Shaping the ethical dimensions of smart information systems– a European perspective (SHERPA)

Deliverable No.

2.3

Online Survey

Report

31 January 2020

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Abstract	Based around the existing outcomes from the SHERPA project so far, and as encapsulated in the online workbook, this online survey aimed to explore the research question, "From the perspective of a well-informed lay public, which ethical and human rights issues relating to SIS are perceived as particularly problematic and how should they be addressed?" Overall, the results show very broad agreement with the SHERPA findings so far.
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Executive Summary

Based around the existing outcomes from the SHERPA project so far, and as encapsulated in the online workbook, this online survey aimed to explore the research question, “From the perspective of a well-informed lay public, which ethical and human rights issues relating to SIS are perceived as particularly problematic and how should they be addressed?” This was investigated via a series of questions which asked the respondents to:

- rate various ethical issues in terms of their importance,
- rate various ethical and human rights issues in terms of future importance,
- rate various SIS relevant ethical issues in terms of concern and the need for regulation or education,
- indicate their agreement with a range of SIS related predictions and trends over the next 10 years.

This was followed by asking respondents to indicate their views on how successful a range of options for addressing SIS ethical and human rights issues might be. Following on from an overview of the survey approach, and details of the questions asked, this deliverable provides a visual analysis of the results and discussion. Overall, the results show very broad agreement with the SHERPA findings so far, in relation to identifying the ethical issues, to the idea that ethical and human right issues would increase in importance in the future, what would be the future key SIS related concerns and that going forwards it would be ‘education’ that would provide the best option for addressing SIS related ethical and human rights issues.

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List of acronyms/abbreviations

Abbreviation	Explanation
SIS	Smart Information Systems (combining artificial intelligence and data analytics)
WP	Work Package
GDPR	General Data Protection Regulation
AI	Artificial Intelligence
CEM	Computing, Engineering and Media
CORDIS	Community Research and Development Information Service
EurAI	European Association for Artificial Intelligence

Table 1 List of acronyms/abbreviations

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Introduction

Based on the interview analysis and preliminary outcomes of WP1 and WP3, SHERPA developed an online survey to collect feedback on the SIS workbook, which contains the state of the art and the SHERPA project proposals for the responsible development of SIS. The online survey identified potential gaps and shortcomings of the workbook and will inform the prioritisation task in WP4.

The survey was sent to at least 1,000 respondents selected from the stakeholder network and the networks of the project partners covering various AI and Big Data stakeholder groups. The response rate was maximised by choosing individuals who are involved in aspects of SIS and by personalising the invitations. Those invited to respond to the survey included partners in relevant EU projects involving SIS. The survey ensured the technical correctness and appropriateness of the workbook at that stage of the project. Among the sources drawn on are the CORDIS database and the members of the European Association for Artificial Intelligence (EurAI).

The survey was mainly ratings based quantitative, with one open-ended qualitative question, and was designed to gain a snapshot of what people are thinking about the ethical and human rights issues relating to SIS that were identified in WP1. It is worth noting that the survey results are not representative of the wider population, but are opinions drawn from those who have experience in developing and using SIS and a well-informed lay public.

This document is designed to provide a detailed breakdown of the survey design. The document describes the design, implementation and outcomes of the survey. Taking its point of departure from the work undertaken in WP1 (i.e. the case studies, scenarios, technical options, human rights analysis, ethical analysis, all of which are part of the SHERPA workbook), the survey addresses the following research question:

> **From the perspective of a well-informed lay public, which ethical and human rights issues relating to SIS are perceived as particularly problematic and how should they be addressed?**

The concept of a 'well-informed lay public' is used to represent the set of people who have some interest in SIS and have shown some indication of an interest in how they are used, and are therefore in a position to give an informed response to the survey questions. For example, the stakeholder network is drawn from people who either self-identify as being interested in this topic or have some sort of public profile which indicates such an interest.

In the logic of the project, the online survey follows on from the work of WP1, which provided descriptions and visualisations of ethical and human rights issues of SIS via case studies, scenarios, and through technical, ethical and legal analysis. The online survey ran between months 15 and 21 of the project, thus allowing it to contribute to WP3, concerning the

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responsible development of SIS and WP4, which was tasked with evaluation and prioritisation of the project findings. The survey results are crucial for the work carried in the SHERPA project because they inform the exploration of possible options in WP3 and the prioritisation task in WP4.

In terms of timing and content, the online survey partly overlapped with the Delphi study. Whereas the online survey in Task 2.3 aimed to collect broad input from a larg number of stakeholders, the Delphi Study's aim is to provide more detailed insights from a smaller number of experts.

This deliverable provides an account of all stages and findings of the online survey. It starts with the protocol or plan for the online survey.

Survey Content, Development and Piloting

Principles

Dillman[1] notes three goals for writing good questions for self- administered surveys so that every potential respondent will: (1) interpret the question the same way, (2) be able to respond accurately, and (3) be willing to answer. This reflects two key concepts in surveys, those of reliability and validity[2]. In this context, reliability refers to the "consistency in responses across different respondents in the same situations" (Cowles and Nelson, 2015[3]). In other words, the questions result in the same type of understanding and hence the same type of response across the set of respondents. Validity in surveys refers to "the extent that the measure being used accurately reflects the concept that is of interest" (Cowles and Nelson , 2015).

The questionnaire used in the SHERPA online survey was developed from the insights developed by SHERPA, including case studies and scenarios, ethical analysis, technical analysis and human rights analysis. The purpose of the first part of the survey was to ascertain whether ethical, social or human rights issues were fully covered and to identify possible gaps. The second purpose of the survey was to provide input into the options being discussed by SHERPA and get an initial indication of which priorities the well informed lay public might have.

In order to attract the desired number of respondents, but also to facilitate simple data analysis and presentation, it was decided to focus on closed questions with an option for respondents to provide a free text entry to allow them to highlight gaps or missing options.

[1] Dillman, D. A., 2009. *Internet, Mail and mixed-Mode Surveys: The Tailored Design Method*. New York: John Wiley & Sons.
[2] Robinson, S.B. and Leonard, K.F., 2018. *Designing quality survey questions*. Sage Publications.
[3] Cowles, E. and Nelson, E. 2015, *An Introduction to Survey Research*, New York, UNITED STATES: Business Expert Press.

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Preparation of survey tool - development and piloting

The initial draft of the survey was developed in collaboration with all consortium partners and was based on work already undertaken by the consortium in WP1 (see Table 2), and on preliminary work undertaken in WP3. It then also feeds back into the ongoing activities in WP3 (see Table 2). Some questions were directly based on the content and initial findings from these deliverables, while others are more background/demographic elicitation.

Deliverable Number	Deliverable Title
D1.1	Case studies
D1.2	SIS scenarios
D1.3	Cyber threats and countermeasures
D1.4	Report of ethical tensions and social impacts
D1.5	Current human rights framework
D3.1	SIS workbook
D3.3	Report on regulatory options
D3.4	Report on standardisation activities
D3.5	Technical options and interventions report
D3.6	Terms of reference for SIS regulator

Table 2 List of deliverables used for the survey development

Pilot Test

A key element of preparation of a survey and in this case an online survey, is the pilot test phase. This involves a 'dry run' of the survey with a small number of friendly participants, to check both the validity of the questions in terms of whether they reflect what is being expected of the questions and their interpretations, and more practical aspects such as timings and the working of the online system itself. Not to pilot test is one of the key things likely to annoy possible participants and so result in a large number of non-completions[4].

[4] https://dynamicsofwriting.com/2017/11/09/how-to-annoy-your-survey-participants-in-six-easy-steps/

The questions were refined through pilot testing with participants from the consortium. Following feedback from the pilot, there were a few revisions of the draft questionnaire related to the wording and coverage of the

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Content of the Survey

Following the protocol detailed above, the specific questions for the online survey were developed and finalised. The specific survey questions used are shown in Appendix A.

Ethics Approval and Data Management

The signed copy of the questionnaire formed the basis for the ethics approval of the SHERPA Online Survey which was approved by De Montfort University, CEM Faculty Research Ethics Committee on 03 October 2019 (See Appendix C). To ensure responsible data use, the project used an information sheet that was designed to gain informed consent to the survey. This included information on how data will be stored, managed and used by the SHERPA project partners and research collaborators.

Recruitment

Survey Promotion

Support through the SHERPA consortium associated networks remained crucial even though the survey took place only online, as did most of the recruitment. The aim was to raise awareness of the survey among the AI/big data ethics community via as many routes as possible. The SHERPA survey was promoted through a number of routes that are outlined in Table 3 (below).

Approach	**Description**
SHERPA Project website	The survey was made prominent on the SHERPA project's website with an aim to target website visitors and attract more participants.

questionnaire. As a result of the pilot, modifications were made to the questionnaire, mainly to reduce the length and enhance the relevance of the questions to the aims of the SHERPA project. The aim was to make the survey as useful as possible to the largest number of people

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Approach	Description
Mass mail-out	The mass mail-outs had the same **generic email text** (see appendix B). The contact details for the generic emails will be sourced from: ● SHERPA contact list ● Stakeholder network ● CORDIS contacts To ensure that this blanket approach did not result in a low response rate, there were up to three automated follow-ups (only to those who had not completed the surveys).
Social media advertising	Twitter and LinkedIn were the primary means for the social media campaign. Specifically, all SHERPA partners were encouraged to promote the online survey to their own contacts. DMU tweeted and posted about the survey from the SHERPA project's Twitter and LinkedIn accounts used tags that relate to ethics and AI, where appropriate. There was a focus on AI-ethics related social media accounts with large followings to maximise outreach. This included weekly tweets, tagging network organisations and EU (e.g., RRI) projects, such as partner projects (SIENNA, PANELFIT) pulling on additional contacts (not mentioned in the SHERPA contact list, H2020 & EC account, SHERPA partner accounts etc.)

