. The report is structured as follows:

- In section 2, we provide an overview of the survey methodology.
- In section 3, we look at overall awareness of robots and artificial intelligence.
- In section 4, we look at perceptions of robots.
- In section 5, we look at perceptions of intelligent machines (AI and robots combined).
- In section 6, we look at the perceived impact of intelligent machines on society.
- In section 7, we draw conclusions from the results across all sections of the survey.

1.4 Scope and limitations

The survey was designed to deliver information in relation to AI and robotics. While data was successfully obtained from 11,000 respondents, there were limits to the scope and approach of the survey that should be considered when interpreting the results:

- Some of the topics and questions planned for inclusion in the survey were felt to be too complex based on current levels of public understanding. This was found in the cognitive testing phase conducted in the Netherlands, Poland and South Africa (see section 2.3), with several changes made to simplify question content following this. While simplifications were made to the questionnaire following testing, and definitions were added to help guide respondents, we cannot fully assess how well respondents understood all of the concepts and questions covered in the final questionnaire. Furthermore, the need to simplify the survey content may have resulted in questions lacking details or specificity. This should be considered when judging the use of the results for any policy-oriented work.

- Due to the budget allotted to the empirical work (approx. €1 million for both the panels, reported in D2.6, and the surveys reported here), the target questionnaire length to cover all three technology areas was very short (an average of 15 minutes in total and 5 minutes per technology area). In such a short time, we could only cover a few areas of use and for each use we could only ask a few relatively simple questions with simple close ended answers.

- The questionnaire was originally drafted in English and translated into each of the languages used for the survey. While attempts were made to ensure equivalent understanding of terms between languages (for example, providing translators with notes to convey the meaning of certain terms), we cannot be sure that all questions and response options were interpreted in completely comparable manner between languages.

- While attempts were made to deliver a representative sample in each country (see section 2.4), it is possible that those with more interest or awareness of the survey topics were more likely to agree to participate and to complete the survey. For example, we found in most countries that the proportion of the surveyed sample with a university degree was higher than we would expect

for a nationally representative sample. Any observable bias in the surveyed sample was corrected through weighting (see section 2.6).

- As shown in section 2.5, the responses rates achieved in each country ranged between 2% and 8%. While these response rates are similar to those achieved for similar surveys, they do show that only a minority of those selected to take part in the survey chose to do so. This may limit the extent to which the results can be seen as representative of the views of the adult population in each country.

- The survey was conducted by telephone in all countries. This meant that responses needed to be provided immediately in response to the survey questions and respondents could not spend much time considering their options.

- "Don't know" and "Refused" options were available at every question but were not read out to respondents. They were therefore only selected by interviewers when respondents offered these responses spontaneously. Levels of "Don't know" and "Refused" responses were low for most survey questions. However, it is possible that this partly reflects the way these response options were administered, and the levels may have been higher if the options were read out to respondents.

- Any 'all country' results included in the report are based on averages across the 11 countries included in the survey. These figures should be interpreted in this way and not as global results, as we cannot generalise these results to other countries not included in the survey. We have also included an EU country average for each question. This reflects the SIENNA project being funded by the EU and, as such, the EU level results being of particular interest. As with the 'all country' results, the EU average results are based on an average of the EU countries included in the survey and cannot be generalised to other EU countries.

- The objective of this report is to provides a descriptive overview of the survey findings. As such, it does not follow common academic standards for publishing survey results. For example, it does not include introduction and discussion sections, which contextualize the results with relevant academic literature in order to further understand the meaning of the results for the field. There is scope to analyse the results more deeply to fully understand their meaning and how this pushes our understanding of public views toward AI and robotics further. Such, further analysis may be conducted by academic partner, University of Twente, through academic publications.

2. Methodology

This section provides insights on the methodology for the survey. This includes information about:

- The collection methodology
- The countries surveyed
- The questionnaire development
- The sampling
- The fieldwork method
- The weighting

2.1 Data collection methodology

The survey was conducted by Computer Assisted Telephone Interviewing (CATI) across all countries. It was decided to adopt a CATI approach for a number of reasons:

- It reflected the objective to attempt to deliver a representative sample of adults in each country. An online approach would have excluded people without internet access. Telephone samples have the advantage of being unclustered, unlike face-to-face designs.
- A CATI approach was more cost effective compared with face-to-face interviewing. If a face-to-face approach was adopted, the number of survey countries and/or respondents to survey per country would have needed to be reduced. An online survey would have been cheaper but would not be feasible for some of the countries included in the survey given lower levels of internet access in some countries.
- It was important to adopt a single mode of data collection for all 11 countries, to support comparative analysis. This consistency would have been difficult to achieve based on alternative modes: for example, face-to-face surveys are rarely conducted in the United States and South Korea.

2.2 Countries surveyed

The survey was conducted in 11 countries; in each country, the target sample size was 1,000 adults aged 18 or over. These countries were selected to include a range of cultures, financial standing and geographic locations across the EU, as well as being countries where consortium members worked and where Kantar could conduct the surveys. Due to the purpose of the research, which is aimed at informing the development of an ethical framework at the European level, seven of the surveyed countries were within the European Union:

- France
- Germany
- Greece
- Netherlands
- Poland
- Spain
- Sweden

The remaining four countries were selected in different regions of the world, to provide comparative insights:

- Brazil
- South Africa
- South Korea[4]
- USA

Kantar Public Division surveyed at least 1,000 adults across all 11 countries. The number of completed surveys in each country at an overall and demographic sub-group level can be found in section 2.5.

2.3 Survey development

The questionnaire development was an iterative process done in collaboration between Kantar UK Public Division and the SIENNA consortium. The questions are presented in Annex 1. As well as the questions, short explanations of a technology or applications were also included and read out for some sections.

The specific wording of the questionnaire and some content was further informed by cognitive testing and a pilot. The cognitive testing was conducted face-to-face by local Kantar teams in the Netherlands, Poland and South Africa. The budget could not cover cognitive testing in all countries.

[4] Originally, the plan was to conduct the surveys in countries where SIENNA is represented by partners. However, because of new legislation in China that prohibits conducting surveys for social purposes without prior governmental consent, it was decided to conduct the Asian survey in South Korea instead.

These three countries were selected to provide a mix of cultures and geographies while also being countries where Kantar has experience in cognitive testing. In each of these countries, 10 participants were selected across a mix of gender, age and education level. The purpose of the cognitive testing was to assess understanding of the questions and terminologies used in the countries.

Following the cognitive testing, the questionnaire was amended, and tested again during the pilot.

The pilot was conducted using the same approach as outlined for the main survey elsewhere in this section (see sections 2.4 and 2.5). As such, it was conducted by telephone using a Random Digit Dialling sample design (more information about this methodology can be found in section 2.4 of the report). The pilot consisted of 30 completed surveys conducted in each of the 11 countries. Following the pilot fieldwork, the Kantar team in each country provided feedback in the form of a written report including recommendations. Further changes to the questionnaire were made based on this feedback.

The translation of the questionnaires was managed by the Kantar team in Brussels. All translators were native speakers in the language in which the survey was to be translated. Verification of the translation followed a two-step process. First, each translation was proofread by a second translator before being reviewed by a project manager. The final translation was then "back-translated" into English by a third translator and this version was verified against the original English version by a fourth translator to ensure they match. Verifications of the translations were made by members of the Kantar teams in each survey country, who reviewed the translations against the original English questionnaire.

The final questionnaire included sections for each of the three technology areas and demographic questions. The order that the three technology areas were included was randomised between respondents, with each area being included 1st, 2nd and 3rd in approximately a third of all surveys completed. Within each section, questions were always presented to respondents in the same order. In a few places, the order of statements was randomised in batteries. This is noted in the questionnaire (see Annex 1).

2.4 Sampling

The survey used a dual frame (mixed landline and mobile) Random Digit Dialling (RDD) sample design in all countries. This was to ensure full coverage of the population (mobile only, landline only and dual phone users) and to help minimise observable biases seen in the responding profiles of dual phone users by responding phone. By this we mean the propensity for dual phone users to respond to a survey by their mobile or landline phone differs by observable characteristics such as gender, age, working status and education.

In all countries, we generated a random sample of numbers using as our frame of the country numbering plans. Prior to generating the samples, the landline frame was stratified by region and the mobile frame by operator. Within each region and operator stratum, random samples of telephone numbers were generated such that the final landline sample was proportionally representative by region and mobile sample by operator.

Using the country numbering plans as the frame from which to generate our samples ensures full coverage of the phone owning population in each country. The telephone owning population make up more than 95% of the total 18+ population, with most countries being much closer to 100%.

The target percentage of the achieved sample from the landline and mobile frames is provided in Table 3. These ratios are designed to optimise the representativeness of the sample with respect to the following demographics: age, gender, working status and phone ownership.

Table 3: Target landline and mobile sample ratios per country

Country	Target landline %	Target Mobile %
Brazil	20%	80%
France	50%	50%
Germany	50%	50%
Greece	50%	50%
Netherlands	40%	60%
Poland	70%	30%
South Africa	5%	95%
South Korea	20%	80%
Spain	40%	60%
Sweden	30%	70%
USA	20%	80%

In all countries except South Africa, these targets were met or were very close to being met (within a few percentage points). The landline sample in South Africa was problematic, with a much higher percentage of numbers than expected being non-active. Whilst every effort was made to obtain the target number of completed surveys through the landline frame, it was clear that this was not going to be feasible in South Africa. Therefore, the decision was taken to reach all respondents through the mobile frame.

This change in approach is unlikely to have any significant impact on the results in South Africa, partly due to the very small target of 5%, but also due to the fact that our design may have over-estimated the percentage of the residential (non-business) South African population with a landline phone given the very high inactive rates we observed.[5]

[5] For South Africa, we had used the International Telecommunication Union (ITU) statistics on landline and mobile subscribers to help determine the sample design. In 2016, the ITU estimated there were just over 3.5 million landline subscriber and almost 77 million mobile subscribers (this figure is higher than the population of South Africa and reflects that some people have multiple phones as well as including phones used for business as well as personal use). However, what isn't clear from these figures is what percentage of the landline subscriber count is for business phones. This could also help explain the low productivity as these were not in scope for this study.

In all 11 countries, a minimum of five call backs were made to numbers with non-final outcomes. Calls were made at different times and on different days of the week to maximise the chances of making contact. Most calls were made in the evening and at the weekend to avoid biasing the sample towards the non-working population. To maximise acceptance, appointments were made if needed to allow individuals contacted an opportunity to take part even if they were unavailable during the initial call.

The person answering the phone was asked to participate in the mobile sample. In landline households one adult aged 18 or over was randomly selected from all adults in the household, based on the Rizzo method.[6] Only the selected person could participate; no replacement was permitted.

No incentives were offered for participation in the survey in any of the countries.

2.5 Fieldwork

Fieldwork was conducted over a period of approximately six weeks in March and April 2019.

Fieldwork teams from each country were briefed by the lead UK-based team prior to the start of fieldwork. They then briefed their interviewers on the survey background and requirements.

After contact was made with respondents, interviewers read out a brief introduction to the survey and asked the respondent for their consent to participate. The introduction included the approximate survey length and a statement that respondents could choose not to answer any questions they did not wish to.

Table 4 shows the number of completed surveys (overall and split by landline and mobile sample frames) and response rates achieved in each country. The response rate is the percentage of completed surveys from all eligible phone numbers attempted.

