AI4media

ARTIFICIAL INTELLIGENCE FOR THE MEDIA AND SOCIETY

ROADMAP ON AI TECHNOLOGIES & APPLICATIONS FOR THE MEDIA INDUSTRY

SECTION: "ONLINE SURVEY ON AI FOR THE MEDIA INDUSTRY (FULL ANALYSIS)"

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1 Online survey on AI for the media industry

One of the tools used to deliver this roadmap on AI for the media industry was a public survey addressed to both AI researchers working on multimedia AI but also to people working in the media industry or whose work is closely related to this industry (e.g. researchers studying the media, media regulators, people working in relevant NGOs, etc.). The survey aimed to collect their ***opinions on the benefits, risks, technological trends and challenges of AI use in the media industry*** as well as their experience on AI strategies and AI skills in media organisations, their insights on the most promising ways to facilitate AI adoption and knowledge transfer and, finally, their perceptions about ethical use of AI.

The ***anonymous*** online survey was launched in December 2021 by the AI4Media project and included two slightly different versions of the same structured questionnaire, addressed to the AI research community and the media professionals' community, respectively (see Appendix, sections 2.1 and 2.2, respectively). The majority of the questions were the same but there were some additional questions addressed specifically either to the first or second community. The survey could be accessed through the AI4Media website[1] (see Figure 1). In total, 150 people completed the survey, 98 from the AI research community and 52 from the media industry or organisations related to the media. In the following, we briefly describe the target groups and content of each questionnaire.

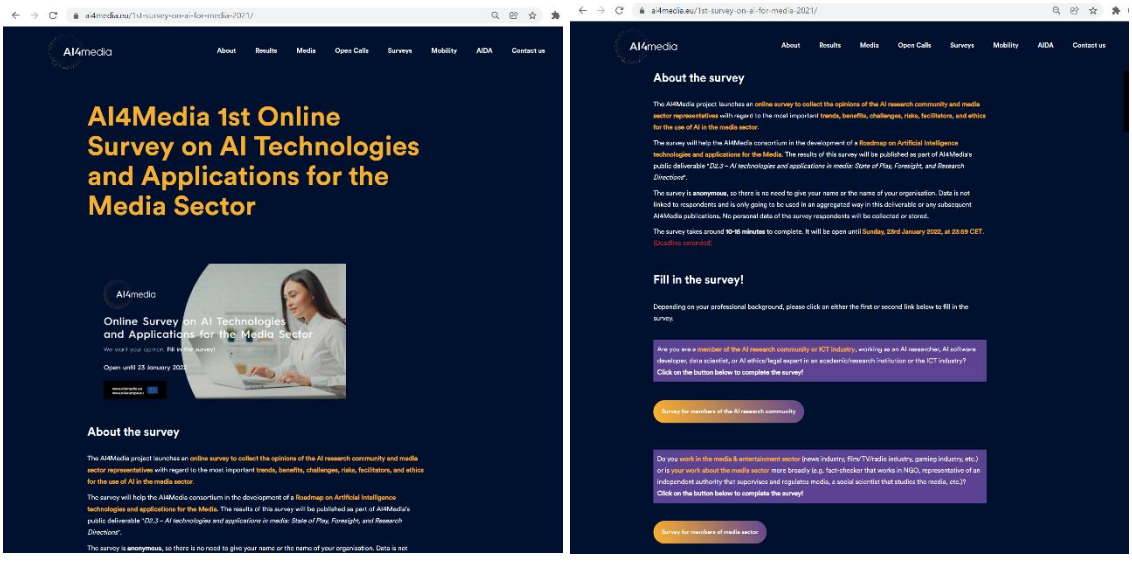


Figure 1: Webpage of the AI4Media online survey on AI for the Media Industry.