Table 3 SHERPA survey promotion routes

Respondent Targets

The minimum requirement of responses for the online survey was 1,000 responses. To achieve the minimum expectation of responses, the survey used the following sources for identifying and recruiting responded targets.

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Sources	Description	Expected numbers
Stakeholder network	The focus was on representatives of industry and civil society organisations, policy, professional bodies, researchers and media. These were crucial for the survey because they provided different perspectives and varying expertise related to how different Smart Information Systems impact ethics and human rights.	1000+
Partner projects	Emails sent to PIs and coordinators of Ai ethics-related projects such as PROGRESSIVE, SIENNA, PANELFIT etc. asking them to disseminate or forward the survey within their projects and also among their networks.	200
SINAPSE Ethical review community	SINAPSE was used to identify e-communities with a common interest in ethics and AI. A survey link that was connected to the SHERPA website was sent to the communities via the web communication platform. https://europa.eu/sinapse/sinapse/index.cfm?fuseaction=sinapse.home&redirect=security2	380
Members of the European Association for Artificial Intelligence	Potential respondents were identified through EurAI and they were sent invitations to participate in the survey https://www.eurai.org/activities/ECAI_conferences	300
Responsible Innovation email list		180
Personal LinkedIn account T. Zijlstra		1100
Email to CEN Focus Group on AI	Request to further disseminate	50

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Sources	Description	Expected numbers
Computer ethics list	Request to further disseminate	150
AISWorld mailing list (LB)	Request to further disseminate	500
UKAIS mailing list (LB)	Request to further disseminate	150
Information Systems mailing list (LB)	Request to further disseminate	100

Table 4 Sources for survey respondents

Data Analysis

The data collected through the online survey was analysed using a broadly quantitative analysis approach. The proposed approach for analysing the SHERPA online survey data was mainly by visual summary. The key aspects were to identify whether the findings from WP1 and WP3 could be confirmed, in terms of whether the respondents agreed with the key issues and the levels of importance. Where there was some indication of possible further insights being shown, then cross analysis, ie. looking at the responses to specific questions split by gender were also generated and reported.

Tools for the Survey

The project used MailChimp to promote the SHERPA survey through mail-outs. The tool was useful for email merging, tagging and integration. The survey tool was also instrumental in collecting participants responses to the survey questions and integrating the link to the survey which was on the SHERPA project website.

The online survey itself was implemented using Gravity Forms, a WordPress plugin, which allowed for the capture of the information for each question and to then download it in a form which could then be imported into MSc Excel. From this, the key visual representations were drawn out, by summarising the information and combining it into various charts (see Results section). In addition, where there was a need for further 'drill-down' into the data, then pivot tables were used to further investigate any specific phenomena and possible further insights.

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Timeline

The survey was live from 14th October 2019 to 19th December 2019. The timeline of the survey tasks/ activities from the development to the final stages is presented in Table 5.

Task	**Due**
Draft questions to Task leaders	20th Sept 2019
Draft protocol to the consortium	26th Sept 2019
Questions sent to the consortium (pilot study)	27th Sept 2019
Partners view questions	2nd Oct 2019
Online survey distributed	14th Oct 2019
Online survey closed	19th December 2019

Table 5 Survey Timeline

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Results and Analysis

The survey was closed on 19th December 2019 and the final participants numbers were:

- All (352) | Complete (120) | Partial (232) | Unread (350) Trash (107)

Therefore, the results and analysis are based around the usable set of Complete and Partial combined = 352.

The raw results from the survey on the SHERPA website were downloaded and extracted into an Excel spreadsheet for analysis. The initial analysis focused on summarising the results in visual representations, to see what elements stand out. These are covered in the following sections:

- Demographics
- SIS Related Ethical and Human Rights Issues
- SIS Application Areas
- Where and How SIS Might be Used
- SIS Ethics Predictions and Trends
- Qualitative Feedback Comments

Demographics

The respondents were asked a small number of demographic questions to give an indication of the backgrounds band, providing context for the responses.

Of those people who chose to specify their gender (115 out of 352 responses), there does appear to be a good balance between male and female respondents, see figure 1:

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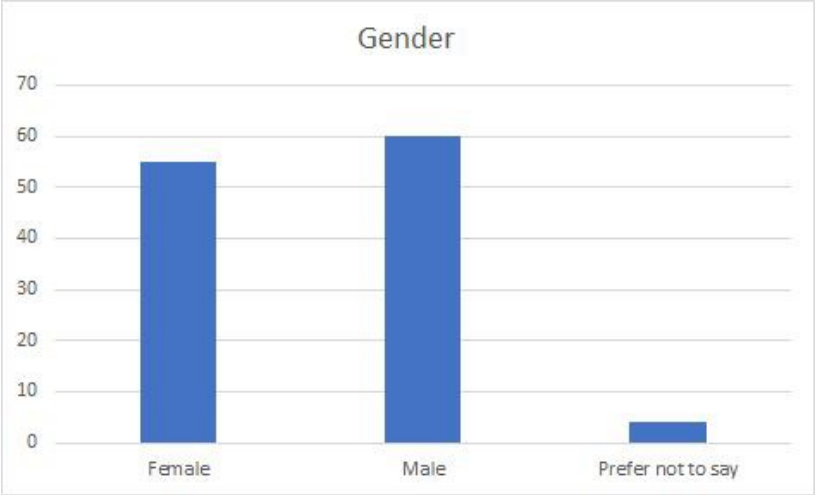

Figure 1 Gender of respondents

However, in terms of ethnicity, there was a much smaller spread with the majority declaring themselves to be white (108 out of 352), see figure 2:

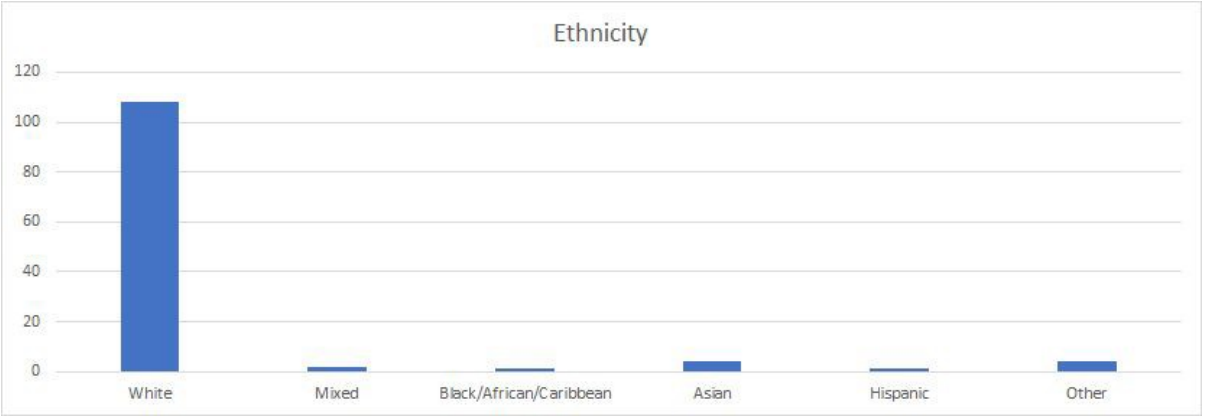

Figure 2 Ethnicity of respondents

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In terms of the spread of places where the respondents originate, there is a strong European bias, see figure 3.

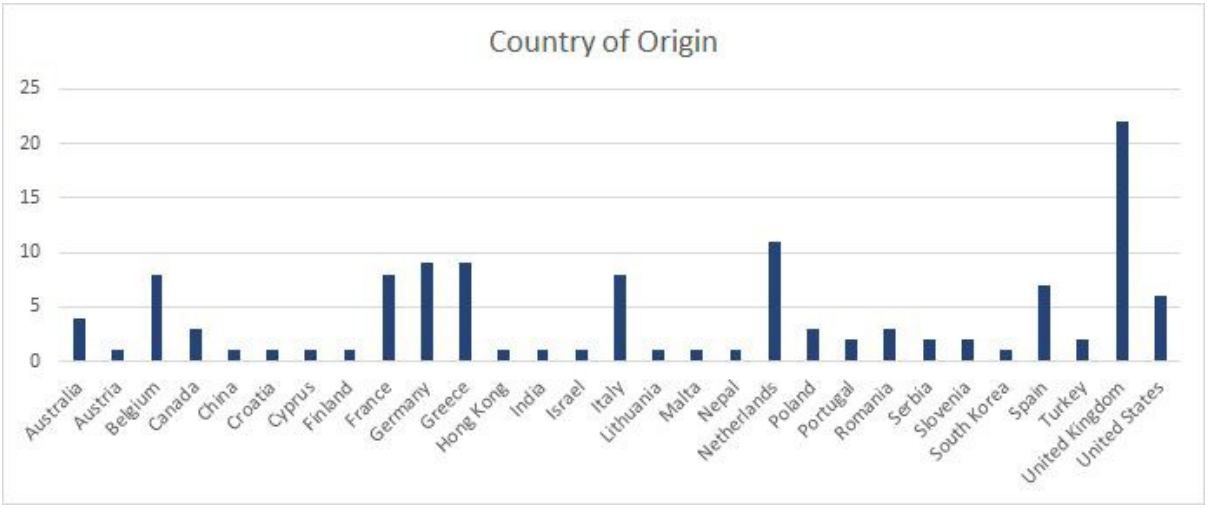

Figure 3 Country of origin of respondents

As can be seen from figure 4, there is quite a good distribution of age ranges in the respondents, with the youngest being 23 and the eldest being 80.