Table 4: Survey numbers and response rates achieved by country

Country	Completed surveys	Completed by landline	Completed by mobile	Response rate
Brazil	1,000	167	833	2%
France	1,002	501	501	4%
Germany	1,002	495	507	2%
Greece	1,001	491	510	4%
Netherlands	1,011	399	612	7%

6 https://www.webdepot.umontreal.ca/Enseignement/SOCIO/Intranet/Sondage/public/exemples_public/Rizzo_Minimally_intrusive_method.pdf

Poland	1,070	264	806	7%
South Africa	1,000	0	1,000	3%
South Korea	1,000	200	800	3%
Spain	1,000	394	606	4%
Sweden	1,000	294	706	8%
USA	1,002	200	802	2%

The target average survey length was 15 minutes. The median length across all completed surveys in each country slightly exceeded this in all countries, ranging from a minimum of 16 minutes in Greece to 22 minutes in Sweden. The median length of each section across all completed surveys was: 4.2 minutes for AI and robotics; 5.5 minutes for human enhancement; and 6.3 minutes for human genomics.[7]

2.6 Weighting

The survey data for each country were weighted to account for different probabilities in selection and non-response (e.g. where certain demographic groups were more or less likely to participate in the survey). Weights were calculated using two stages.

The first stage of weighting (design weighting) corrected for the different probabilities of selection based on the telephone types the respondent had access to and the number of adults in the household. This weighting also adjusted for the overlapping landline and cell frames and the relative size of each frame and each sample.[8]

A probability weight was calculated based on the probability of selections from the landline and mobile frames and then standardised by taking the mean of the probability weights to give the design weight.[9]

The second stage of weighting (rim weighting) adjusted key sample demographics to be reflective of the population using the design weight as a pre-weight and rim weighting on the key demographics.[10]

[7] In addition to these sections, a median time of 1.4 minutes was spent introducing the survey and carrying out a person selection (where required) and 1.0 minutes was spent collecting demographic information.
[8] A design weight is used to account for differences in the probability of being selected into the sample. With dual frame telephone surveys, a respondent who owns a mobile and fixed line phone has a higher chance of being selected than a person who just has a fixed line phone or just a mobile. Also, a person living in a household with multiple eligible people has a lower probability of selection than a person living on their own. We need to account for these differences in the probability of selection through our design weight.
[9] By this we mean that the design weights were recalibrated so that they had a mean of 1 and summed to the total sample size prior to running non-response weighting.

The key demographics for non-response were identified as being age by gender (12 bands – see table below), educational attainment (2 bands – university degree or above vs. other) and working status (2 bands – working vs. non-working). Population targets for the key demographics were sourced from official population sources for each country.[11]

Respondents were rim weighted to the population based on these key demographics using the design weight as a pre-weight at a country level. All countries were weighted to the same total weight, meaning that all countries contribute equally to the 'All country average' results included in this report.

Tables 5 and 6 include a comparison of the demographic of the achieved survey sample in each country against the population profile in that country.

Table 7 includes the overall design effect for each country and maximum confidence interval for estimates based on the full sample in each country and at a 95% confidence level.

The design effect is calculated based on the impact of weighting on the survey results for each country; the larger the design effect, the larger the confidence interval around the survey results. The maximum confidence interval is based on an estimate of 50%.[12] For example, if 50% of people in Brazil gave a particular response to a question, we can be 95% confident that the true population value is between 46% and 54%.[13]

[10] Rim (or post stratification) weighting is a method for calculating weights that ensure the marginal totals match population targets. It is a standard method to weight survey data where you are using multiple variables to weight on, e.g. age, working status, educational attainment, region. Rim weighting uses an iterative proportional fitting method to calculate a weight for each respondent that ensures the survey data when weighted replicates the population targets e.g. the % of people aged 18-24 is the same in the sample as the population. For further information, please refer to: https://www.europeansocialsurvey.org/methodology/ess_methodology/data_processing_archiving/weighting.html

[11] For further information on weighting of dual frame telephone surveys please refer to: http://www.aapor.org/Education-Resources/Reports/Cell-Phone-Task-Force-Report/Weighting.aspx and https://surveyinsights.org/?p=5291

[12] The confidence interval reduces as estimates get closer to 0% or 100%. For example, the confidence interval for an estimate of 10% or 90% in Brazil is +/- 2.4%, compared with +/- 4.0% for an estimate of 50%.

[13] The design effect due to weighting is calculated using the Kish approximation. (Reference: Kish, L. (1990). Weighting: Why, when, and how? Proceedings of the Joint Statistical Meetings, Section on Survey Research Methods, American Statistical Association, 121-129. Kish proposed the "design effect due to weighting" as a measure to quantify the loss of precision due to using unequal and inefficient weights.)

Table 5: Profile of achieved sample versus population – age by gender

	Survey %												Population %											
	M 18-24	M 25-34	M 35-44	M 45-54	M 55-64	M 65+	F 18-24	F 25-34	F 35-44	F 45-54	F 55-64	F 65+	M 18-24	M 25-34	M 35-44	M 45-54	M 55-64	M 65+	F 18-24	F 25-34	F 35-44	F 45-54	F 55-64	F 65+
Brazil	7%	17%	12%	9%	6%	4%	8%	12%	11%	8%	7%	3%	8%	11%	10%	8%	6%	5%	8%	11%	11%	9%	7%	7%
France	4%	7%	9%	10%	10%	12%	2%	5%	6%	7%	10%	17%	5%	7%	8%	9%	8%	11%	5%	8%	8%	9%	8%	14%
Germany	5%	8%	8%	11%	11%	12%	4%	5%	7%	8%	10%	11%	5%	8%	7%	9%	8%	11%	4%	7%	7%	9%	9%	14%
Greece	5%	9%	12%	11%	7%	7%	4%	8%	11%	13%	7%	5%	4%	7%	9%	9%	7%	12%	4%	7%	9%	9%	8%	15%
Netherlands	4%	6%	7%	10%	11%	16%	2%	4%	5%	9%	9%	15%	6%	8%	7%	9%	8%	11%	5%	8%	7%	9%	8%	13%
Poland	6%	12%	12%	6%	5%	8%	5%	9%	9%	6%	8%	13%	5%	9%	10%	7%	8%	8%	5%	9%	9%	8%	9%	13%
South Africa	15%	22%	10%	5%	3%	2%	12%	15%	7%	5%	2%	1%	9%	14%	11%	7%	5%	4%	9%	14%	10%	7%	5%	5%
South Korea	4%	15%	14%	12%	11%	8%	5%	11%	7%	5%	5%	4%	6%	8%	10%	10%	9%	8%	5%	7%	9%	10%	9%	10%
Spain	4%	7%	11%	13%	6%	5%	4%	7%	10%	13%	12%	6%	4%	7%	10%	10%	8%	10%	4%	7%	10%	10%	8%	13%
Sweden	3%	7%	9%	11%	8%	19%	2%	4%	8%	8%	6%	16%	5%	9%	8%	9%	7%	12%	5%	8%	8%	8%	7%	13%
USA	6%	8%	7%	8%	12%	16%	3%	4%	5%	5%	7%	16%	6%	9%	8%	8%	8%	9%	6%	9%	8%	8%	9%	12%

Table 6: Profile of achieved sample versus population – educational attainment and working status

	Educational attainment				Working status			
	Survey %		Population %		Survey %		Population %	
	Degree or above	Other	Degree or above	Other	Working	Not-working	Working	Not-working
Brazil	33%	67%	20%	80%	64%	36%	54%	46%
France	61%	39%	32%	68%	53%	47%	52%	48%
Germany	40%	59%	26%	74%	67%	32%	60%	40%
Greece	60%	39%	27%	73%	61%	34%	43%	57%
Netherlands	42%	57%	32%	68%	56%	41%	62%	38%
Poland	50%	49%	25%	75%	62%	36%	55%	45%
South Africa	36%	64%	11%	89%	49%	49%	43%	57%
South Korea	76%	23%	36%	64%	71%	28%	61%	39%
Spain	45%	55%	32%	68%	63%	37%	50%	50%
Sweden	64%	36%	23%	77%	60%	39%	63%	37%
USA	61%	38%	32%	68%	55%	42%	59%	41%

Table 7: Design effects for each country

Country	Design effect	Maximum confidence interval
Brazil	1.69	+/- 4.0%
France	1.78	+/- 4.1%
Germany	1.29	+/- 3.5%
Greece	2.40	+/- 4.8%
Netherlands	1.33	+/- 3.6%
Poland	1.63	+/- 3.8%
South Africa	1.93	+/- 4.3%
South Korea	3.63	+/- 5.9%
Spain	1.39	+/- 3.7%
Sweden	2.31	+/- 4.7%
USA	1.92	+/- 4.3%

2.7 Notes on analysis and interpretation

In this report we present the results from all survey questions based on an overall (all countries) and individual country level. As noted above, the overall results are based on the average results across all countries. This means that all countries contribute equally towards the average, regardless of the number of surveys completed in that country or the population total of the country. The same applies to the EU average results; these are based on the average across the seven EU countries surveyed, regardless of the number of interviews achieved in each country.

Results are also compared between demographic sub-groups. The results at all questions were analysed by gender, age group, and level of education. Selected questions were also analysed based on working status, importance of religion and parental status. We only include comparisons between demographic subgroups in this report where there were significant differences based on two criteria. First, that there was a significant difference in results at an 'all country' level: for example, on average across all countries, men were more likely to hold a certain view than women. And second, that these significant differences hold for the majority of countries surveyed (at least 6 out of the 11 countries). Where one or both of these criteria do not hold, we do not include the subgroup comparisons in the report. If a significant difference holds for most, but not all, countries, we note the exceptions in the report.

Significance tests (t-tests) were conducted on the country level and demographic subgroup results based on a 95% confidence interval. This means we can be 95% certain that any significant differences reported between countries or demographic subgroups reflect true differences in the populations.

Any differences reported are significant at a 95% confidence level.

Due to rounding, charts may not always add to 100%.

3. Awareness of robots and artificial intelligence

3.1 Awareness of robots

Respondents were asked how much they had heard or read about robots, described in the survey as '*...machines designed to perform tasks automatically and by themselves. For example, robots that can perform surgery, or clean the house*'.

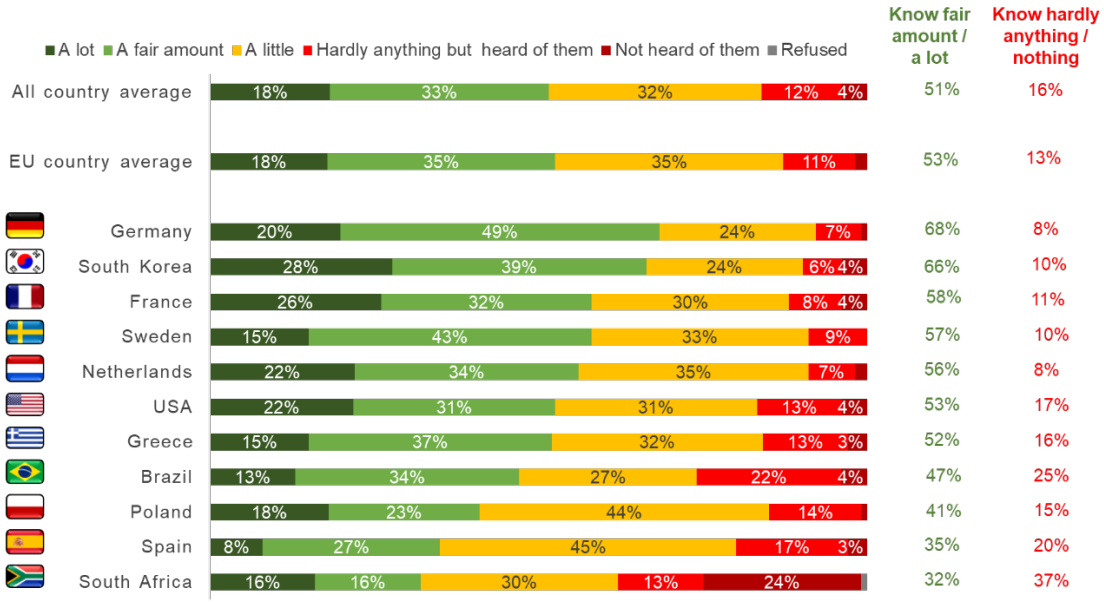
Overall, an average of 96% across all countries included in the survey had heard or read at least something about robots while four per cent had never heard of this. Overall, again based on an all-country average, 18% said they had heard or read 'a lot'; 33% 'a fair amount', 32% 'a little' and 12% 'hardly anything'.