Questionnaire for the AI research community *(AIResearchQuest)*: This questionnaire was targeted at AI researchers and developers working in academia, research or ICT industry. The survey included the following sections: (1) Professional background of survey respondents; (2) Future AI technology trends for the media sector; (3) AI benefits for the media sector; (4) AI risks for the media sector; (5) AI challenges for the media sector; (6) Adoption of AI solutions by media

[1] AI4Media 1st Online Survey on AI Technologies and Applications for the Media Sector (2021): https://www.ai4media.eu/1st-survey-on-ai-for-media-2021/

sector; (7) AI ethics & AI regulation. In total, 98 members of the AI research community completed this questionnaire. More information on their professional background can be found in the next section. Some screenshots of this questionnaire can be seen in Figure 2. The full version is available in the Appendix, in section 2.1.

Questionnaire for the media industry *(MediaProfQuest)*: This questionnaire was targeted at media industry representatives (news industry, film/TV/radio industry, gaming industry, music industry, content providers, advertisers etc.) as well as at people whose work is about the media sector more broadly (e.g. fact checkers that work in NGOs, representatives of independent authorities that supervise and regulate media, social scientists that study the media, etc.). The survey included the following sections: (1) Professional background of respondents; (2) AI benefits for the media sector; (3) AI risks for the media sector; (4) AI challenges for the media sector; (5) AI strategies & skills in media sector; (6) Adoption of AI solutions by media sector; (7) AI ethics & regulation. In total, 52 people completed this questionnaire. More information on their professional background can be found in the next section. Some screenshots of this questionnaire can be seen in Figure 3. The full version is available in the Appendix, in section 2.2.

In both versions of the survey, each questionnaire section usually included 1-2 multiple choice questions + complementary open-ended questions (allowing respondents to elaborate, in case the previous choices were not enough). Some survey questions and answers have been inspired by Deloitte's survey on "State of AI in the Enterprise", 2nd edition[2].

In the following subsections, we analyse the received responses. Each subsection corresponds to a different survey section.

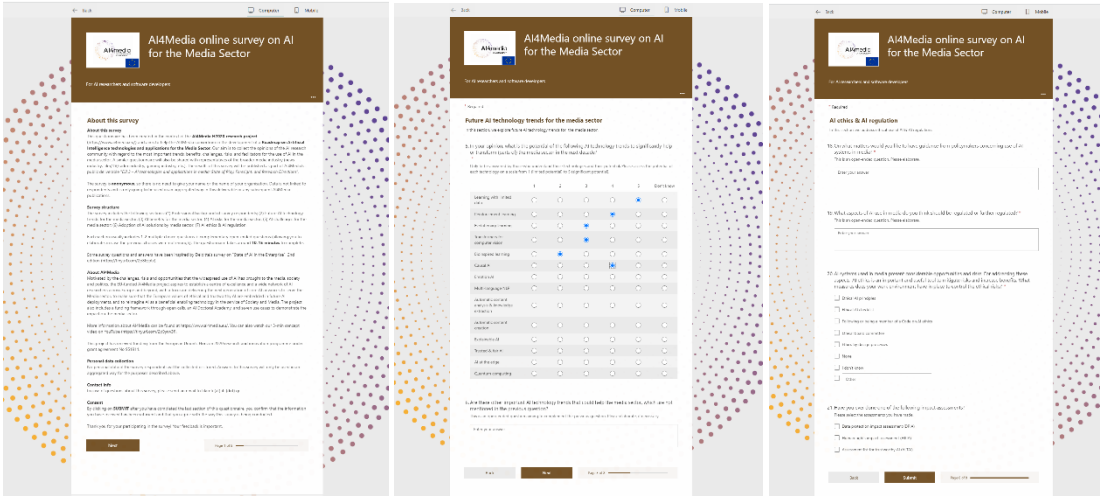


Figure 2: Questionnaire addressed to the AI research community (full version available in the Appendix, section 2.1).