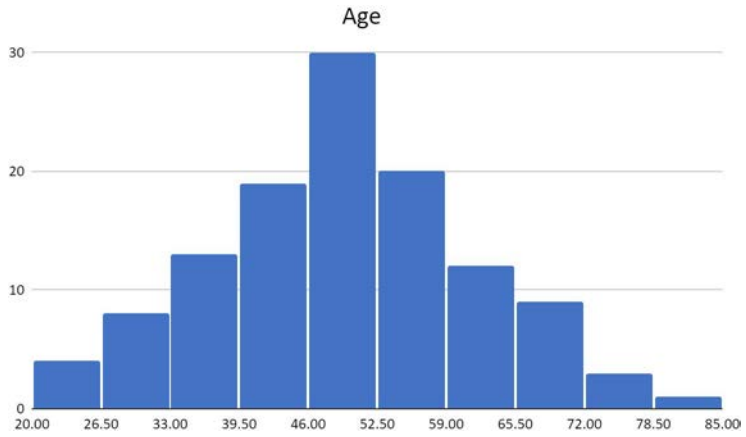

Figure 4 Age range of respondents

The majority of the people who answered this question on the survey saw themselves with between medium to high levels of expertise in the area (99 out of 365). While only a few, it is interesting to note that a small number did rate their expertise with SIS on the lower end of the scale, see figure 5.

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Figure 5 Level of SIS expertise

SIS Related Ethical and Human Rights Issues

Drawing on previous work done in SHERPA, the first main question used a large set (35) of SIS ethical and Human Rights issues. For each of these, the respondents were asked to rate their view on the issue on a scale of importance, from 'not at all' to 'very'. The results showed that the majority are seen as either 'important' or 'very important' (see figure 6).

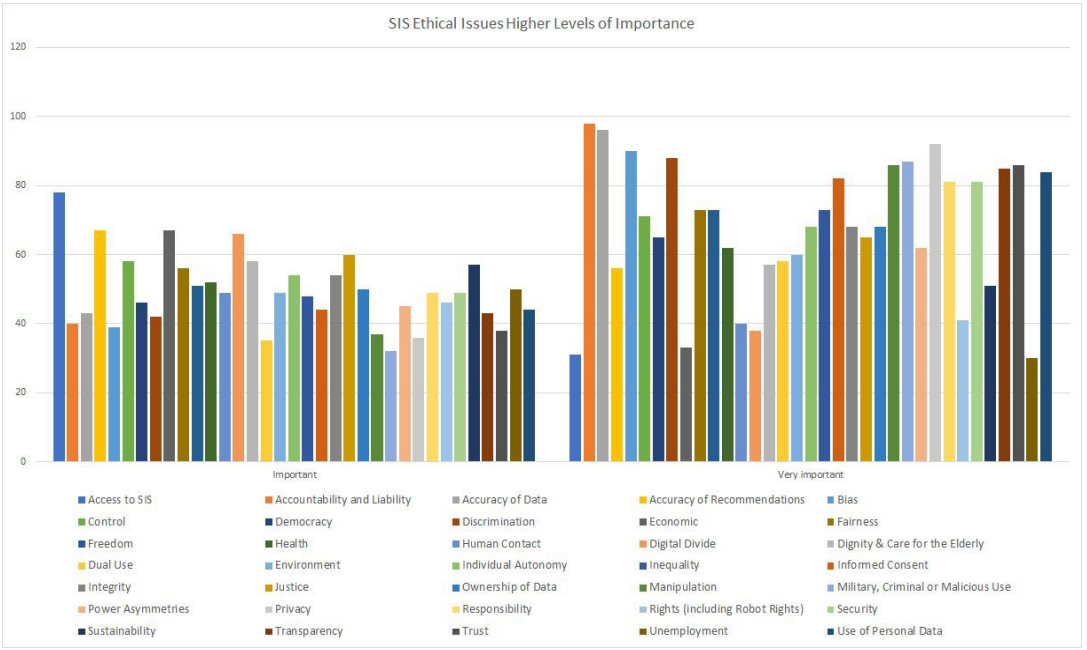

Figure 6 SIS ethical issues higher levels of importance

Drilling down a bit more, looking at the issue which has the strongest level of 'not at all

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important' or 'not very important' (see figure 7), the impact of SIS on unemployment, we can look at whether there are any gender differences. It appears that for 'not at all important' to just 'important', males respondents are a bit stronger in their views, while for the 'very important' category, it is female respondents that show the stronger viewpoints (see figure 8).

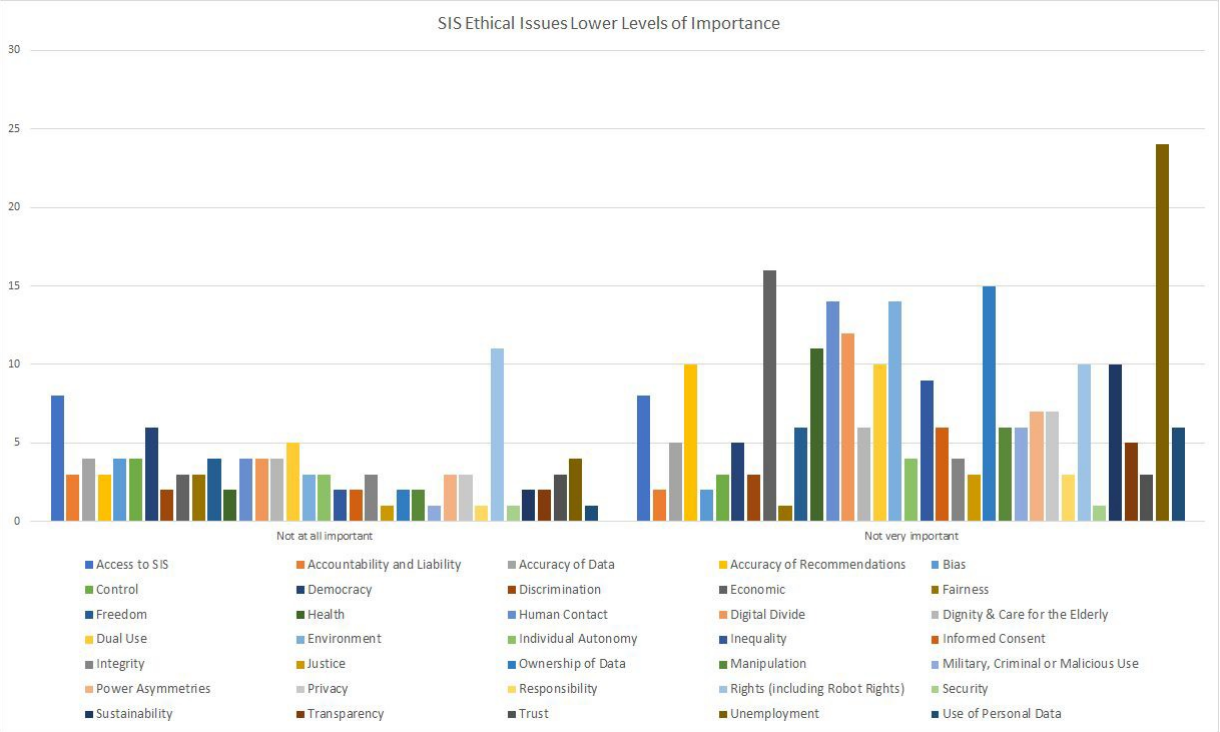

Figure 7 SIS ethical issues lower levels of importance

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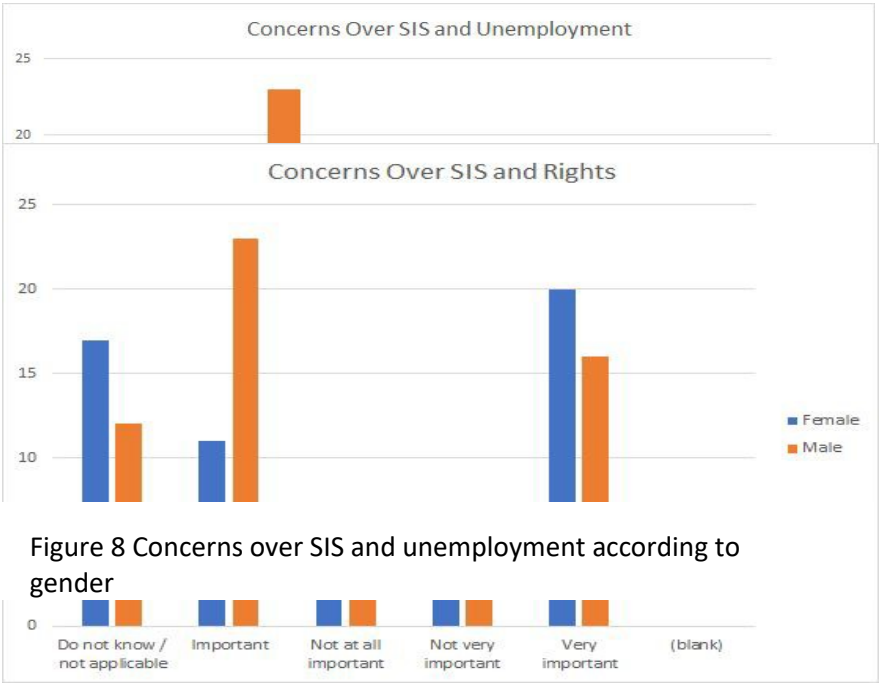

Figure 8 Concerns over SIS and unemployment according to gender

Figure 9 Concerns over SIS and rights according to gender

Another weak issue, that of the issue of rights (including robot rights), shows a similar gender pattern (see figure 9), of slightly more males showing it as 'important' and slightly more females showing it as 'very important'.