The average across the EU countries surveyed was consistent with the all country analysis: 98% of those surveyed within the EU had heard or read at least something about robots, with 53% having heard or read 'a lot' or 'a fair amount'.

Awareness varied by country. Focussing on the top two categories of this self-reported measure, that is those who had heard or read at least a fair amount about robots, respondents in Germany (68%) and South Korea (66%) were the most knowledgeable. Just under six in ten respondents had heard or read at least a fair amount about robots in France (58%), Sweden (57%), and the Netherlands (56%) whilst this figure was around half of all respondents in the USA (53%), Greece (52%) and Brazil (47%). The countries with the lowest level of awareness based on this combined measure were South Africa (32%), Spain (35%), and Poland (41%).

The proportion of respondents who had heard or read hardly anything or nothing at all about robots was much higher in South Africa and Brazil when compared with other countries. Just over one in three respondents in South Africa (37%) and one in four respondents in Brazil (25%) said they had heard or read hardly anything or nothing at all about robots. In South Africa, a quarter (24%) had never heard of robots which is substantially higher than any country (in all other countries this proportion was less than 5%).

Figure 1: Level of awareness about robots



Q019: AI_Q1 Before today, how much, if anything, had you heard or read about robots?
Base: all respondents.

Based on an equal-weighted country average, men had a higher level of self-reported awareness about robots than women. Overall 61% of men compared with 43% of women considered they had heard or read either a lot or a fair amount about robots and a similar pattern of results was found across all surveyed countries.

Awareness also increased in line with education level. Based on an equal-weighted country average, respondents with university-level qualifications were much more likely (62%) than those with lower or no educational qualifications (48%) to have heard or read at least a fair amount about robots. Similar educational divides in levels of awareness were seen across almost all survey countries[14].

3.2 Awareness of artificial intelligence

Respondents were also asked how much they had heard or read about artificial intelligence, described in the survey as *'…computer programs that can do tasks normally performed by people. For example, personal assistants in smartphones, like Siri, software used in self-driving cars, and computer programs that can learn to recognize faces'*.

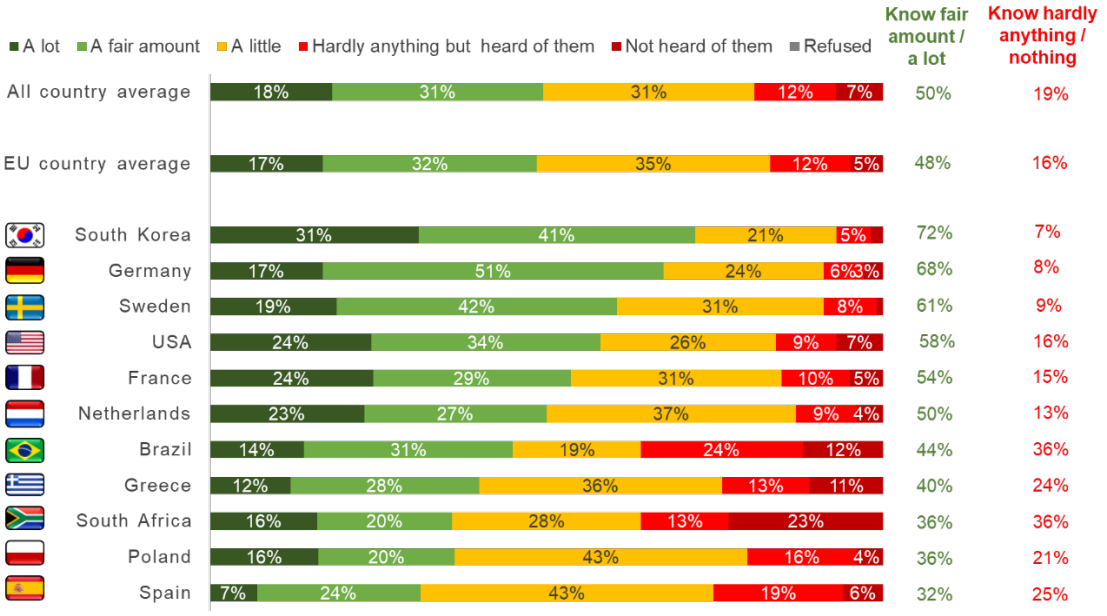
[14] Similar significant findings were noted in all countries with the exception of Sweden, where a similar difference was noted (63% university-educated vs 56% with lower-level qualifications) but this was not significant.

Based on an average across all survey countries, the level of awareness for artificial intelligence (AI) was similar to that of robots: 18% said they had heard or read 'a lot'; 31% 'a fair amount', 31% 'a little', 12% 'hardly anything' and seven per cent had never heard of AI. Compared with robots, a slightly higher proportion of respondents said that they had never heard of AI (7% compared with 4% who had never heard of robots).

Once again, there was little variation between the average of EU surveyed countries and the all country average on this measure. Across the EU countries surveyed, an average of 48% of respondents knew either 'a lot' or 'a fair amount' about AI.

Results by country followed a similar pattern to that of robots. Respondents in Germany (68%) and South Korea (72%) were most likely to have heard or read at least a fair amount, while respondents in Spain (32%), South Africa and Poland (both 36%) were least likely to know at least a fair amount. As with knowledge about robots, respondents in South Africa and Brazil were the most likely to say they knew hardly anything or nothing at all about robots (both 36%), while respondents in South Africa were markedly more likely than all other countries to have no knowledge about AI at all: 23% of respondents in South Africa had never heard of AI while this figure was between 1% and 12% in all other countries.

Figure 2: Level of awareness about artificial intelligence (AI)



Q022: AI_Q3 Before today, how much, if anything, had you heard or read about artificial intelligence?
Base: all respondents.

The pattern of self-reported awareness of AI by demographic subgroups was similar to the pattern found for awareness of robots. Based on an equal-weighted country average, 59% of men compared with 41% of women considered they had heard or read either a lot or a fair amount about AI, and a similar difference was noted in all survey countries. However, compared with robots, the gap in knowledge about AI by educational attainment was even wider. Respondents with a university-level qualification (65%) were more likely than those with lower-level educational qualifications (45%) to know at least a fair amount. These gender and educational divides were consistent across all countries except Sweden where there was no difference by education level.

There was also an age differential within most countries in the sample. Based on an equal-weighted country average, respondents aged 18-34 were the most aware (59% knew at least a fair amount) while respondents aged 55 or over were the least aware (42%). Similar differentials were observed in all countries with the exception of Germany and South Africa, where there was no difference between the 18-34 and 55+ age groups.

4. Perceptions of robots

The survey measured public perception of the extent to which robots should be developed to resemble humans, which can be through their physical appearance, the ways they interact with humans, or the roles they take on in society. Respondents across all countries were asked to consider their degree of acceptance towards this in two scenarios: firstly, the extent to which robots used in the workplace or public places should be made to resemble humans; and secondly, the extent to which they feel it is acceptable for people to have a robot as a romantic partner.

4.1 Level of acceptability towards the idea that robots should resemble humans

In all countries, respondents were asked how much they agreed or disagreed with the following statement: '*If robots are used in the workplace and in public places it would be okay if they were made to look and behave like human beings'.*

The all-country average indicates that, overall, citizens were more negative than positive about the idea of robots taking on human-like features.

Across all countries, an average of 29% of respondents either strongly agreed or tended to agree that it would be okay for robots used in the workplace or public places to look and behave like human beings, with only 10% agreeing strongly that this would be acceptable.

Based on the average across EU countries included in the survey, EU respondents were slightly more negative on this measure: 25% agreed that it would okay for robots used in the workplace to resemble humans (and 7% strongly agreed with this).

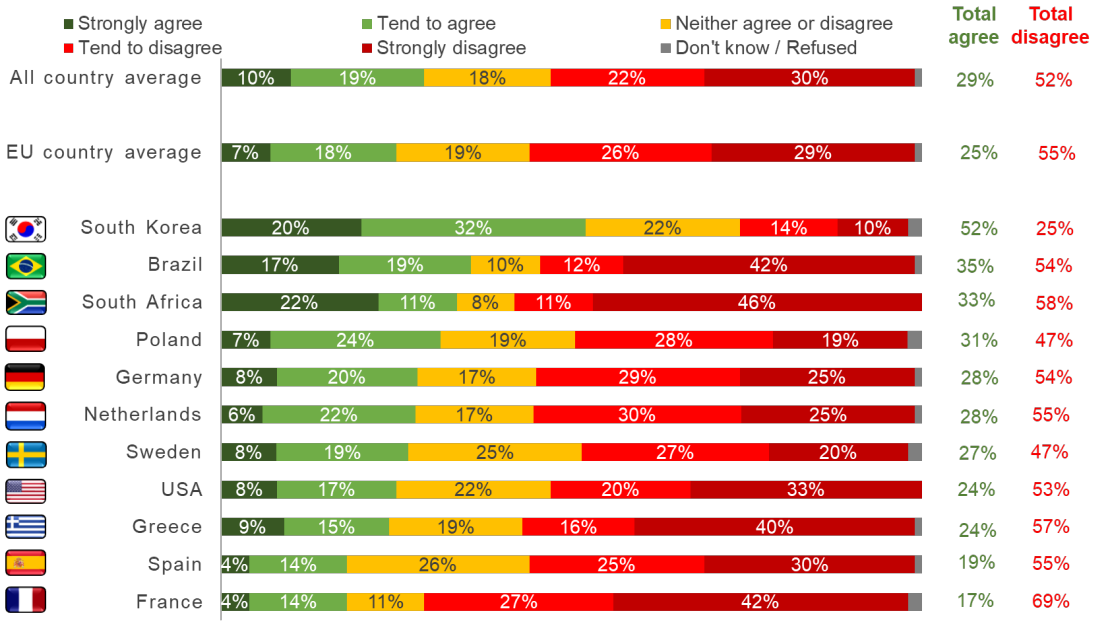
There was considerable variation by country. South Korea stood out as the only country surveyed which was more favourable than unfavourable about the concept of human-like robots in workplaces and public spaces: in fact they were twice as likely to agree (52%) than disagree (25%) that this was acceptable, and 20% agreed strongly that they were in favour of human-like robots.

Other countries with higher than average levels of acceptability towards the concept of robots used in society looking and behaving like humans included Brazil (35% overall agreement) and South Africa (33% overall agreement).

In many European countries, and in the USA, the level who agree that it would be okay for robots to look and behave like human beings was in the region of around 25%-30% (Poland, Germany, Netherlands, Sweden, USA, Greece). At the other end of the scale, respondents in France and Spain (17% and 19% respectively) were the least likely to agree with this development.

France stood out as the country which was most negative about the idea of robots developing human-like qualities. Overall, 69% disagreed that it would be acceptable for robots to look and behave like humans in workplace and public settings. South Africa was the most polarised country in terms of opinions, with 33% agreeing that this was acceptable and 58% disagreeing.

Figure 3: Level of acceptance towards the idea that robots used in workplaces and public places should be made to look and behave like humans



Q030: AI_Q10 To what extent do you agree or disagree with each of the following statements? "If robots are used in the workplace and in public places it would be okay if they were made to look and behave like humans"
Base: all respondents.

Based on an equal-weighted country average, men were more willing than women to accept the idea of robots used in the workplace or public places looking and behaving like human beings: 36% of men either strongly agreed or tended to agree that this was acceptable compared with 22% of women. This finding was replicated across all countries.