[2] Deloitte's survey on "State of AI in the Enterprise", 2nd edition (2020): https://www2.deloitte.com/content/dam/insights/us/articles/4780_State-of-AI-in-the-enterprise/DI_State-of-AI-in-the-enterprise-2nd-ed.pdf

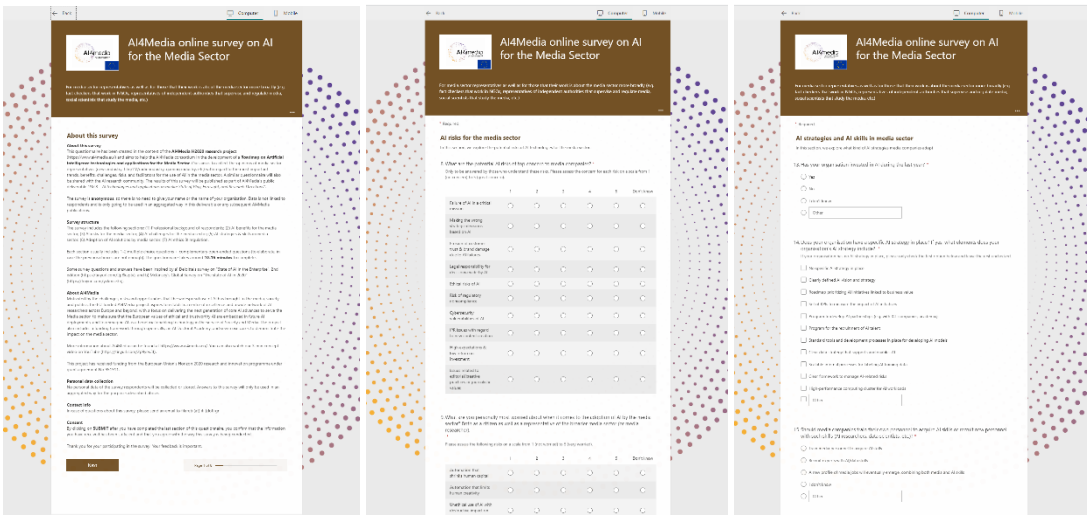
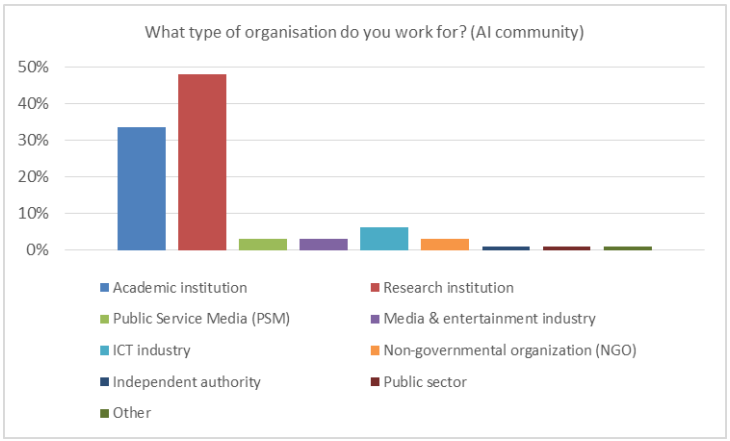


Figure 3: Questionnaire addressed to media industry professionals (full version available in the Appendix, section 2.2).

1.1 Professional background of survey respondents

With regard to the questionnaire addressed to the ***AI research community***, 81% of the responders work in academia or research and 5% in the ICT industry. 56% are researchers, 10% software developers, and 15% Innovation or R&D managers. Their main research interests include general topics like machine learning (72%), deep learning (65%) and data science (45%), as was expected. With regard to more specific fields, the most popular ones are image/video analysis (55%), text analysis (23%), audio or speech analysis & synthesis (19% and 17%), trustworthy AI (23%) and AI ethics (17%). This information is visualised in Figure 4.