SIS Application Areas

The respondents were asked to indicate their views on how important ethical and human rights issues would become in the future for specific application areas.

As before the general view was that these issues would become more important in the future for most of the application areas (see figure 10).

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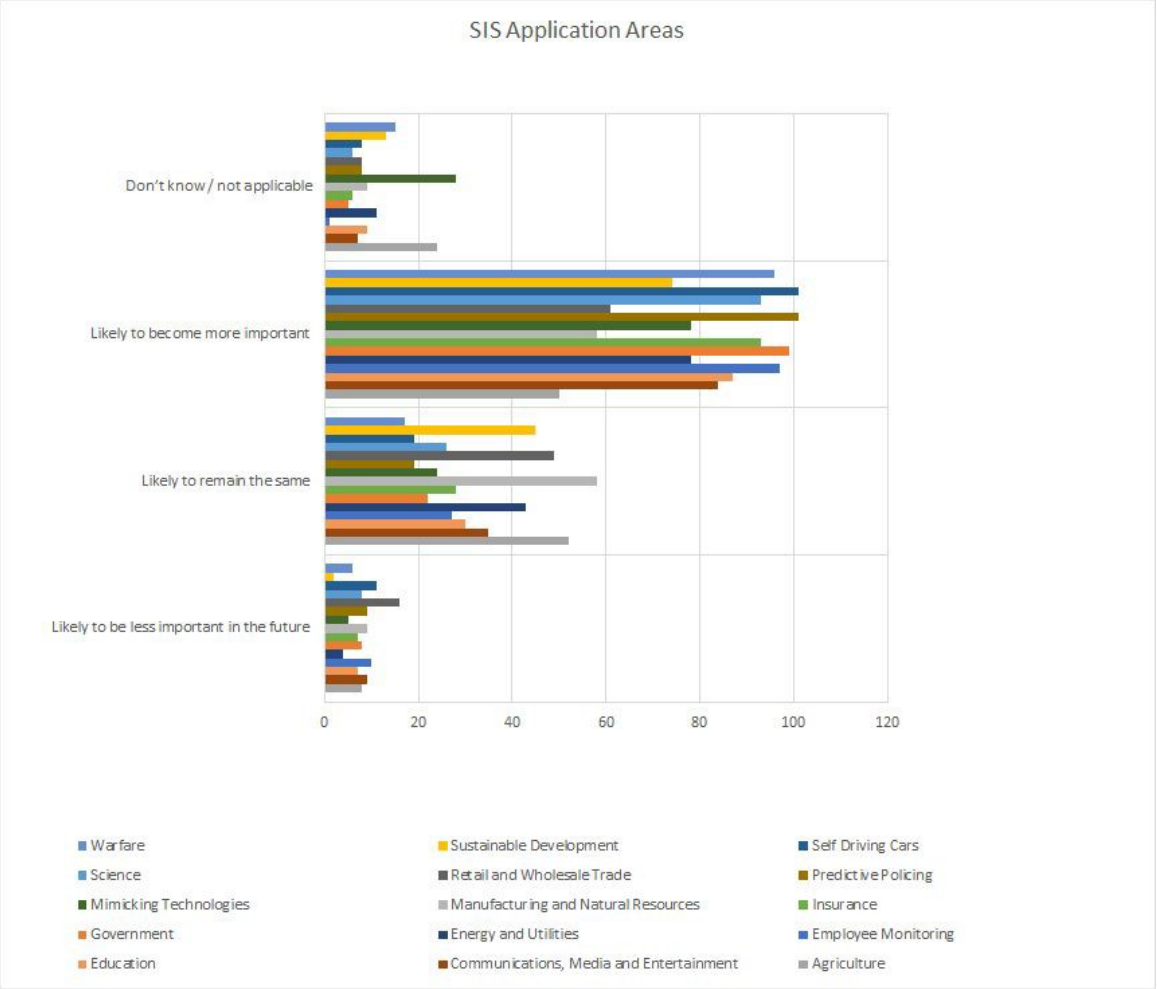

Figure 10 Importance of SIS application areas

Having said that, the views on Agriculture were split quite evenly between those who thought it would remain the same and those who thought it would become more important (see figure 11). In addition to Agriculture, the other area that respondents seemed least sure about, in terms of future importance, was Mimicking Technologies (eg. robotics).

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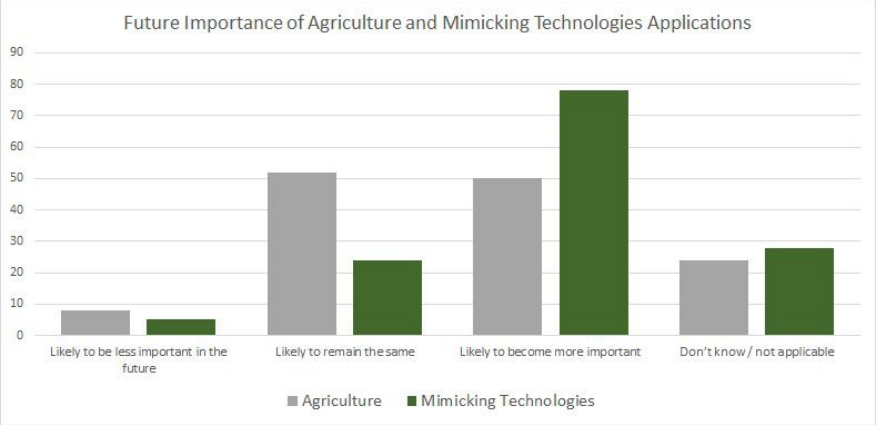

Figure 11 Future importance of ethical and human rights for agriculture and mimicking technologies

Where and How SIS Might be Used

This question aimed to find out opinions on what would be the concerns and opportunities that could be brought about by the use of SIS. There was broad agreement in most of the categories, with the strongest being for 'Widespread use of SIS in preparing and conducting cyber-attacks' and 'Widespread use of SIS for disinformation and producing fake news content'.

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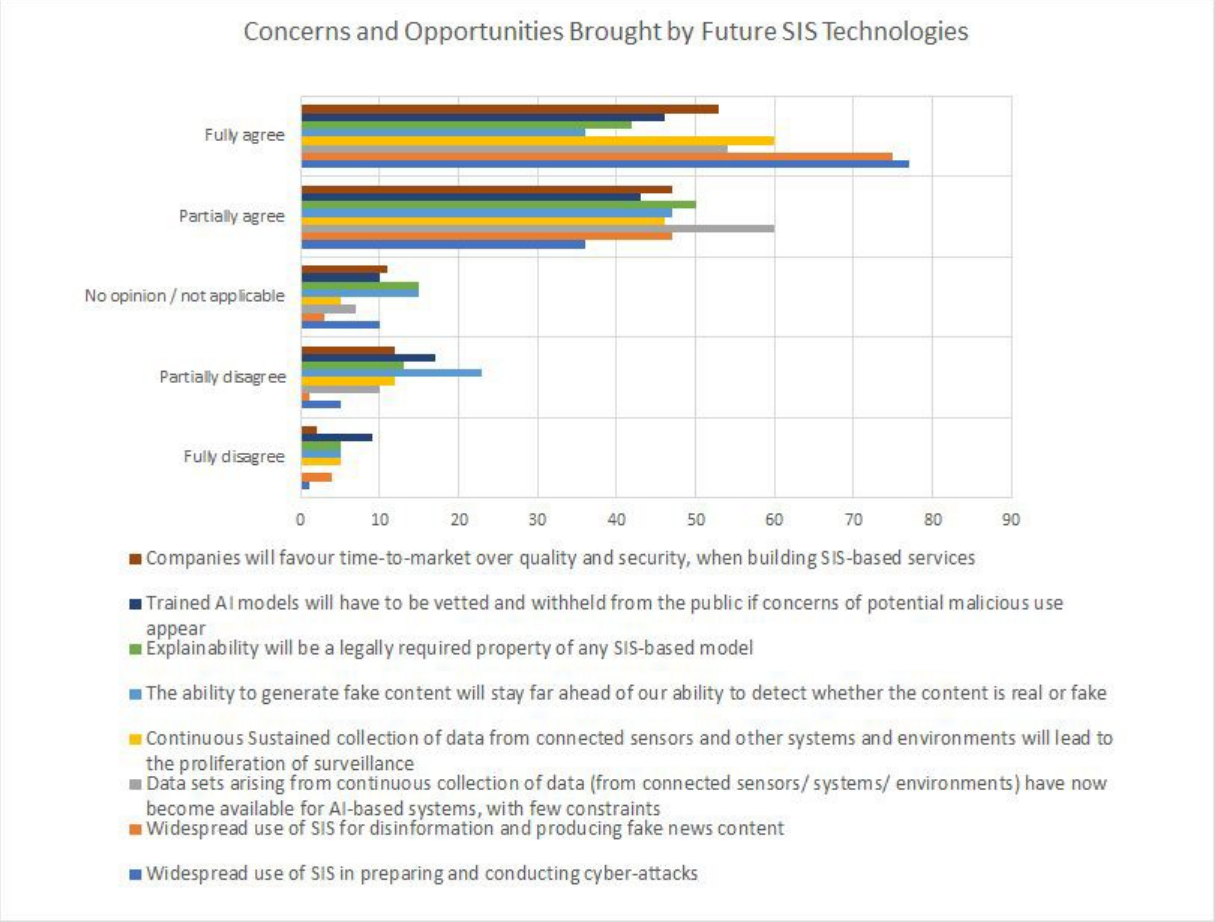

Figure 12 Concerns and opportunities brought about by SIS

While not very strong, the clearest indication of where opinions disagreed with the issues raised were for 'The ability to generate fake content will stay far ahead of our ability to detect whether the content is real or fake' and then for 'Trained AI models will have to be vetted and withheld from the public if concerns of potential malicious use appear'. Gender does not appear to affect this result (see figure 13).