Respondents who considered themselves knowledgeable about robots tended to be more supportive of this idea: 42% of those who said they had heard or read 'a lot' about robots agreed with this concept compared with 22% of those who knew hardly anything or nothing at all about robots. Again, this trend was also observed within most of the individual survey countries[15].

[15] This difference was significant in all countries except Poland, France and South Africa

4.2 Level of acceptability towards the idea of robots as a romantic partner

The concept of robots acting in the role of romantic companion was also explored. In all countries, respondents were asked how much they agreed or disagreed that '*It's acceptable if people have a robot as a romantic partner, that is a girlfriend or boyfriend'.*

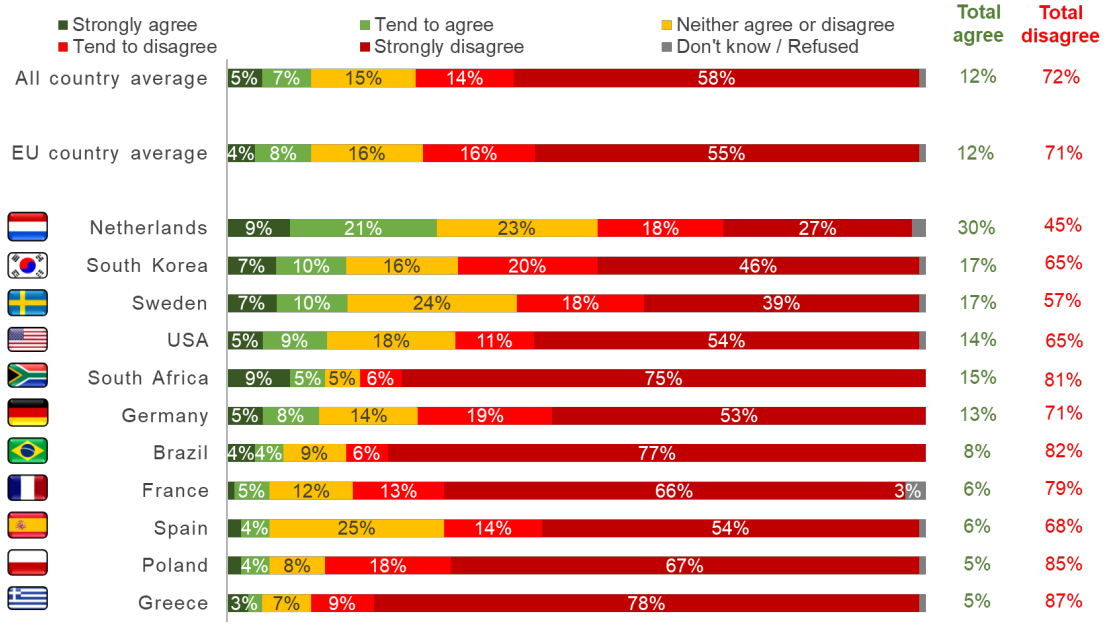
Across all countries there was widespread rejection of this concept. Based on an all-country average, only 12% agreed that they found this acceptable (5% strongly agreed and 7% tended to agree) and 72% found this unacceptable (14% tended to disagree and 58% strongly disagreed).

The average across EU countries surveyed was similar: 12% agreed that having a robot as a romantic partner would be acceptable, whilst 4% strongly agreed.

There was wide variation by country in terms of levels of acceptance to the idea of robots as romantic partners. The Netherlands was the most accepting, with 30% agreeing that this was acceptable. Other countries with a higher than average level of support included Sweden and South Korea (both 17%), the USA (15%), South Africa (14%) and Germany (13%). There were several countries where the level of agreement towards this being acceptable was below 10%: Brazil (8%) Spain (6%), France (6%) Poland (5%), Greece (5%).

The countries which expressed the strongest negativity towards this concept, as measured by the proportion who disagreed strongly that it would be acceptable to have a robot as a romantic partner, were Greece (78%), Brazil (77%), and South Africa (75%).

Figure 4: Level of acceptance towards the idea that people should be allowed robots as a romantic partner



Q030: AI_Q10 To what extent do you agree or disagree with each of the following statements? "It's acceptable if people have a robot as a romantic partner, that is a girlfriend or boyfriend"
Base: all respondents.

Based on an equal-weighted country average, men (16%) were slightly more likely than women (9%) to find the idea of robots as a romantic partner acceptable, and similar gender differences were observed in many, although not all, countries[16].

Again, based on an equal-weighted country average, respondents aged 55 or over were less likely than respondents aged 18-34 to find the idea of robots as a romantic partner acceptable: 78% of respondents aged 55 or over disagreed that this was acceptable compared with 65% of respondents 18-34. A similar finding was observed in many, but not all, countries[17].

Religion was also associated with the level of acceptance towards robots in the role of a romantic partner. Again, based on an equal-weighted country average, seven in ten respondents (68%) who considered that religion was an important part of their life strongly disagreed that this was acceptable, compared with 42% of those who said that religion was not an important part of their life[18].

These wider demographic patterns by age and religion[19] were reflected within all countries included in the survey.

[16] Men were more likely than women to find robots as a romantic partner acceptable in all countries except Germany, Greece & South Africa where no differences were observed.
[17] People age 55+ were less likely than those aged 18-34 to find this acceptable in all countries except Netherlands, South Korea and South Africa where no differences were observed
[18] A similar finding was observed in all countries except South Korea where there was no significant difference on this measure by religion.
[19] In Poland, the difference by age group in the proportion who disagreed that a robotic romantic partner was acceptable was not significant. In South Korea, the differences in the proportion who strongly disagreed with this between those who said religion was important vs non-important was also not significant.

5. Perceptions of intelligent machines

People were asked about their expectations of the future of intelligent machines in society, where intelligent machines were defined as encompassing both robots and artificial intelligence.

Respondents responding to the survey were asked to what extent they thought that each of the following would happen within the next 20 years:

- Intelligent machines will understand and communicate as well as humans
- Intelligent machines will be able to replace professionals like scientists, teachers, doctors or lawyers.

5.1 Views on the ability of intelligent machines to communicate as well as humans

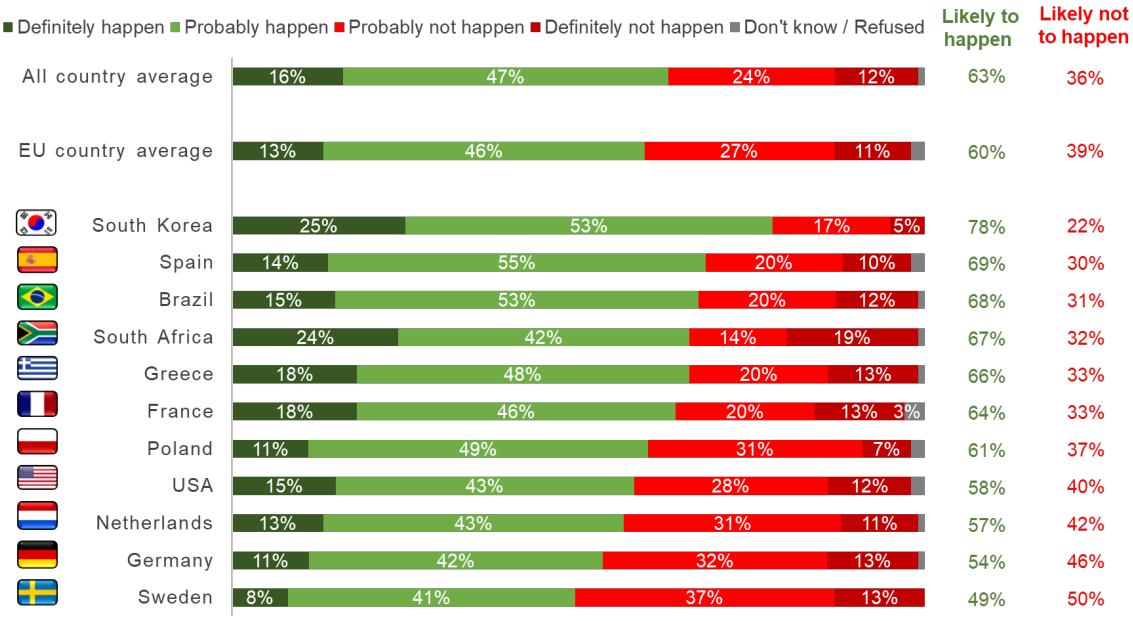
All respondents were asked how likely or unlikely they considered that in the next 20 years *intelligent machines will understand and communicate as well as humans.*

On balance, across all survey countries, a higher proportion of respondents thought it likely (63%) rather than unlikely (36%) that intelligent machines would develop the capability for intelligent communication on a par with humans within the next 20 years. However, respondents were more likely to consider this probable, rather than certain. Overall, based on an all-country average, 16% thought that intelligent machines would 'definitely' understand and communicate as well as humans, while 47% thought that this would 'probably' happen. At the opposing end of the scale, 24% considered that this 'probably' wouldn't happen and 12% felt it 'definitely' wouldn't happen.

Based on an average of all EU countries surveyed, 60% thought it was likely intelligent machines would understand and communicate as well as humans in 20 years (compared to an all country average of 63%).

By country, respondents in South Korea were substantially more likely than respondents in other countries to anticipate a future in which intelligent machines can understand and communicate as well as humans. Overall, eight in ten South Koreans (78%) anticipate this will 'definitely' or 'probably' happen within the next twenty years. Other countries where relatively high proportions of respondents view this as likely include Spain (69%), Brazil (68%), South Africa (67%), Greece (66%) and France (64%). In Poland, the USA and the Netherlands, respondents were somewhat more likely than unlikely to anticipate the development of this technology (61%, 58% and 57% respectively). In Germany and Sweden, respondents were more evenly divided with around half (54% and 49% respectively) predicting that communications technology will be on a par with humans.

Figure 5: Perceived likelihood that intelligent machines will understand and communicate as well as humans in the next 20 years



Q025: AI_Q5 How likely or unlikely do you think each of the following is to happen within the next 20 years? 'Intelligent machines will understand and communicate as well as humans'
Base: all respondents.

Overall, there was no variation on this measure by age, gender or education. In general, this was true within all countries though there were some demographic differences within individual countries[20].

[20] In Poland and France, men were more likely than women to think that this development was likely (Poland: 69% vs 53%; France: 69% vs 60%). In South Korea adults aged 55+ were more likely than adults aged 18-34 to think this was likely (83% vs 71%), while in Sweden adults aged 55+ were less likely than people aged 18-34 to think this was likely (43% vs 57%). In Germany, Spain and Sweden, university-educated adults were less likely to think this development was likely (Germany: 47% vs 56%; Spain: 63% vs 71%; Sweden: 43% vs 51%).