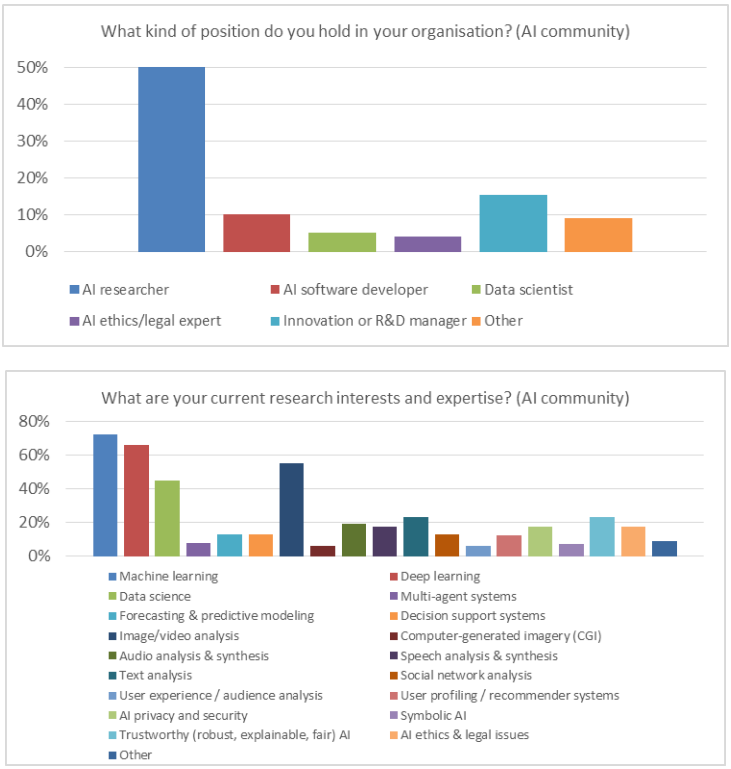


Figure 4: Information about the professional background of respondents to the AIResearchQuest questionnaire.

With regard to the questionnaire addressed to ***media professionals***, 54% of respondents work in Public Service Media (PSM) (25%) or the media & entertainment industry (29%). The rest work for independent authorities, NGOs, academia/research (with their work related to media research), etc. 25% work in a big media network (network that includes several media - TV, radio, news and online media), 19% work in an online news platform while the rest work in various other media organisations (newspaper, TV, Radio, game industry, music, content providers, fact-checking organisation, etc.) or organisations related to media (e.g. PSB associations, regulatory bodies, programmes for data driven media innovation etc.). With regard to their professional background, 21% are journalists, 30% are R&D managers or project managers in a media organisation while the rest are media content creators or providers, game developers, advertisers, fact-checkers, media regulators, media archivers, etc. (see Figure 5).