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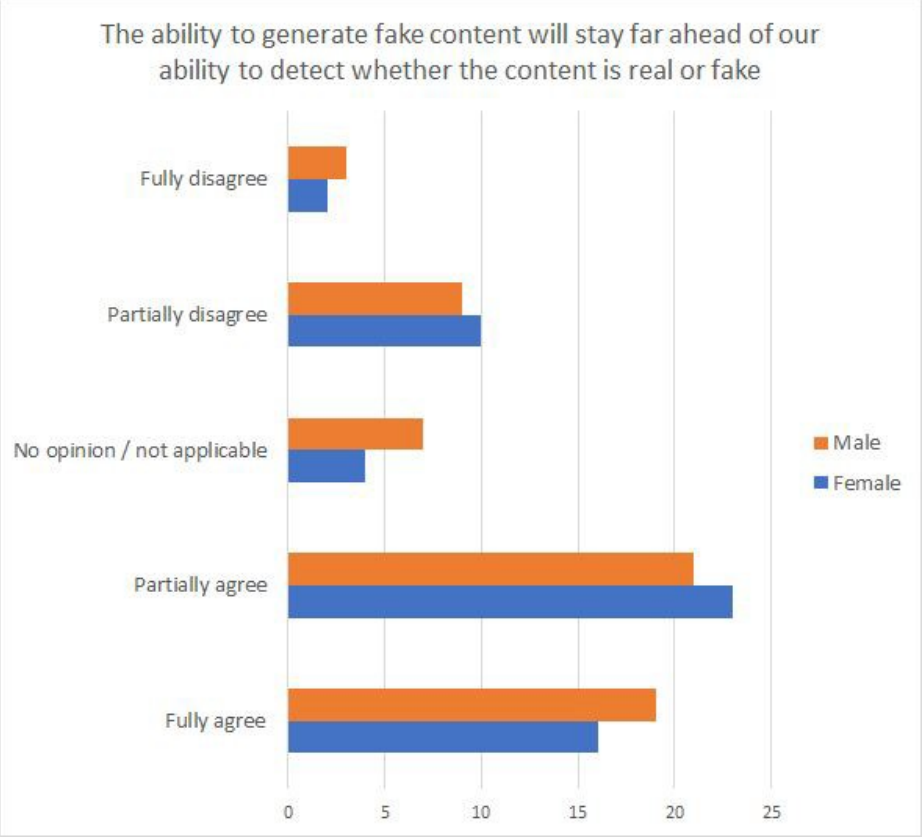

Figure 13 Agreement with 'The ability to generate fake content will stay far ahead of our ability to detect whether the content is real or fake' by gender

SIS Ethics Predictions and Trends

Looking forwards at where the possible future successes in addressing ethics and human rights issues in SIS might be based, the respondents were given 9 options to rate as being likely to be successful or not. Out of these, the least likely to be successful is seen in the current legislation and the strongest option for success going forwards is 'education' (see figure 14). However, other than 'current legislation', the other 8 were all quite strongly supported (see figure 15). The one option that people seemed less sure about was technical options (see figure 16).

Overall, it looks like people think that while current legislation is not sufficient, and therefore we do need to do something (or things), most of the other options suggested (such as education, future legislation, etc.) are viable and useful, except for technical options, which could be that people seemed less sure about what these are in the first place and so less able to predict how useful they might be.

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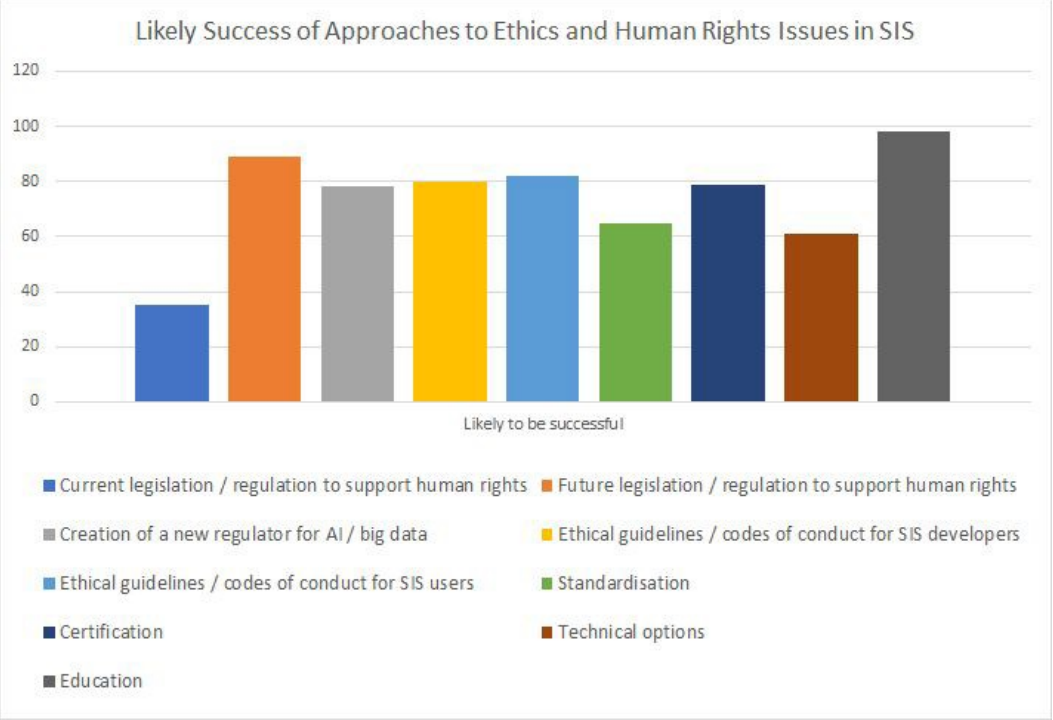

Figure 14 Likely success of approaches to ethics and human rights issues in SIS

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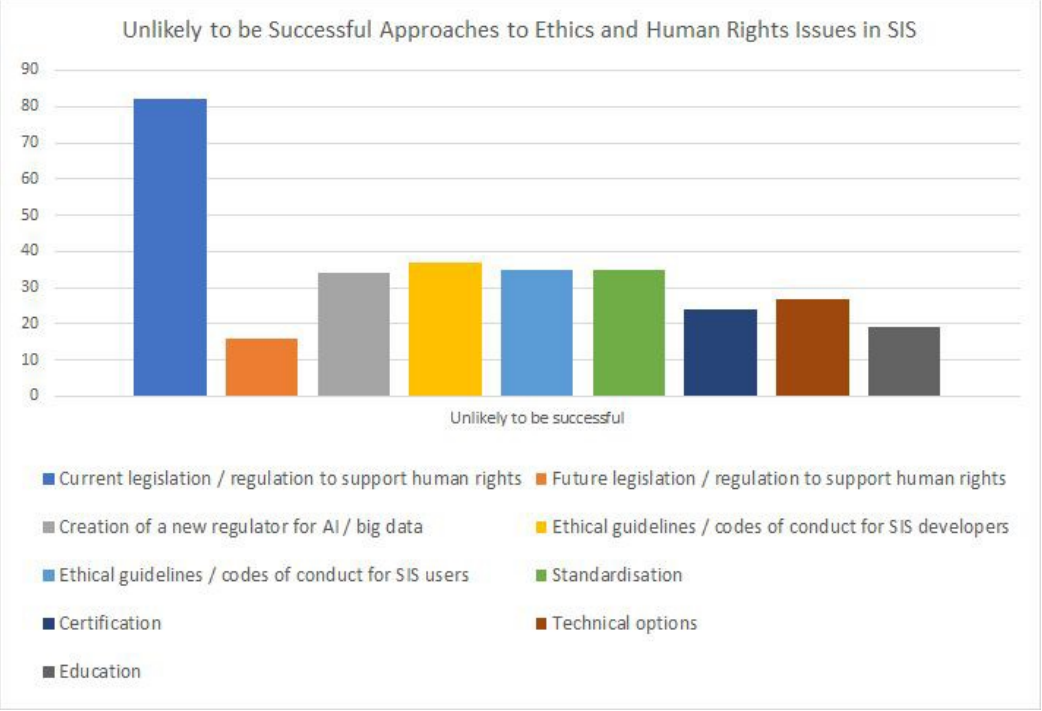

Figure 15 Unlikely to be successful approaches to ethics and human rights issues in SIS

Figure 16 Overall likely success of approaches to ethics and human rights issues in SIS

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Qualitative Feedback Comments

At the end of the survey, respondents were asked to give any other relevant comments about SIS and its use within modern society. There were 25 comments provided, some very short and some longer. One general theme that comes through in these comments, is that the use of SIS is very context dependant and hence the results should be interpreted as such.