5.2 Views on intelligent machines replacing professions

All respondents were asked how likely or unlikely they considered a scenario where in the next 20 years *intelligent machines will be able to replace professionals like scientists, teachers, doctors or lawyers*

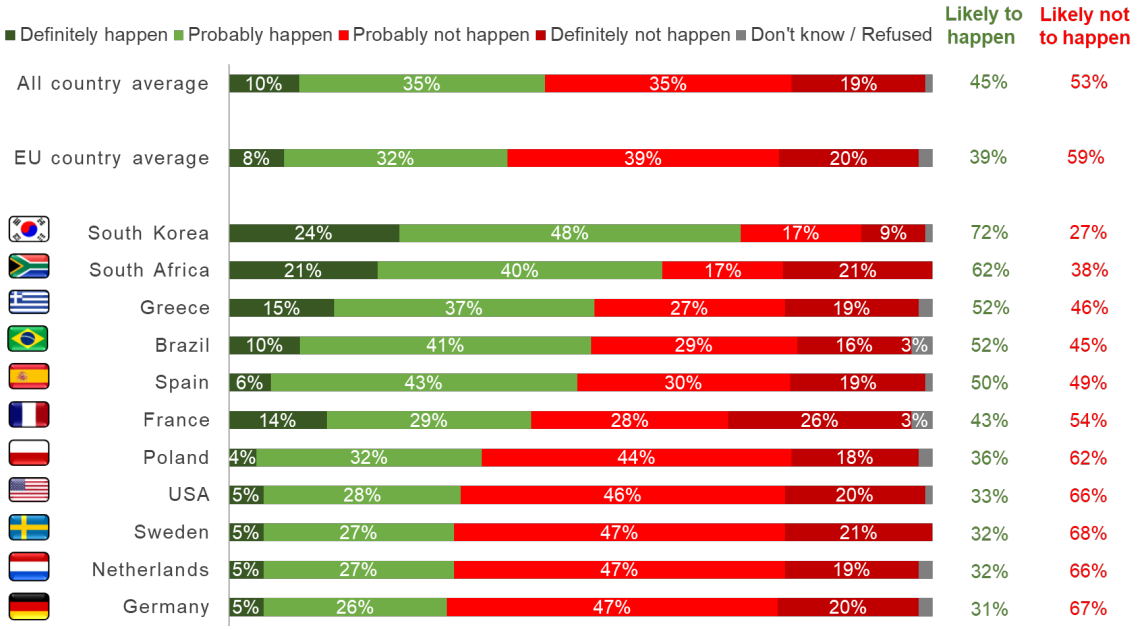
Compared with expectations of intelligent communication, respondents across all survey countries were more evenly divided in their opinions about the likelihood of intelligent machines replacing these types of skilled professionals within the next 20 years. On balance, based on an all-country average, respondents were slightly more likely to think this definitely or probably *won't* happen (53%) than it probably or definitely *will* happen (45%) within the next 20 years. However, as with the previous measure, people are more likely to give a 'probable' than a 'definite' response. Overall, based on an all-country average, 10% feel that this will 'definitely happen', 35% feel it will 'probably happen', 35% 'probably not happen' and 19% 'definitely not' happen.

Based on an average of EU countries in the survey, 39% thought that it was likely intelligent machines would be able to replace skilled professionals in the next 20 years, and 59% thought this was unlikely.

There was substantial variation by country on this measure. Respondents in South Korea anticipate the most rapid advancement of technology in the area of intelligent machines replacing skilled professionals. Seven in ten South Koreans (72%) think this is likely to happen, with 24% thinking this will 'definitely happen'. There were three other countries where respondents were more likely to consider this development will rather than won't happen within the next 20 years. These were South Africa (62% vs 38%), Brazil (52% vs 45%) and Greece (52% vs 46%)

In most other countries, the balance of opinion was in the other direction with people more inclined to think this won't happen than will happen. Countries where respondents were least likely to think this will definitely or probably happen were Germany (31%), Netherlands (32%), Sweden (32%), USA (33%), and Poland (36%). In all these cases, around a third were of the view that intelligent machines would be sufficiently developed to replace skilled professionals such as doctors and lawyers within the next two decades. In Spain, opinion was more evenly split (50% vs 49% thinking it will vs won't happen in this time frame).

Figure 6: Perceived likelihood that intelligent machines will replace professionals such as scientists, teachers, doctors, lawyers etc. in the next 20 years



Q025: AI_Q5 How likely or unlikely do you think each of the following is to happen within the next 20 years? 'Intelligent machines will be able to replace professionals like scientists, teachers, doctors or lawyers.'
Base: all respondents.

At an overall level, there was no statistically significant variation on this measure by gender, age, education and working status. While this was the same in most countries, in three countries a different pattern emerged. In Spain, USA and France, university-educated respondents were less likely than respondents with lower-levels of education to predict that intelligent machines will replace skilled professionals. Also, within Spain and France, those who were working were less likely to predict this than those who were not working. There were also some age differences in a small number of countries, but there was no consistent pattern.

6. Impact of intelligent machines on society

Respondents were asked to consider a range of possible impacts based on a future where intelligent machines become more commonplace. Respondents in the survey were first asked to consider the following three potential impacts:

- Whether this will result in increased or reduced inequalities between rich and poor
- Whether this will result in people having more or less control over their own decisions and actions
- The extent to which their country will be different in 20 years' time

And finally, respondents were asked to provide a rating to indicate how positive or negative they felt about the impact intelligent machines might have on their country.

The findings for these four measures are covered below.

6.1 Impact of intelligent machines on inequalities between rich and poor

Respondents were asked: *If intelligent machines were able to perform most of the jobs currently done by humans, do you think this would result in more inequality between rich and poor, less inequality, or would there be no difference compared to now?*

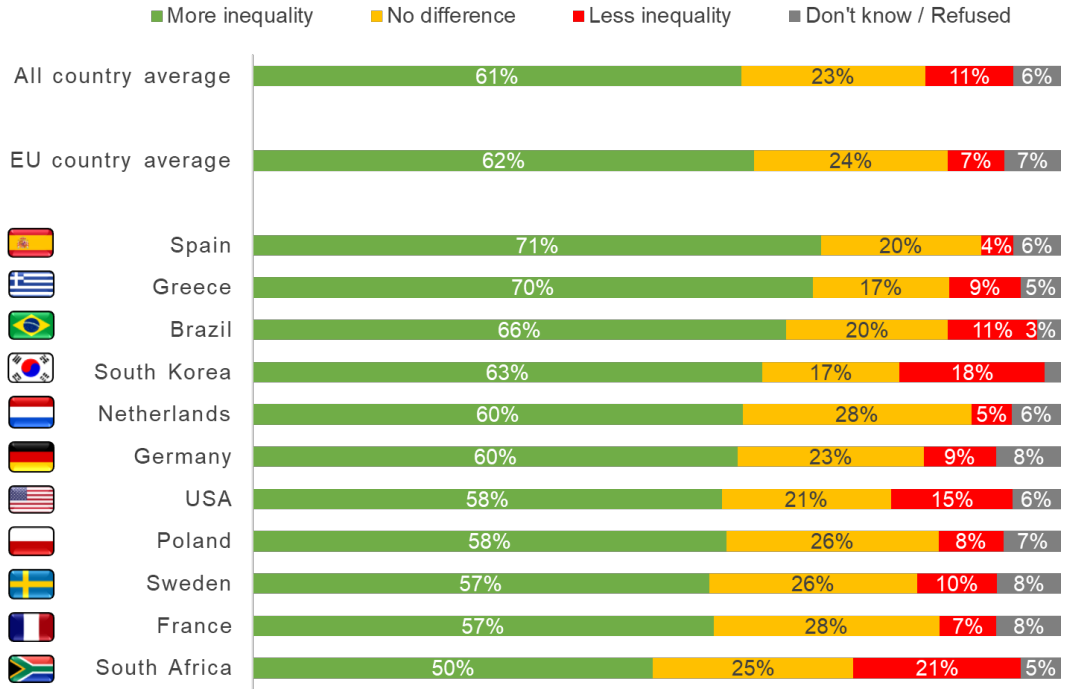
Based on an all-country average, six in ten (61%) expected that more widespread use of intelligent machines in the workplace would lead to greater levels of economic inequality than today. Only 11% felt that inequalities would be reduced, while 23% felt that there would be no difference.

The findings based on an average of EU countries included in the survey were very similar: 62% expected that more widespread use of intelligent machines in the workplace would result in more inequality. Only seven per cent thought this would lead to a reduction in inequality, and 24% thought that there would be no impact on inequality.

In almost all countries, most respondents felt that more widespread use of intelligent machines would lead to greater economic inequalities, with levels varying between 57% and 71%. The only exception to this was South Africa where 50% felt that there would be greater inequalities. Compared with other countries, a much higher proportion of South Africans (21%) considered that a proliferation of intelligent machines in the workplace would instead result in reduced inequalities.

The countries which were most likely to consider that more widespread use of intelligent machines in the workplace would increase inequalities between rich and poor were Spain (71%), Greece (70%), Brazil (66%) and South Korea (63%). Respondents in the Netherlands had the highest proportion of respondents thinking that more widespread intelligent technology would have no impact on levels of economic inequality (28% of Dutch citizens considered that there would be difference compared to 23% overall).

Figure 7: Whether people feel that more widespread use of intelligent machines in the workplace will result in more or less inequality between rich and poor



Q024: AI_Q4 If intelligent machines were able to perform most of the jobs currently done by humans, do you think this would result in […] between rich and poor
Base: all respondents.

Attitudes towards the level of inequality posed by the intelligent machines in the future remained relatively stable across all demographic subgroups, based on an equal-weighted all-country average. At an overall level, differences between demographic subgroups such as age, gender, working status, and education were small, and while there was some demographic variation within individual countries there was no consistent pattern.

However, there was a strong association between overall feelings about the impact of intelligent machines on society and views about the impact of intelligent machines on inequalities. Seven in ten (69%) of those who had a negative overall opinion of the impact of intelligent machines on society felt that increasing use of intelligent machines would lead to greater economic inequality. This compares with 52% of respondents with a positive overall option. This general trend was observed in all countries with the exception of South Africa, where there was no difference.

6.2 Impact of intelligent machines on level of control over decisions and actions

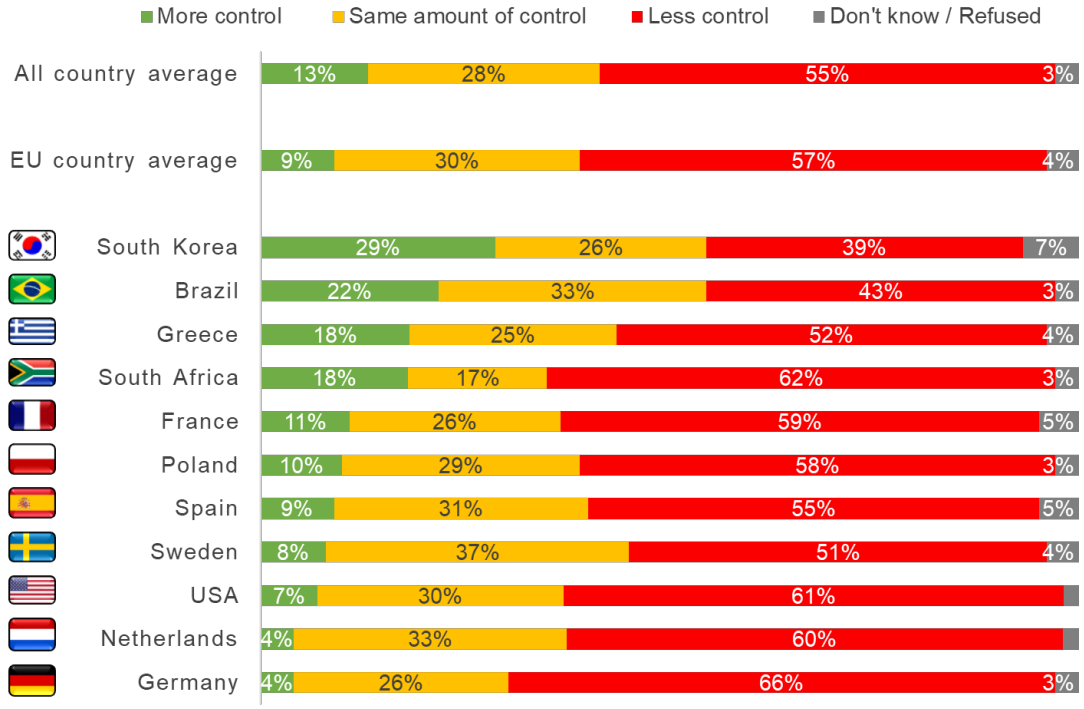
Respondents were asked: *Now imagine that intelligent machines are used everywhere in [*your country*], for example the workplace, home, schools, shops, banks and restaurants. Do you think people would have more control over their own decisions and actions, less control, or the same amount of control?*

Based on an all-country average, just over half (55%) expected that more widespread use of intelligent machines would lead to people having *less* control, while 28% thought there would be no change compared to now. Only 13% considered that more widespread use of intelligent machines would lead to people having *more* control.