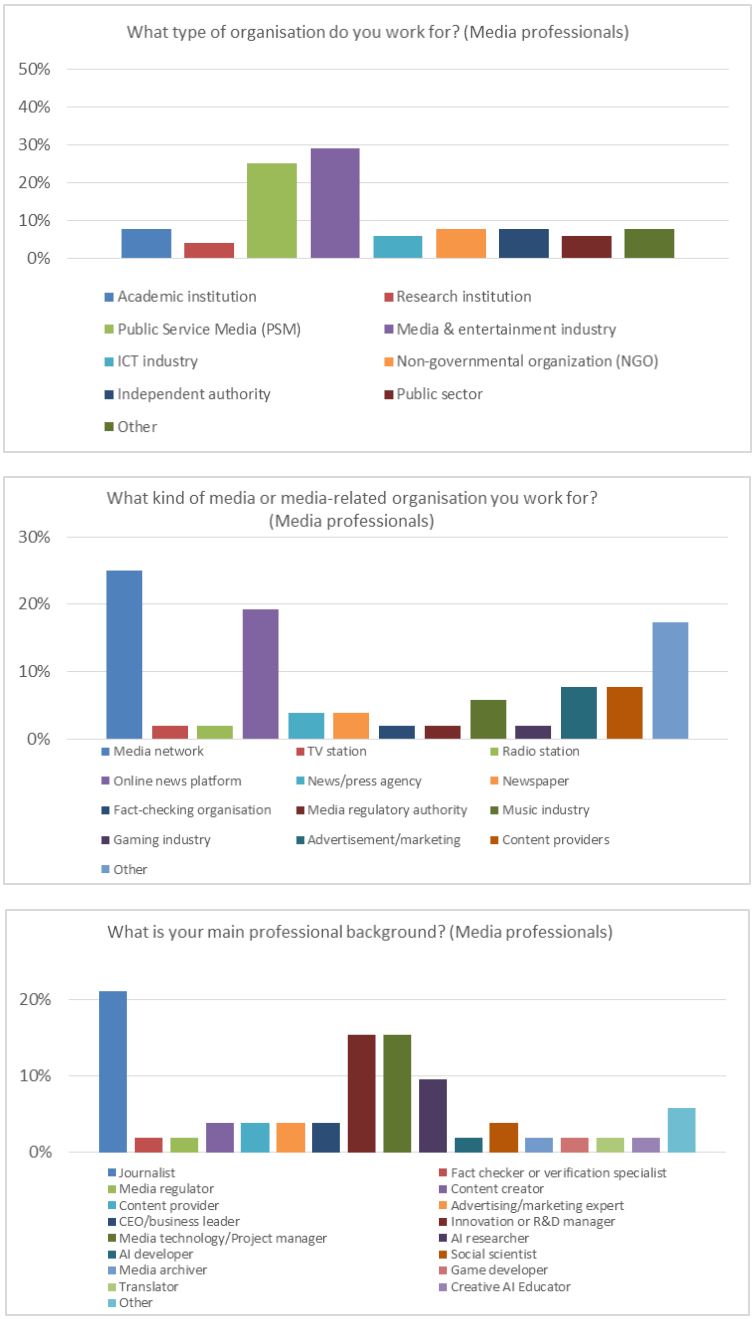


Figure 5: Information about the professional background of respondents to the MediaProfQuest questionnaire.

The 150 respondents worked in 26 different countries in Europe but also in the US and India as can be seen in Figure 6.

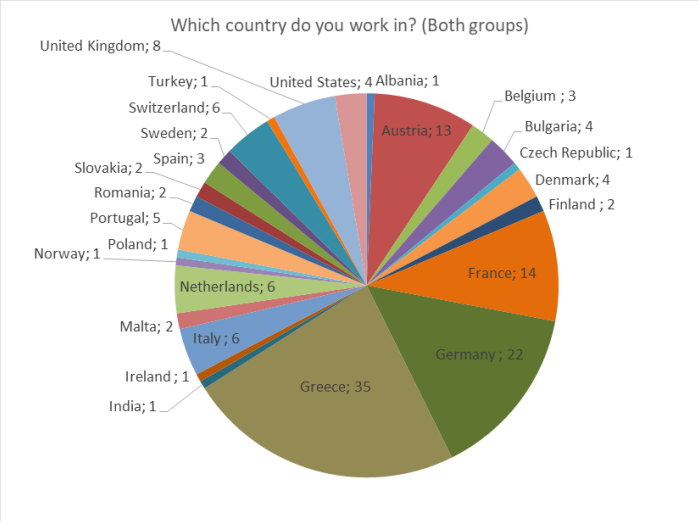


Figure 6: The 26 countries that respondnets of the survey work in.

1.2 Future AI technology trends for the Media Industry

The next section of the survey explored the potential of selected **AI technology trends** to significantly help or transform (parts of) the media sector in the next decade. The technologies examined included a selection of the emerging technologies identified in the section "*Overview: AI research & technology trends*" of this Roadmap such as reinforcement learning, transformers for computer vision, emotion AI, causal AI, explainable AI, quantum computing, etc. The respondents were asked to assess the potential of each technology on a Likert scale (1: limited potential, 5: significant potential). This question was only addressed to the research community. The results are visualised in Figure 7. We can see that the technologies with the biggest potential according to respondents are automatic content analysis & content creation, multi-lingual NLP, learning with limited data, explainable AI and trusted and fair AI. These answers come as no surprise since these technologies aspire to provide solutions to some of the most pressing problems of the media industry: the ever-growing need for new content, the need to automatically analyse content to extract knowledge, the language barrier, the lack of data to train algorithms for new tasks or new domains, and the need for AI that can trusted to be fair and is able to explain its decisions. The technologies that are believed to have less potential are quantum computing and bioinspired learning, which are at the same time the two technologies for which we got a high number of "I don't know" answers. Both technologies are still in a very experimental stage and quite far from becoming widely used in the media or other fields, which explains why respondents may not see their potential to change things significantly in the next decade.