Conclusions

Lessons Learned

Overall, the survey results appear to broadly confirm the findings of the project, so far. People are concerned about the ethical and Human Rights aspects of SIS, across a wide range of areas and for a wide range of reasons. They are also concerned that what is currently being done is not enough and so more needs to be done in the future.

More specifically, the 35 issues identified by the project so far do seem to resonate with the respondents. The 15 application areas identified and presented in the survey were also broadly seen as areas in which ethical and human rights issue would increase in importance. In terms of the concerns the people showed, this reflects media presentation of the misuse of SIS, such as for cyber-attacks or distribution of 'fake news' content. Finally, among a range of options including future legislation, regulation, codes of conduct for developers and users, the strongest support for the way to address ethics and human rights issues in SIS in the future was for education. SHERPA will now use a Delphi study approach to delve much deeper into the issues and thinking behind some of the findings shown here.

Limitations

While the survey had aimed to be completed by 1,000 respondents, and there were multiple attempts to generate further responses, in the end it was completed by less than 50% of this target. Therefore, it lacks any qualitative representative element for Europe as a whole. Also, as noted by the qualitative comments, because SIS and AI are very context dependant, a 'bare' online survey finds it hard to capture these nuances. However, the survey results will feed into the next analytical tool, the in-depth Delphi study, which will allow for a deeper exploration of these more nuanced elements of the ethics and Human Rights aspects of SIS.

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Appendix A: SHERPA Questionnaire

See following link for the online version of the SHERPA Survey.

Below is the content of the survey questions, in a formatted offline version.

Participant info

What is the survey about?

The SHERPA project (Grant no 786641) (https://www.project-sherpa.eu/) will investigate, analyse and synthesise our understanding of how smart information systems (SIS) impact ethics and human rights issues. It will develop novel ways of understanding and addressing SIS challenges, evaluate with stakeholders, and advocate the most desirable and sustainable solutions. This online survey seeks to gain opinion about the ethical and human rights issues relating to SIS. Also, the survey will inform the exploration of possible options for addressing ethics and human rights issues related to SIS.

How long will the survey take?

The survey will take 10 to 15 minutes to complete. It is is voluntary, and you can stop and withdraw at any time. None of the data you supplied will be collected if you do this.

What about data protection?

We guarantee your anonymity. We will not collect any information about you that would allow anybody to identify you.

Where will the data go?

The anonymous data will be stored and managed by the SHERPA project. The data will be managed in accordance with GDPR.

When can I see the results?

Results will be available after mid-2020 and can be accessed via the project's website at https://www.project-sherpa.eu

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Current status and concerns

Smart Information Systems (SIS) are a combination of artificial intelligence (AI) and big data. Some examples of these technologies include Amazon's Alexa home assistant, Google's search engine, AI algorithms used in Facebook and other social media. Such SIS collect and process big data and use AI for analysis and decision-making.

Consent

We would like you to complete this survey for the SHERPA project (Shaping the ethical dimensions of smart information systems (SIS) – a European perspective). The SHERPA project (grant no 786641) (https://www.project-sherpa.eu/) will investigate, analyse and synthesise our understanding of the ways in which smart information systems (SIS) impact ethics and human rights issues. It will develop novel ways of understanding and addressing SIS challenges, evaluate with stakeholders, and advocate the most desirable and sustainable solutions.

Data Use

The responses that you give will be used by the SHERPA consortium for the purposes of the project. They will be stored on the project server and only be available to project partners and research collaborators. We will not collect identifiable personal data. Demographic data is collected to check the validity of the findings and will not be used to identify participants. The data will be used to produce documents and deliverables for the project and publications.

I agree with the use of my responses for research purposes of the SHERPA project as outlined above. [yes/no]

Part A: Focus on current ethical, human rights issues in SIS

Smart Information Systems (SIS) are a combination of artificial intelligence (AI) and big data. Some examples of these technologies include Amazon's Alexa home assistant, Google's search engine, AI algorithms used in Facebook and other social media. Such SIS collect and process big data and use AI for analysis and decision-making.

Question 1: SIS Related Ethical and Human Rights Issues

This question is based on the insights generated by the SHERPA case studies, which include a list of ethical issues that respondents faced in the cases. The purpose of this question is to validate the findings and to allow for a better understanding of the perception of the severity of these issues.

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For each of the following ethical issues, which have been identified as being relevant to SIS, please rate/show what level of importance you would give to it? *(please give one rating/tick/cross for each)*

Ethical Issues	Brief Explanation	Not at all important	Not very important	Do not know / not applicable	Important	Very important
Access	Related to the potential to favour people with more money to access SIS (ie. poorer people may not be able to afford access or the knowledge to access these technologies), at the local national or even global level					
Accountability and liability	Related to the need to explain and justify one's decisions and actions to its partners, users and others with whom the SIS interacts; Regarding liability, it is related to the sense that a person who has suffered loss because of a decision made by SIS may be owed a duty of care					
Accuracy of Data	Related to using misrepresentative data or misrepresenting information (i.e. predictions are only as good as the underlying data) and how that affects end user views on what decisions are made (i.e. whether they trust the SIS and outcomes arising from it)					

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Ethical Issues	Brief Explanation	Not at all important	Not very important	Do not know / not applicable	Important	Very important
Accuracy of Recommendations	Related to the possibility of misinterpreting data, implementing biases, and diminishing the accuracy of SIS recommendations					
Bias	Related to the samples people that might be chosen/involved in generating data					
Control	The degree to which people perceive they or the SIS are in control					
Democracy	The degree to which all involved feel they have an equal say in the outcomes, compared with the SIS					
Discrimination	Related to discrimination in terms of who has access to data. For example, discrimination in algorithms may be conscious or unconscious acts by those employing the SIS, or a result of algorithms mirroring society by reflecting pre-existing biases					
Economic	Related to the potential for SIS to boost economic growth and productivity, but at the same time creating equally serious risks of job market polarisation, rising inequality, structural unemployment and emergence of new undesirable industrial structures					

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Ethical Issues	Brief Explanation	Not at all important	Not very important	Do not know / not applicable	Important	Very important
Fairness	Related to how data is collected and manipulated (i.e. how it is used), also who has access to the data and what they might do with it as well as how resources (e.g. Energy) might be distributed according to the guidance arising out of the data					
Freedom	Related to the manipulative power of algorithms results in nudges towards some preferred behaviours, free will and the self-determination of people, which are the preconditions for democratic constitutions, run the risk of being compromised					
Health	The use of SIS to monitor an individual's health and how much control one can have over that					
Human Contact	The potential for SIS to reduce the contact between people, as they take on more of the functions within a society					
Digital divide	Related to the potential for SIS to favour people with more money (i.e. poorer people may not be able to afford access or the knowledge to access these technologies)					

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Ethical Issues	Brief Explanation	Not at all important	Not very important	Do not know / not applicable	Important	Very important
Dignity and care for the elderly	The level at which SIS is seen as impacting on the dignity and care for older people, for example how much a care robot might exert over an older person's life and 'tell them what to do'					
Dual use	Concerns over the potential use of SIS for both military and non-military use					
Environment	Related to the use of SIS resources contributing to the production of greenhouse emissions as well as impacting the environments they are built on					
Individual Autonomy	Related to how algorithms used in SIS affect how people analyse the world and modify their perception of the social and political environment					
Inequality	Related to the digital divide and the potential for SIS to favour people with more money (ie. poorer people may not be able to afford access or the knowledge to access these technologies), at the local national or even global level; also related to discrimination in terms of who has access to data					

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Ethical Issues	Brief Explanation	Not at all important	Not very important	Do not know / not applicable	Important	Very important
Informed Consent	Related to informed consent being difficult to uphold in SIS when the value and consequences of the information that is collected is not immediately known by users and other stakeholders, thus lowering the possibility of upfront notice					
Integrity	The internal integrity of the date used as well as the integrity of how the data is used by a SIS					
Justice	The use of SIS within judicial systems, for example AI used to 'inform' judicial reviews in areas such as probation					
Ownership of Data	Where ownership of data sits, and how transparent that is, for example when you give details to an organisation, who then 'owns' the data, you or that organisation					
Manipulation	What is done with and to the data, for example when used with other data points to make a dataset, how is this done, what basis and who is making sure that it is not in some way abused					

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Ethical Issues	Brief Explanation	Not at all important	Not very important	Do not know / not applicable	Important	Very important
Military, Criminal, Malicious Use	Related to the use of SIS to make predictions about future possible military, criminal and malicious scenarios that can elaborate and improve strategies for instance, in cyber-attacks and cyber espionage					
Power Asymmetries	Related to the fact that the knowledge offered by SIS and its practices, and how to regulate this knowledge is in the hands of a few powerful corporations					
Privacy	Related to how much data is collected, where from (i.e. public such as social media or privately directly from the person/home) and how well it is looked after					
Responsibility	Related to the role of people themselves and to the capability of SIS to answer for one's decision and identify errors or unexpected results					
Rights	As SIS, such as AI, gain more complexity and empowerment, then to what degree they should have rights and be protected, e.g. digital personhood					