The results based on the EU survey country average were similar although, compared with the all-country average, a slightly lower proportion thought that this would lead to more control. Overall, 57% expected that this would lead to *less* control, 9% to *more* control, and 30% thought it would make no difference.

Across most countries, the proportion of respondents feeling that increased use of intelligent machines would lead to people having less control was between 50% and 60%. However, in Germany (66%) and South Africa (62%) a higher proportion of respondents thought that this would lead to people having less control in society. On the other hand, respondents in Brazil (43%) and South Korea (39%) were less likely than the all-country average to feel that more widespread use of intelligent machines would lead to lower levels of control in society. Instead they were more likely than other countries to feel that people would have more control over their decisions and actions (29% of South Korean respondents and 22% of Brazilian respondents thought this).

Figure 8: Whether people feel that more widespread use of intelligent machines in [your country] will lead to people have more or less control over their decisions and actions



Q027: AI_Q7 Now imagine that intelligent machines are used everywhere in [COUNTRY], for example the workplace, home, schools, shops, banks and restaurants. Do you think people would have.....over their decisions and actions?
Base: all respondents.

There was an association between overall feelings about the impact of intelligent machines on society and views about the impact of intelligent machines on people's level of control.

Based on an equal-weighted country average, three-quarters (74%) of those who had a negative overall opinion of the impact of intelligent machines on society felt that increased use of intelligent machines would lead to people having less control over their decisions and actions. This compares with only 42% of respondents with a positive overall option. Those who felt more positively about the impact of intelligent machines on their society were instead more likely to consider that intelligent machine would give people more control (17% vs 8% of those with a negative overall opinion) or the same level of control as now (38% vs 14% of those with a negative opinion). This general trend was observed within many but not all survey countries [21].

[21] These significant differences were noted in the following countries: Greece, South Africa, Spain, Sweden, USA, Netherlands and Germany

6.3 Whether intelligent machines will lead to changes in survey countries

Respondents were asked: *If intelligent machines become more widespread, in 20 years do you think that* [your country] *will be completely different, somewhat different, not very different or not different at all?*

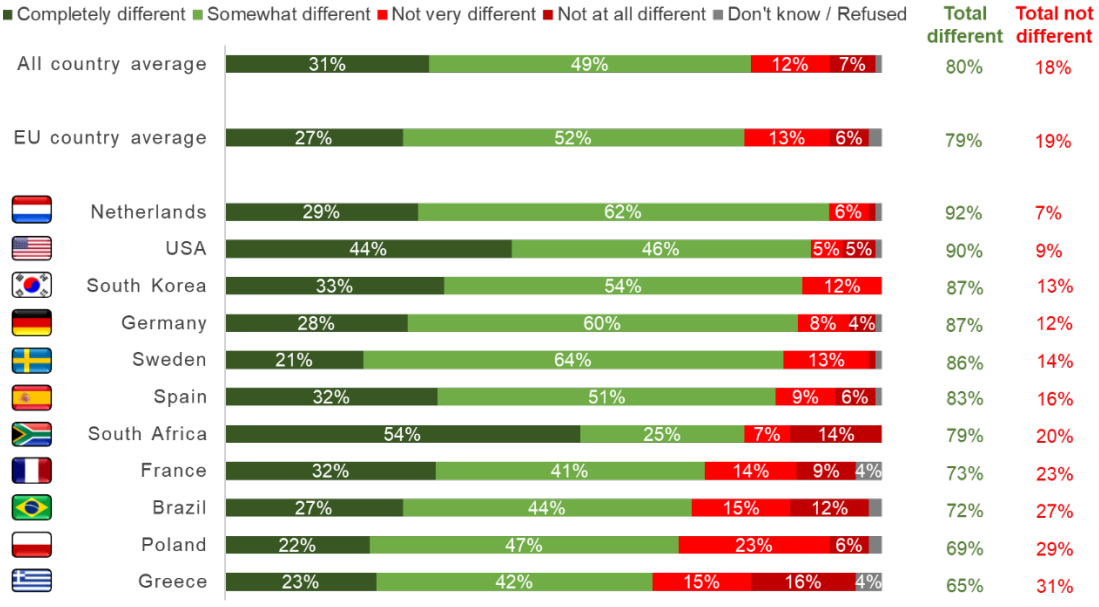
Based on an all-country average, the large majority of respondents (80%) predicted that their country would be different in 20 years if intelligent machines became more widespread; 31% thought that society would be 'completely different' and 49% thought it would be 'somewhat different'.

Based on an average of all EU countries, 79% thought that their country would be different if intelligent machines became more widespread, while 19% said that their country would not be different.

Countries which were particularly likely to anticipate changes in society were the Netherlands (92%), USA (90%) Germany (88%), South Korea (87%) and Sweden (86%). On the other hand, Greece (65%), Poland (69%) and Brazil (72%) were less likely than the all-country average to think society would change, though there was still an overall majority who held this viewpoint.

Respondents in South Africa and the USA were most likely to think that more widespread use of intelligent machines would lead to their country being 'completely different' (South Africa 54%, USA 44%). The countries which were most likely to feel that this would lead to no change at all were Greece (16%) and South Africa (14%). This illustrates that, as with other survey measures, South Africans tend to have more polarised views compared with other countries.

Figure 9: Perceptions on how different [your country] will be in 20 years if intelligent machines become more widespread



Q026: AI_Q6 If intelligent machines become more widespread, in 20 years do you think that [COUNTRY] will be…
Base: all respondents.

6.4 Overall opinion on the impact of intelligent machines in survey country

Respondents were asked to rate their degree of support or opposition to the idea of intelligent machines on society: *Thinking about the impact intelligent machines might have on* [your country] *overall how positive do you feel about this? Please answer on a scale of zero to 10, where zero is 'not at all positive' and 10 is 'completely positive'.*

For the purposes of this report, the scores have been grouped as follows:

Score of 0-2: Strongly negative	Negative
Score of 3-4: Moderately negative	
Score of 5: Neutral	Neutral
Score of 6-7: Moderately positive	Positive
Score of 8-10: Strongly positive	

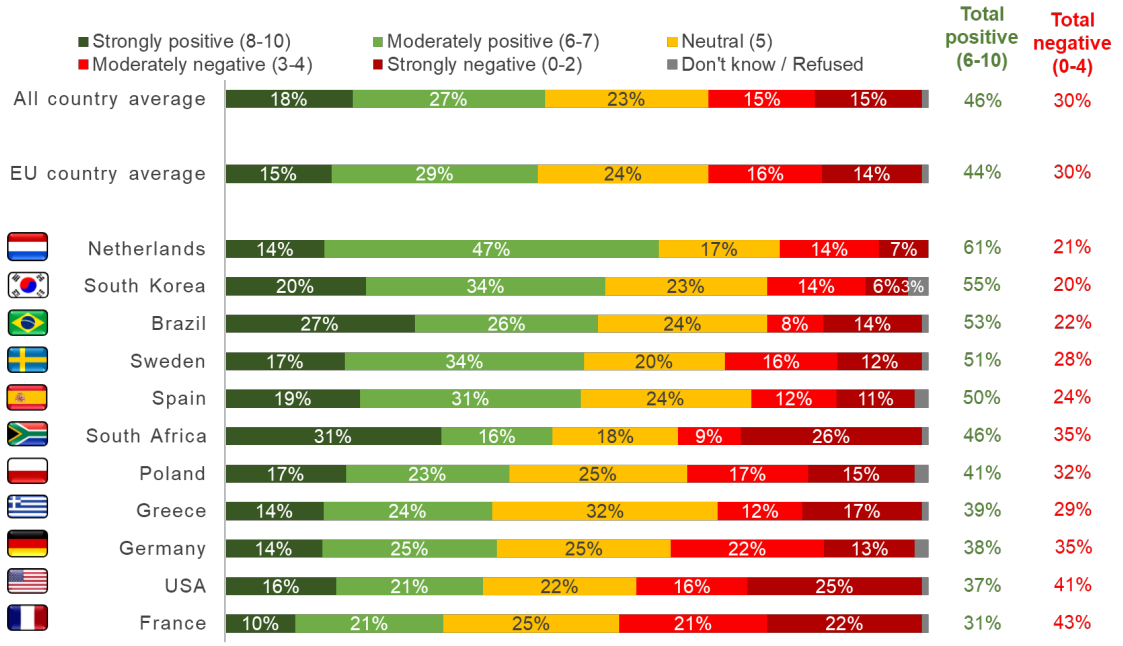
On balance, based on an all-country average, respondents were more positive than negative about the impact of intelligent machines on their country. Just under half (46%) gave a positive score of between 6 and 10 while 30% gave a negative score in the range 0 and 4 and a quarter (23%) gave a neutral score of 5.

The results were very similar for the EU survey countries as a whole. Based on an average of all surveyed EU countries, 44% gave a positive score when asked about the impact of intelligent machines on their country, compared to 30% who gave a negative score.

Countries with the most positive outlook, as measured by the proportion who gave a rating in the range 6 to 10 were the Netherlands (61%), South Korea (55%), and Brazil (53%). The countries which were most likely to give a strongly positive score of 8-10 were South Africa (31%) and Brazil (27%).

Countries with the most negative outlook, as measured by the proportion who gave a rating in the range 0 to 4 were France (43%) and the USA (41%). The countries most likely to give a strongly negative score in the range of 0-2 were South Africa (26%), the USA (25%), and France (22%). Respondents in South Africa were both the most strongly positive and the most strongly negative, again indicating a polarisation of opinion on the topic of intelligent machines.

Figure 10: Overall opinion about the impact of intelligent machines on [your country]: rating on a scale of 1-10



Q031: AI_Q11 Thinking about the impact intelligent machines might have on [COUNTRY], overall how positive do you feel about this? Please answer on a scale of zero to 10, where zero is 'not at all positive' and 10 is 'completely positive'.
Base: all respondents.

Across most survey countries, overall levels of positivity or negativity towards the impact of intelligent machines on society was associated with age, gender, education, religion and level of knowledge about AI.

Based on an equal-weighted country average, men were more positive than women (55% compared with 37% gave a score of 6-10). This finding was observed within all survey countries, with the exception of Brazil where there was no difference between men and women on this score.

Across most countries covered in this study, respondents aged 18-34 were more positive than respondents aged 55+ (54% compared with 39% gave a score of 6-10). While a similar pattern was reflected across most countries in the survey sample, in Brazil and France the opposite pattern emerged. In Brazil, older respondents were more positive than younger respondents (64% of Brazilian respondents aged 55+ gave a positive score of 6-10 compared with 50% of Brazilian respondents aged 18-34) while in France, younger respondents were more negative than older respondents (though this finding was not significant).

In general, more educated respondents were more positive about the impact of intelligent machines on society than less educated respondents (54% of university-educated respondents vs 42% of

respondents with lower qualifications gave a score of 6-10)[22]. In South Africa, level of education was not associated with positive scores, although those with below-university level qualifications were more negative than university-educated respondents which indicates a trend in the same direction. In Sweden, there was no difference in levels of positivity or negativity by education.

Across all countries, respondents who knew either 'a lot' of 'a fair amount' about AI were more positive about the impact of intelligent machines on society than respondents who knew 'hardly anything' or 'nothing at all'. Across most countries[23], 54% those who knew at least a fair amount about AI gave a positive score of 6-10 compared with 34% of those who knew hardly anything or nothing at all. This finding was replicated across all constituent survey countries[24].

[22] A significant difference in this direction was noted in all countries except South Africa and Sweden
[23] All countries except South Africa where there was no difference
[24] In South Africa, there was no difference between these two groups in terms of those giving a positive score. However, those who knew hardly anything or nothing at all about AI were more likely than those who knew a at least a fair amount to give a negative score (37% compared with 29%) which indicates a similar trend to the overall pattern.