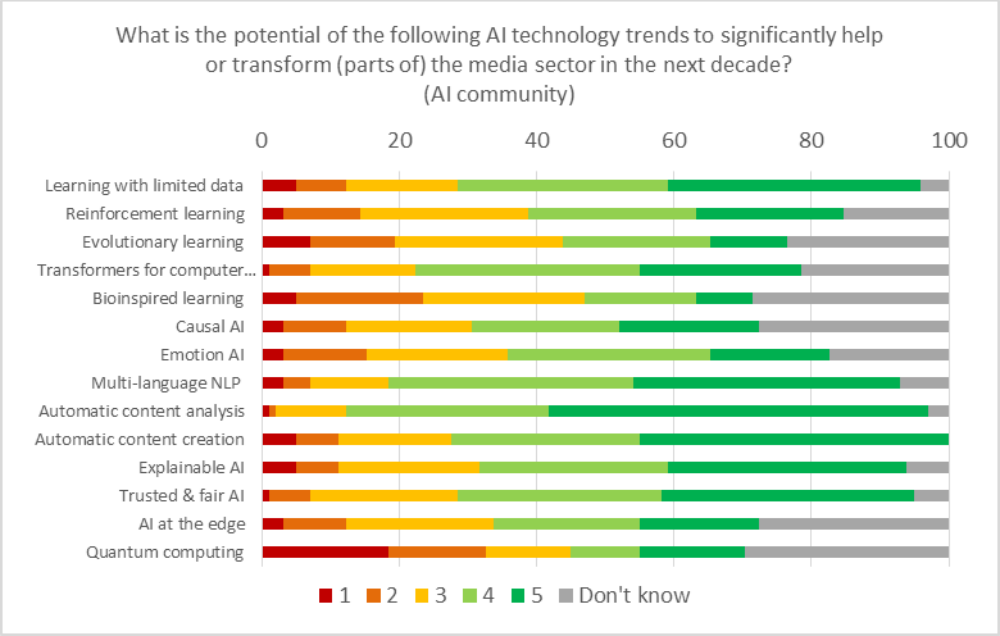


Figure 7: Potential of emerging AI technology trends for the media sector (Likert scale: 1= limited potential, 5 = significant potential).

This section also included an open question, focusing on which other emerging technologies have high potential for transforming the media sector. Answers included:

- Transfer learning;
- Federated learning & privacy preserving technologies;
- Generative AI;
- Better knowledge leveraging (particularly hierarchical and contextual) in training data;
- AI exploiting multi-modality (combining text, image, sound, sentiment, context);
- Thinking Models instead of Language Models;
- MLOps to deploy and maintain ML models in production reliably and efficiently;
- Green AI, scalable and energy-efficient technology.

1.3 Benefits of AI technology for the Media Industry

This section of the survey aims to explore the potential of AI to positively affect and benefit the media sector. Respondents were asked to assess each **potential benefit** for the media sector on a Likert scale (1: not important, 5: very important). The list of potential benefits that AI can bring to the media sector was devised based on the state-of the-art analysis of the section "*Overview of existing AI roadmaps, surveys and review papers*" of this Roadmap – some answers were also inspired by Deloitte's survey as mentioned above. The focus was on popular applications and general business benefits that are applicable to all the different sectors of the media industry. Thus, we examine how important are from a business perspective personalisation of content & services, creation of new services or content, automation of routine tasks, enhanced decision making, big data analysis to identify business opportunities, improved monetisation of content and data etc.

This question was asked to both the AI and media communities. The results are visualised in Figure 8.