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Ethical Issues	Brief Explanation	Not at all important	Not very important	Do not know / not applicable	Important	Very important
Security	Related to the sensitivity of SIS given the amounts and kind of data that they hold which needs protection of the systems against hackers to ensure a positive impact and reduce risks					
Sustainability	Related to a concern about the data centres needed to run SIS, as the demand for huge computing power along with greater resources and energy required for data collection, storage and analytics					
Transparency	Related to the need to describe, inspect and reproduce the mechanisms through which SIS make decisions and learns to adapt to its environment, and to the governance of the data used created.					
Trust	Related to using misrepresentative data or misrepresenting information (ie. predictions are only as good as the underlying data) and how that affects					
	end user views on what decisions are made (i.e. whether they trust the SIS and outcomes arising from it); also related to informed consent and that helps with trust					

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Ethical Issues	Brief Explanation	Not at all important	Not very important	Do not know / not applicable	Important	Very important
Unemployment	The worry that use of SIS will lead to significant drop in the need to employ people					
Use of Personal Data	The concerns over how SIS might use your and anyone's personal data					

Question 2: Application areas of SIS

This question explores the expectations of the respondents with regards to the future use of SIS, drawn from the case studies and scenarios and human rights analysis.

AI and big data are already used or are expected to be used in the following application areas. Please indicate whether you think the ethical and human rights issues arising in these areas are likely to become more, or less important in the future. You can find detailed example of these applications here SHERPA Project Workbook. *(please give one rating/tick/cross for each)*

SIS Application areas	Likely to be less important in the future	Likely to remain the same	Likely to become more important	Don't know / not applicable
Employee Monitoring and Administration				
Government				
Agriculture				
Sustainable Development				

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SIS Application areas	Likely to be less important in the future	Likely to remain the same	Likely to become more important	Don't know / not applicable
Science				
Insurance				
Energy and Utilities				
Communications, Media and Entertainment				
Retail and Wholesale Trade				
Manufacturing and natural resources				
Predictive Policing				
Self-Driving Cars				
Mimicking Technologies				
Warfare				
Education				

Smart Information Systems (SIS), including Artificial Intelligence (commonly known as AI), have the potential to significantly impact on every aspect of our lives. Please answer the following questions about where and how these SIS might be used.

Data privacy - related to how much data is collected, where from (i.e. public such as social media or privately directly from the person/home) and how well it is looked after;

Transparency and fairness - related to how data is collected and manipulated (i.e. how it is used), also who has access to the data and what they might do with it as well as how resources (e.g. Energy) might be distributed according to the guidance arising out of the data;

Bias - related to the samples people that might be chosen/involved in generating data;

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Trust and accuracy - related to using misrepresentative data or misrepresenting information (ie. predictions are only as good as the underlying data) and how that affects end user views on what decisions are made (i.e. whether they trust the SIS and outcomes arising from it); also related to informed consent and that helps with trust;

Inequalities - related to the digital divide and the potential for SIS to favour people with more money (i.e. poorer people may not be able to afford access or the knowledge to access these technologies), at the local national or even global level; also related to discrimination in terms of who has access to data.

Question 3 - For each of the following SIS relevant ethical issues, please show whether it is something that concerns you now, or might in the future, and whether you feel there should be regulations or education about each of these to help you?

	Concerning now	Concerning in the future	Regulation about this needed	Education about this needed
Data privacy				
Transparency and fairness				
Bias				
Trust and accuracy				
Inequalities				

Question 4: Security and ethics related predictions and trends

This question explores opinions of the respondents with regards to a number of statements on the future SIS-related developments.

Concerns and opportunities brought by SIS technologies are already widely discussed. Please indicate the extent of your agreement with the stated predictions and trends for the next ten years. You can find background information for these statements here SHERPA Deliverable D1.3. *(please give one rating/tick/cross for each)*

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Statements	Fully disagree	Partially disagree	No opinion / not applicable	Partially agree	Fully agree
Widespread use of SIS in preparing and conducting cyber-attacks					
Widespread use of SIS for disinformation and producing fake news content					
Data sets arising from continuous collection of data (from connected sensors/ systems/ environments) have now become being available for AI-based systems, with few constraints					
Continuous Sustained collection of data from connected sensors and other systems and environments will lead to the proliferation of surveillance					
The ability to generate fake content will stay far ahead of our ability to detect whether the content is real or fake					
Explainability will be a legally required property of any SIS-based model					
Trained AI models will have to be vetted and withheld from the public if concerns of potential malicious use appear					
Companies will favour time-to-market over quality and security, when building SIS-based services					

Part B: Focus on possible options (WP3)

Question A: Overview

This question aims to explore whether respondents have a view on which ways of addressing SIS ethics and human rights issues are most suitable

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What do you think about the likelihood of success of these different ways of addressing ethical and human rights issues in SIS? *(please give one rating/tick/cross for each)*

Option	Unlikely to be successful	Likely to be successful	Don't know / not applicable
Current legislation / regulation to support human rights			
Future legislation / regulation to support human rights			
Creation of new a regulator for AI/big data			
Ethical guidelines / codes of conduct for SIS developers			
Ethical guidelines / codes of conduct for SIS users			
Standardisation			
Certification			
Technical options			
Education			

Question B: Open question

Please highlight your experience beyond the closed questions.

Do you want to share any further insights, point out omissions, provide pointers for the SHERPA consortium to follow up? If so, please provide your comments here:

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Part C: Demographics

Please tell us a little bit about you, the respondent, so that we are better able to understand which issues or applications are seen as particularly relevant by specific groups. Note, these questions are optional, and the information collected here will be kept confidential and will not be used to identify any specific respondents in the reporting of the survey results.

Question a: To which gender identity do you most identify?

[Radio box]

- Female
- Male
- Other
- Prefer not to say

Question b: Please indicate your age

[Numerical answer]

Question c: What is your country of usual residence?

[Drop-down list]

Question d: How would you describe your ethnicity?

- White
- Mixed
- Black/African/Caribbean
- Asian
- Hispanic
- Other

Question e: What is your level of expertise with SIS Data?

[Likert scale from 1 (low expertise) to 5 (high expertise)]

Question f: What is your highest educational qualification?

[Dropdown list]

- Secondary school

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- Non-university professional qualification (e.g diploma, professional certifications)
- University degree
- Masters degree
- PhD
- Other (please specify)

Part D: Finally

Are there any other comments on SIS and its use within modern society that you would like to make?

Thank you very much for completing this online survey and contributing towards the SHERPA project.

If you are an expert in some aspect of SIS, would you like to engage in a more detailed discussion of these issues and be interested in participating in the SHERPA Delphi Study?

- Yes
- No
- If Yes, please supply your email address and a short statement of your expertise

Please feel free to sign-up for our stakeholder network and send us any further comments/questions, at https://www.project-sherpa.eu/

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Appendix B: Invitation Email

Dear [insert Participant Name],

On behalf of the SHERPA project, we would like to invite you to respond to a survey regarding your experiences with ethics of Artificial Intelligence and Big Data, a combination of which we are calling Smart Information Systems (SIS). This online survey forms a part of the research that is conducted in the EU Horizon 2020 SHERPA project to identify and prioritise ways in which ethical and human rights impacts of artificial intelligence and big data should be addressed. The survey is intended to gather opinions about the ethical and human rights issues relating to SIS. Also, the survey will inform the exploration of possible options for addressing ethics and human rights issues related to SIS.

The key reason why we have approached you is because of your interest and expertise in the field. We are keen to hear about your experiences and ultimately, we are really eager to learn from your insights concerning ethics and human rights issues related to SIS.

By participating in this survey, you will be contributing to the outcomes of the SHERPA project which provides policy advice to the European Commission. Therefore your participation will influence policy through the SHERPA project.

Should this opportunity interest you, we would be grateful if you could complete the survey by [Insert date]. We expect the survey will take around 15 minutes to complete. The survey (with further information) is available here: [Link to the SHERPA online survey].

If you have any questions, please do not hesitate to ask. Looking forward to hearing from you.

Sincerely, [DMU Partner]

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Appendix C: Ethics Approval

See below for a copy of the ethics approval letter for the SHERPA online survey.

DE MONTFORT UNIVERSITY LEICESTER

03 October 2019

Dr Tilimbe Jiya
Centre for Computing & Social Responsibility (CCSR)
School of Computer Science & Informatics
Faculty of Computing, Engineering and Media

Dear Tilimbe

Research Ethics Application Approval: 1920/520 - SHERPA project Online Survey

Your application to gain ethical approval for research activities has been considered and approved by Professor Kathleen Richardson

Your approval is valid for three years from the date of this communication. Should you wish to continue this research after this period, please note that you must resubmit your application using the normal process.

Please be aware that changes to the project plan or unforeseen circumstances may raise ethical issues. If this is the case it is the researcher's duty to repeat the ethics approval process.