7. Conclusion

Artificial intelligence is a technology that can perform tasks that would otherwise require human intelligence, while a robot is a machine that completes complex tasks. Together, these intelligent machines are increasingly transforming society and are being used in a widening number of applications including healthcare, social care, transport, manufacturing, advertising, and finance.

As these technologies become more complex and sophisticated, they have the potential to transform and disrupt the way in which we live our lives. This poses a range of social, legal and ethical challenges in society. Against this backdrop, the SIENNA project has generated first insights into public awareness and opinions of using these emerging technologies in 2019 and provides a comparison across countries both within and outside the EU. In this conclusion, we first discuss findings at a very broad level. We then consider general patterns of results by country and by demographic subgroups such as age, gender and education.

Awareness

Across nearly all countries, awareness of these technologies was near-universal, with over nine in ten having at least heard of robots and AI. However, although respondents were broadly familiar with the concept of AI and robots, few had a deep understanding of it. Based on an all-country average, only around half considered themselves to be reasonably well informed about these technologies, that is having heard or read at least a fair amount about, while around a fifth said that they had heard or read 'a lot'.

Future expectations

Despite these relatively low levels of knowledge, respondents in most countries anticipated a rapid development in the capabilities of these technologies. In almost all survey countries, over half predicted that intelligent machines will understand and communicate as well as humans in the next two decades (over the 11 countries, the proportion thinking this likely ranged from c. 50-80%). However, people were more reticent about the ability of intelligent machines to replace skilled professionals like scientists, teachers, doctors and lawyers (over the 11 countries, the proportion thinking this likely ranged from c. 30-70%). The high level of country variability on the latter measure indicates that this perception is much more context-specific (see discussion below).

Humanisation of robots

Increasingly, robots are being developed to mimic human appearance and actions. This can be through physical resemblance, the way they interact with humans, or the roles they take on in society. Robotics specialists view this development as enabling more natural human-robot interactions, and helping to foster increased levels of trust and acceptance of robots in society. However, concerns have been expressed about this (see Robert, 2017).

We measured public opinion towards two possible scenarios: one where robots used in workplaces and everyday life would look and behave more like humans; and one where a robot takes on the role of romantic partners. Across almost all countries, people were more negative than positive about the humanisation of robots in these scenarios. With the exception of South Korea and France (which stood as anomalies at either end of the spectrum - see below), around 20-35% agreed that humanisation of robots in everyday life was acceptable, while around 50% disagreed. The development of robots as a romantic partner was even more widely rejected. In all 11 countries,

more people disagreed than agreed that this was acceptable, and levels of opposition ranged from 45% to 87%.

Impact on society

Most people recognised that more widespread use of intelligent machines will be accompanied by changes to the societies in which they live. Across the 11 countries, between 65% and 90% recognised that their country would be different in 20 years' time However, this transformation was not necessarily regarded as positive. The survey elicited opinion on two potential risks of increased automation in everyday life and in the workforce: the potential for this to widen inequalities between rich and poor; and the potential for people to lose the autonomy to make decisions for themselves.

Across most countries, people were on balance more negative than positive about these potential impacts. So, in most countries, majorities of people considered that more widespread automation in the workplace would widen inequalities and would lead to people having less control over their own decisions and actions.

However, when asked to weigh up their overall opinion of the impact of intelligent machines on society, on average people were more positive than negative. Based on an all-country average, around half gave a positive score, around a third gave a negative score, and around a quarter gave a neutral score. This indicates that, while there is still a fair degree of scepticism and concern about these technologies, there is also a cautious optimism.

Variation by country

The findings above indicate overall trends towards perceptions of these technologies. However, these findings mask some wide variation by country. Across all survey measures some clear patterns emerged.

Countries with higher levels of awareness, expectation, and acceptance of intelligent machines

South Korea stood apart from most other countries in terms of both awareness and acceptance towards these new technologies. Compared with most other countries, South Koreans were: more knowledgeable about AI; most likely to anticipate a near-future in which intelligent machines take on more human roles; more accepting about robots resembling humans both in everyday life and as romantic partners; most likely to think increased used of intelligent machines will lead to people having more autonomy; and more likely to see the increased use of intelligent machines as a positive development in society.

While not generally as positive as South Korea, *Brazil* also stood out as being more positive than other countries in many areas, for example being more likely than most other countries to predict that AI and robots will take over more skilled human tasks, to view the increased humanisation of robots in everyday life as acceptable, and to see intelligent machines as a positive development overall. *South Africa* was also more positive than average on several of these measures, although, as noted below, views in South Africa tended to be much more polarised.

Aside from South Korea, *Germany* and *Sweden* also displayed higher than average levels of self-reported knowledge. More specifically, *the Netherlands* stood out as the country with the most positive views about robots as a romantic partner.

Countries with lower levels of awareness, expectation, and acceptance of intelligent machine

People in *Spain*, *Poland* and *South Africa* had the lowest level of self-reported knowledge about AI and robots. In particular, *South Africa* had by far the highest proportion of people who had never heard of these concepts.

France stood out as the country most likely to oppose the development of robots to look like humans in everyday life, and most likely to see intelligent machines as a negative development overall. *Greece* and *Spain* were also less likely than average to agree that the increased humanisation of robots was acceptable, and to be concerned that increased use of intelligent machines would widen inequalities in society. *Greece, Brazil, South Africa* and *Poland* stood out in particular as having very high levels of opposition to the idea of robots as a romantic partner.

People in the *Netherlands, Germany* and *Sweden* were least likely to anticipate that robots and AI would develop human-like capabilities of language, and to replace skilled workers such as doctors and lawyers.

Aside from *France*, people in the *USA and Germany* were most negative overall about robots. The *USA* and *Germany* were also, alongside *South Africa,* most likely to associate more widespread automation with people having less control.

Countries with most polarised opinions

South Africa stood out as a country with very polarised views on many measures, which is likely to reflect the extremely wide inequalities in society; according to the Word Bank (2018)[25] South Africa is one of the most unequal countries in world.

There were several measures where South Africans were both among the most positive and the most negative. This is evident in the proportions of South Africans who: support vs oppose the idea of robots resembling humans in everyday life and as romantic partners; feel that intelligent machines will lead to more autonomy vs less autonomy; and feel that their country will be completely different vs not different at all. It is also notable that in all countries apart from South Africa, a majority considered that more widespread automation would lead to greater inequalities. In South Africa, a sizeable minority (21%, higher than all other countries) thought it would instead lead to reduced inequalities within their county.

Variation by demographic and other subgroups

Although these trends were not observed across all survey measures, there was a general tendency for men, people with higher levels of education, and younger people to be more accepting and more positive about the development of intelligent machines and their impact on society. Also, those with higher levels of knowledge about AI tended to be more positive than average on many measures.

[25] http://documents.worldbank.org/curated/en/530481521735906534/Overcoming-Poverty-and-Inequality-in-South-Africa-An-Assessment-of-Drivers-Constraints-and-Opportunities

Negative opinions tended to be correlated. In many countries, those who had an overall negative opinion of intelligent machines were also more likely to feel that increased use of these technologies would lead to widened inequalities and people having less control over their decisions and actions.

Appendix

Appendix 1 - Questionnaire

Q001 - Q001: INTRODUCTION	**Single coded**

Not back

Good morning / afternoon / evening. My name is ... and I am calling from [NAME OF NATIONAL INSTITUTE] on behalf of Kantar Public, an independent research company. We are conducting a global survey funded by the European Union about some technologies and their impact on society.

IF NEEDED: The European Union is an organization comprising 28 European countries and governing over their economics, social and security policies.

Your participation in this survey is entirely voluntary. You can choose not to answer any questions if you do not wish to. Your answers will remain confidential.

IF ASKED: The survey will take about 15 minutes.

IF NECESSARY: If now is not convenient, I can call back at another time, but it would be helpful if I could ask you a couple of questions now, to check if you are the person we need to speak to.

IF NECESSARY: If you would like any more information about the survey, please contact [INSERT NAME, EMAIL AND PHONE NUMBER OF LOCAL KANTAR FIELD TEAM MEMBER].

[EACH COUNTRY SHOULD ADD ANY RELEVANT ADDITIONAL LOCAL INFORMATION SUCH AS GDPR PRIVACY NOTICES.]

INTERVIEWER: CONFIRM RESPONDENT IS AGED 18 OR OVER. IF NOT, ASK TO SPEAK TO SOMEONE AGED 18+, MAKING AN APPOINTMENT IF NECESSARY. IF NO ONE AGED 18+ LIVES IN HOUSEHOLD OR PHONE BELONGS TO SOMEONE AGED UNDER 18, CODE AS UNPRODUCTIVE OUTCOME.

May I ask you a few questions?

CODE OUTCOME FROM LIST BELOW
DO NOT READ OUT

Normal

1	Continue
2	Book appointment
3	Refuses to participate [GO TO OUTCOMES]

Q083 - Q083:	**Text**

Not back

For quality control and training purposes this interview may be monitored.

Q002 - Q002: Landline or mobile sample - dummy — **Single coded**

Not back | Dummy

Landline or mobile sample

Normal

1	Mobile
2	Landline

Ask only if **Q002 - Q002**,1

Q007 - Q007: M1 — **Single coded**

Not back

For safety reasons, could you please confirm that you are not driving and that you are in a safe position to answer the survey?

DO NOT READ OUT UNLESS NECESSARY – IF NEEDED, READ OUT 'YES' OR 'NO'

Normal

1	Yes, the respondent is in a safe position to answer the survey
2	No, the respondent is not in a safe position to answer the survey [GO TO OUTCOMES]

Ask only if **Q002 - Q002**,1

Q008 - Q008: M2 — **Single coded**

Not back

Is this your phone?

INTERVIEWER: SELECT 'YES' IN CASES WHERE RESPONDENT SAYS THIS IS A WORK PHONE THEY USE.
DO NOT READ OUT UNLESS NECESSARY

Normal

1	Yes
2	No

Ask only if **Q008 - Q008**,2

Q009 - Q009: M3 — **Open**

Not back

INTERVIEWER: ASK FOR PERSON WHO THE PHONE BELONGS TO. IF NOT AVAILABLE, ARRANGE TO CALL BACK.

Ask only if **Q002 - Q002**,2

Q011 - Q011: S1 **Numeric**

Not back | Max = 100

How many people aged 18 or over currently live in your household **including yourself**?

INTERVIEWER: ENTER NUMBER. CHECK THE FOLLOWING IF NECESSARY:

INCLUDE:
- People who normally live at this address, but are away for less than 10 weeks.
- People away at work for whom this is the main address.
- Boarders and lodgers.

EXCLUDE:
- People away for 10 weeks or more
- People who live elsewhere due to work/study
- Spouses who are separated and no longer resident

ENTER NUMBER

Scripter notes: Scripter notes: ***SCRIPTING NOTE: MAKE SELECTION USING RIZZO METHOD HERE***

RIZZO METHOD WORKS AS FOLLOWS:

- NUMBER OF PEOPLE TO SELECT FROM = NUMBER ENTERED AT S1
- ALL HAVE AN EQUAL PROBABILITY OF SELECTION
- PERSON INTERVIEWING IS SPEAKING TO COUNTS AS 'PERSON 1'
- THE DATA SHOULD STORE THE PERSON NUMBER OF THE SELECTED PERSON

Q012 - Q012: S2 **Single coded**

Not back

To make sure we speak to a good cross section of the public, we are using a random method to select who takes part. On this occasion someone else has been selected to take part. Could I speak to the person aged 18 or over, not yourself, who has the most recent birthday?

INTERVIEWER NOTE: THIS DOES NOT INCLUDE THE PERSON YOU ARE SPEAKING TO, IT MUST BE ANOTHER MEMBER OF THE HOUSEHOLD.

IF NECESSARY, SAY THE PERSON WITH THE MOST RECENT BIRTHDAY IS SELECTED TO ENSURE WE ACHIEVE A NATIONALLY REPRESENTATIVE SAMPLE OF ADULTS.

DO NOT READ OUT – IF NEEDED, READ OUT 'YES' OR 'NO'

Normal

1	Yes, available
2	No, not available [BOOK APPOINTMENT]
98	Refuses to participate [GO TO OUTCOMES]

Scripter notes: ROUTING CONDITIONS: ASK IF S1 > 2 AND PERSON 1 NOT SELECTED

Q013 - Q013: S3	Single coded

Not back

To make sure we speak to a good cross-section of the public, we are using a random method to select who takes part. On this occasion it is the other person that I would like to speak to. May I speak to that person?

IF NECESSARY, SAY WE NEED TO MAKE A RANDOM SELECTION TO ENSURE WE ACHIEVE A NATIONALLY REPRESENTATIVE SAMPLE OF ADULTS

DO NOT READ OUT

Normal

1	Yes, available
2	No, not available [BOOK APPOINTMENT]
98	Refuses to participate [GO TO OUTCOMES]

Scripter notes: ROUTING CONDITIONS: ASK IF S1 = 2 AND PERSON 1 NOT SELECTED

Q014 - Q014: S4	Single coded

Not back

Is it okay to continue with the interview now?

DO NOT READ OUT

Normal

1	Respondents willing – CONTINUE
2	Book appointment
98	Refuses to participate [GO TO OUTCOMES]

Scripter notes: ROUTING CONDITIONS: ASK IF PERSON 1 SELECTED

Ask only if **Q012 - Q012**,1 or **Q013 - Q013**,1

Q015 - Q015: S5 **Single coded**

Not back

Good morning / afternoon / evening. My name is ... and I am calling from [NAME OF NATIONAL INSTITUTE] on behalf of Kantar Public, an independent research company. We are conducting a global survey funded by the European Union about some technologies and their impact on society.

IF NECESSARY: The European Union is an organization comprising 28 European countries and governing over their economic, social, and security policies.

Your participation in this survey is entirely voluntary. You can choose not to answer any questions if you do not wish to. All your answers will remain confidential.

IF ASKED: The survey will take about 15 minutes.

IF NECESSARY: If now is not convenient, I can call back at another time, but it would be helpful if I could ask you a couple of questions now, to check if you are the person we need to speak to.

ADD IF NECESSARY: If you would like any more information about the survey, please contact [INSERT NAME, EMAIL AND PHONE NUMBER OF LOCAL KANTAR FIELD TEAM MEMBER].

[EACH COUNTRY SHOULD ADD ANY RELEVANT ADDITIONAL LOCAL INFORMATION SUCH AS GDPR PRIVACY NOTICES.]

Can we continue?

CODE OUTCOME FROM LIST BELOW

Normal

1	Continue
2	Book appointment
98	Refuses to participate [GO TO OUTCOMES]

Ask only if **Q012 - Q012**,1 or **Q013 - Q013**,1

Q085 - Q085: **Text**

Not back

For quality control and training purposes this interview may be monitored.

Ask only if **Q014 - Q014**,1 or **Q015 - Q015**,1

Q016 - Q016: S5a **Text**

Not back

Thank you for agreeing to participate.

THEN PROCEED TO INTERVIEW

B001 - B001: SECTION 1 - CONTACT SCRIPT **End block**

B002 - B002: SECTION 2 - DEMOGRAPHICS PART 1 **Begin block**

Q017 - Q017: Q3 **Single coded**

Not back

Before we start, can you confirm whether you are…

READ OUT

Normal

1	Male
2	Female
3	Or identify in another way
98	Refused (DO NOT READ)

Q018 - Q018: SECTION 3 INTRODUCTION **Text**

Not back

[TEXTFILL IF FIRST IN ROTATION: This first section is about**; IF SECOND IN ROTATION:** We are now moving onto the second part of this survey. This section is about**; IF THIRD IN ROTATION:** We are now moving onto the last part of this survey. The final section is about**]** intelligent machines, including robots and artificial intelligence.

Firstly, some questions about robots, which are machines designed to perform tasks automatically and by themselves. For example, robots that can perform surgery, or clean the house.

READ OUT

Q019 - Q019: AI_Q1 **Single coded**

Not back

Before today, how much, if anything, had you heard or read about robots?

READ OUT

Normal

1	A lot
2	A fair amount
3	A little
4	Hardly anything but I have heard of it
5	I have not heard of this
98	Refused [DO NOT READ OUT]

Q030 - Q030: AI_Q10 **Matrix**

Not back | Number of rows: 3 | Number of columns: 7

To what extent do you agree or disagree with each of the following statements?

ONLY READ AFTER THE FIRST SCREEN IF NECESSARY

Rows: Random | Columns: Normal

Rendered as Dynamic Grid

	Strongly agree [ONLY READ IF NECESSARY]	Tend to agree [ONLY READ IF NECESSARY]	Neither agree or disagree [ONLY READ IF NECESSARY]	Tend to disagree [ONLY READ IF NECESSARY]	Strongly disagree [ONLY READ IF NECESSARY]	I don't know [DO NOT READ OUT] *Fixed	Refused [DO NOT READ OUT] *Fixed
If robots are used in the workplace and in public places it would be okay if they were made to look and behave like human beings [READ OUT]	❍	❍	❍	❍	❍	❍	❍
It's acceptable if people have a robot as a romantic partner, that is a girlfriend or boyfriend [READ OUT]	❍	❍	❍	❍	❍	❍	❍

Q021 - Q021: ARTIFICIAL INTELLIGENCE INTRO	Text

Not back

Now a question about artificial intelligence, which refers to computer programs that can do tasks normally performed by people. For example, personal assistants in smartphones, like Siri, software used in in self-driving cars, and computer programs that can learn to recognize faces.

READ OUT

Q022 - Q022: AI_Q3	Single coded

Not back

Before today, how much, if anything, had you heard or read about artificial intelligence?

READ OUT

Normal

1	A lot
2	A fair amount
3	A little
4	Hardly anything but I have heard of it
5	I have not heard of this
98	Refused [DO NOT READ OUT]

Q023 - Q023: INTELLIGENT MACHINES INTRO	Text

Not back

Now some questions about both robots and artificial intelligence, which we refer to, altogether, as intelligent machines.

READ OUT

Q024 - Q024: AI_Q4	Single coded

Not back

If intelligent machines were able to perform most of the jobs currently done by humans, do you think this would result in…

READ OUT

Normal

1	More inequality between rich and poor
2	Less inequality
3	Or would there be no difference compared to now
99	Don’t know [DO NOT READ OUT]
98	Refused [DO NOT READ OUT]

Q025 - Q025: AI_Q5 **Matrix**

Not back | Number of rows: 2 | Number of columns: 6

How likely or unlikely do you think each of the following is to happen within the next 20 years?

Rows: Random | Columns: Normal

Rendered as Dynamic Grid

	Definitely happen [ONLY READ IF NECESSARY]	Probably happen [ONLY READ IF NECESSARY]	Probably not happen [ONLY READ IF NECESSARY]	Definitely not happen [ONLY READ IF NECESSARY]	Don't know (DO NOT READ OUT)	Refused [DO NOT READ OUT]
Intelligent machines will understand and communicate as well as humans [READ OUT]	❍	❍	❍	❍	❍	❍
Intelligent machines will be able to replace professionals like scientists, teachers, doctors or lawyers. [READ OUT]	❍	❍	❍	❍	❍	❍

Q026 - Q026: AI_Q6 **Single coded**

Not back

If intelligent machines become more widespread, in 20 years do you think that [COUNTRY] will be…

READ OUT

Normal

1	Completely different
2	Somewhat different
3	Not very different
4	Or not different at all
99	Don’t know [DO NOT READ OUT]
98	Refused [DO NOT READ OUT]

Q027 - Q027: AI_Q7 **Single coded**

Not back

Now imagine that intelligent machines are used everywhere in [COUNTRY], for example the workplace, home, schools, shops, banks and restaurants. Do you think people would have….

READ OUT

Normal

1	More control over their own decisions and actions
2	Less control
3	Or the same amount of control
99	Don't know [DO NOT READ OUT]
98	Refused [DO NOT READ OUT]

Q031 - Q031: AI_Q11 **Numeric**

Not back | Max = 10

Thinking about the impact intelligent machines might have on [COUNTRY], overall how positive do you feel about this? Please answer on a scale of zero to 10, where zero is 'not at all positive' and 10 is 'completely positive'.

ENTER VALUE BETWEEN 0 - 10

999	99 Don't know [DO NOT READ OUT] **Fixed *Exclusive*
997	Refused [DO NOT READ OUT] **Fixed *Exclusive*

Q073 - Q073: DEM_INTRO **Text**

Not back

We are nearly done with the survey, thank you very much for your time. Before we finish, we have a couple of questions about you.

READ OUT

Q074 - Q074: DEM_Q1 **Numeric**

Not back | Min = 16 | Max = 99

What is your age?

TYPE IN

Scripter notes: ADD CODE "REFUSED (DO NOT READ)"

Q075 - Q075: DEM_Q2 **Single coded**

Not back

Which of these age bands do you belong to?

READ OUT

Normal

1	18-24
2	25-34
3	35-44
4	45-54
5	55-64
6	65-74
7	75+
98	Refused (DO NOT READ)

Scripter notes: ASK IF DEM_Q1 = REFUSED

Q076 - Q076: DEM_Q3 **Single coded**

Not back

What is the highest level of education you have successfully completed?

READ OUT

Normal

1	University degree or above (or equivalent)
2	High school/senior school (or equivalent)
3	Below high school/senior school (or equivalent)
4	No educational qualifications
98	Refused (DO NOT READ)

Q077 - Q077: DEM_Q4 **Single coded**

Not back

What is your main current status. Are you...?

READ OUT

INTERVIEWER: IF 2+ ACTIVITIES, CODE THE ONE WHICH RESPONDENT SPENDS MOST TIME DOING

Normal

1	Working full-time or part-time
2	Unemployed
3	Retired
4	Full time student
5	Or doing something else (IF NECESSARY: for example looking after home/family, sick/disabled) [ASK TO SPECIFY] **Open *Fixed*
99	Don't know (DO NOT READ)
98	Refused (DO NOT READ)

Q078 - Q078: DEM_Q5 **Single coded**

Not back

Have you ever been the parent of a child?

IF NECESSARY – IF SAY NO: Please include adult children, and any step-children or adopted children

READ OUT

Normal

1	Yes
2	No
98	Refused (DO NOT READ)

Q079 - Q079: DEM_Q6 **Single coded**

Not back

[GERMANY ONLY] The next question asks about the importance of religion in your life. You do not have to answer should you not wish to.]

How important, if at all, is religion in your life?

READ OUT

Normal

1	Very important
2	Somewhat important
3	Not very important
4	Not at all important
99	Don't know (DO NOT READ)
98	Refused (DO NOT READ)

B006 - B006: SECTION 6 - DEMOGRAPHICS PART 2 **End block**

Ask only if **Q002 - Q002**,1

Q081 - Q081: END_M **Single coded**

Not back

Do you have a working landline telephone at home?

READ OUT

Normal

1	Yes
2	No
99	Don't know (DO NOT READ)
98	Refused (DO NOT READ)

Ask only if **Q002 - Q002**,2

Q082 - Q082: END_L **Single coded**

Not back

Do you have a working cell phone?

READ OUT

Normal

1	Yes
2	No
99	Don’t know (DO NOT READ)
98	Refused (DO NOT READ)

Q080 - Q080: END **Text**

Not back

That's the end of the interview. Thank you very much for your time.