Yours sincerely

Professor Kathleen Richardson
Chair, Faculty Research Ethics Committee

Faculty of Computing, Engineering and Media, The Gateway, Leicester, LE1 9BH, United Kingdom
S:\RIO Administration\Ethics\FREC - Faculty Research Ethics Committee\1920 520 Jiya Approval Ltr 031019.doc

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Appendix D: Summary Tables of the Online Survey Raw Data

Access to SIS	
Not at all important	8
Not very important	8
Do not know / not applicable	20
Important	78
Very important	31

Accountability and Liability	
Not at all important	3
Not very important	2
Do not know / not applicable	1
Important	40
Very important	98

Accuracy of Data	
Not at all important	4
Not very important	5
Do not know / not applicable	1
Important	43
Very important	96

Accuracy of Recommendations	
Not at all important	3
Not very important	10
Do not know / not applicable	8
Important	67

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Very important	56

Bias	
Not at all important	4
Not very important	2
Do not know / not applicable	10
Important	39
Very important	90

Control	
Not at all important	4
Not very important	3
Do not know / not applicable	5
Important	58
Very important	71

Democracy	
Not at all important	6
Not very important	5
Do not know / not applicable	21
Important	46
Very important	65

Discrimination	
Not at all important	2
Not very important	3
Do not know / not applicable	9
Important	42
Very important	88

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Economic	
Not at all important	3
Not very important	16
Do not know / not applicable	21
Important	67
Very important	33

Fairness	
Not at all important	3
Not very important	1
Do not know / not applicable	7
Important	56
Very important	73

Freedom	
Not at all important	4
Not very important	6
Do not know / not applicable	8
Important	51
Very important	73

Health	
Not at all important	2
Not very important	11
Do not know / not applicable	15
Important	52
Very important	62

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Human Contact	
Not at all important	4
Not very important	14
Do not know / not applicable	34
Important	49
Very important	40

Digital Divide	
Not at all important	4
Not very important	12
Do not know / not applicable	20
Important	66
Very important	38

Dignity & Care for the Elderly	
Not at all important	4
Not very important	6
Do not know / not applicable	14
Important	58
Very important	57

Dual Use	
Not at all important	5
Not very important	10
Do not know / not applicable	29
Important	35
Very important	58

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Environment	
Not at all important	3
Not very important	14
Do not know / not applicable	14
Important	49
Very important	60

Individual Autonomy	
Not at all important	3
Not very important	4
Do not know / not applicable	11
Important	54
Very important	68

Inequality	
Not at all important	2
Not very important	9
Do not know / not applicable	10
Important	48
Very important	73

Informed Consent	
Not at all important	2
Not very important	6
Do not know / not applicable	6
Important	44
Very important	82

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Integrity	
Not at all important	3
Not very important	4
Do not know / not applicable	11
Important	54
Very important	68

Justice	
Not at all important	1
Not very important	3
Do not know / not applicable	7
Important	60
Very important	65

Ownership of Data	
Not at all important	2
Not very important	15
Do not know / not applicable	5
Important	50
Very important	68

Manipulation	
Not at all important	2
Not very important	6
Do not know / not applicable	8
Important	37
Very important	86

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Military, Criminal or Malicious Use	
Not at all important	1
Not very important	6
Do not know / not applicable	12
Important	32
Very important	87

Power Asymmetries	
Not at all important	3
Not very important	7
Do not know / not applicable	20
Important	45
Very important	62

Privacy	
Not at all important	3
Not very important	7
Do not know / not applicable	2
Important	36
Very important	92

Responsibility	
Not at all important	1
Not very important	3
Do not know / not applicable	3
Important	49
Very important	81

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Rights (including Robot Rights)	
Not at all important	11
Not very important	10
Do not know / not applicable	29
Important	46
Very important	41

Security	
Not at all important	1
Not very important	1
Do not know / not applicable	4
Important	49
Very important	81

Sustainability	
Not at all important	2
Not very important	10
Do not know / not applicable	19
Important	57
Very important	51

Transparency	
Not at all important	2
Not very important	5
Do not know / not applicable	3
Important	43
Very important	85

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Trust	
Not at all important	3
Not very important	3
Do not know / not applicable	5
Important	38
Very important	86

Unemployment	
Not at all important	4
Not very important	24
Do not know / not applicable	30
Important	50
Very important	30

Use of Personal Data	
Not at all important	1
Not very important	6
Do not know / not applicable	3
Important	44
Very important	84

Employee Monitoring	
Likely to be less important in the future	10
Likely to remain the same	27
Likely to become more important	97
Don’t know / not applicable	1

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Government	
Likely to be less important in the future	8
Likely to remain the same	22
Likely to become more important	99
Don’t know / not applicable	5

Agriculture	
Likely to be less important in the future	8
Likely to remain the same	52
Likely to become more important	50
Don’t know / not applicable	24

Sustainable Development	
Likely to be less important in the future	2
Likely to remain the same	45
Likely to become more important	74
Don’t know / not applicable	13

Science	
Likely to be less important in the future	8
Likely to remain the same	26
Likely to become more important	93
Don’t know / not applicable	6

Insurance	
Likely to be less important in the future	7
Likely to remain the same	28
Likely to become more important	93
Don’t know / not applicable	6

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Energy and Utilities	
Likely to be less important in the future	4
Likely to remain the same	43
Likely to become more important	78
Don’t know / not applicable	11

Communications, Media and Entertainment	
Likely to be less important in the future	9
Likely to remain the same	35
Likely to become more important	84
Don’t know / not applicable	7

Retail and Wholesale Trade	
Likely to be less important in the future	16
Likely to remain the same	49
Likely to become more important	61
Don’t know / not applicable	8

Manufacturing and Natural Resources	
Likely to be less important in the future	9
Likely to remain the same	58
Likely to become more important	58
Don’t know / not applicable	9

Predictive Policing	
Likely to be less important in the future	9
Likely to remain the same	19
Likely to become more important	101
Don’t know / not applicable	8

Self Driving Cars	
Likely to be less important in the future	11

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Likely to remain the same	19
Likely to become more important	101
Don’t know / not applicable	8

Mimicking Technologies	
Likely to be less important in the future	5
Likely to remain the same	24
Likely to become more important	78
Don’t know / not applicable	28

Warfare	
Likely to be less important in the future	6
Likely to remain the same	17
Likely to become more important	96
Don’t know / not applicable	15

Education	
Likely to be less important in the future	7
Likely to remain the same	30
Likely to become more important	87
Don’t know / not applicable	9

Data Privacy	
Concerning Now	117
Concerning in the Future	55
Regulation about this is needed	74
Education about this is needed	75

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Transparency and Fairness	
Concerning Now	100
Concerning in the Future	54
Regulation about this is needed	75
Education about this is needed	66

Bias	
Concerning Now	187
Concerning in the Future	60
Regulation about this is needed	62
Education about this is needed	71

Trust and Accuracy	
Concerning Now	97
Concerning in the Future	51
Regulation about this is needed	73
Education about this is needed	61

Inequalities	
Concerning Now	78
Concerning in the Future	69
Regulation about this is needed	65
Education about this is needed	68

Gender	
Female	55
Male	60
Other	0
Prefer not to say	4

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Average Age of Participant
49

Ethnicity	
White	108
Mixed	2
Black/African/Caribbean	1
Asian	4
Hispanic	1
Other	4

Expertise in SIS	
Low Expertise	9
Low to Medium Expertise	12
Medium Expertise	38
Medium to High Expertise	24
High Expertise	37

Highest Educational Qualification	
Secondary school	228
Non-university professional qualification (e.g diploma, professional certifications)	0
University degree	12
Masters degree	23
PhD	80
Other	0

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Country of Origin	
Australia	4
Austria	1
Belgium	8
Canada	3
China	1
Croatia	1
Cyprus	1
Finland	1
France	8
Germany	9
Greece	9
Hong Kong	1
India	1
Israel	1
Italy	8
Lithuania	1
Malta	1
Nepal	1
Netherlands	11
Poland	3
Portugal	2
Romania	3
Serbia	2
Slovenia	2
South Korea	1
Spain	7
Turkey	2
United Kingdom	22

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United States	6

Widespread use of SIS in preparing and conducting cyber-attacks	
Fully disagree	1
Partially disagree	5
No opinion / not applicable	10
Partially agree	36
Fully agree	77

Widespread use of SIS for disinformation and producing fake news content	
Fully disagree	4
Partially disagree	1
No opinion / not applicable	3
Partially agree	47
Fully agree	75

Data sets arising from continuous collection of data (from connected sensors/ systems/ environments) have now become available for AI-based systems, with few constraints	
Fully disagree	0
Partially disagree	10
No opinion / not applicable	7
Partially agree	60
Fully agree	54

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Continuous Sustained collection of data from connected sensors and other systems and environments will lead to the proliferation of surveillance	
Fully disagree	5
Partially disagree	12
No opinion / not applicable	5
Partially agree	46
Fully agree	60

The ability to generate fake content will stay far ahead of our ability to detect whether the content is real or fake	
Fully disagree	5
Partially disagree	23
No opinion / not applicable	15
Partially agree	47
Fully agree	36

Explainability will be a legally required property of any SIS-based model	
Fully disagree	5
Partially disagree	13
No opinion / not applicable	15
Partially agree	50
Fully agree	42

Trained AI models will have to be vetted and withheld from the public if concerns of potential malicious use appear	
Fully disagree	9
Partially disagree	17
No opinion / not applicable	10
Partially agree	43

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Fully agree	46
Companies will favour time-to-market over quality and security, when building SIS-based services	
Fully disagree	2
Partially disagree	12
No opinion / not applicable	11
Partially agree	47
Fully agree	53

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