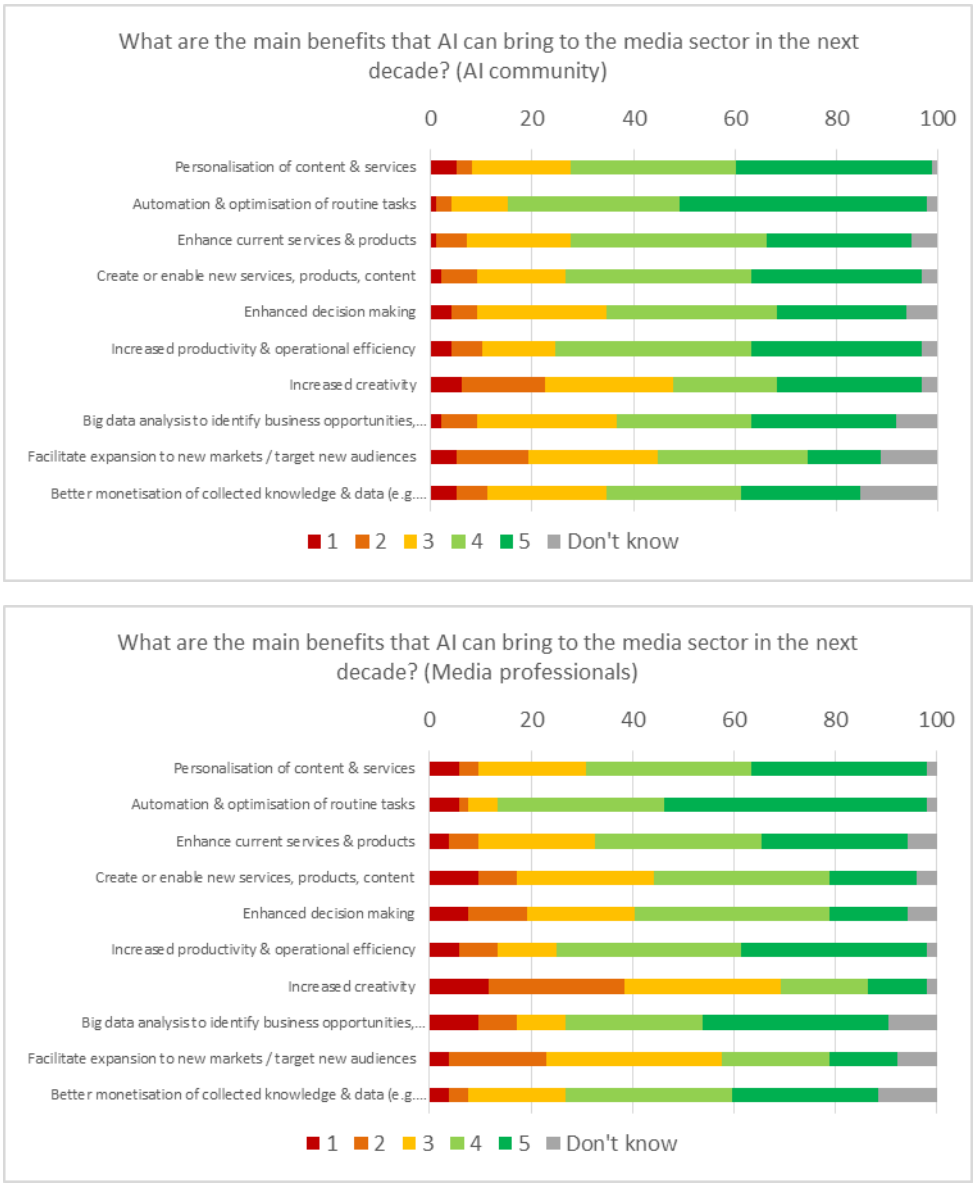


Figure 8: Assessment of the potential AI benefits for the media sector by a) members of the AI research community (top) and b) members of the media industry (bottom) (Likert scale: 1 = not important, 5 = very important).

We can see that survey participants consider automation & optimisation of routine tasks, personalisation of content and services, increased productivity & operational efficiency, and enhancement of current services as the most important benefits of AI. On the other side, both types of respondents seem to believe much less in the potential of AI to increase creativity or facilitate expansion to new markets / target new audiences. The finding about creativity is not that surprising since in other surveys too AI is considered as an assistant - someone to do the hard work - that will increase creativity only indirectly by freeing the workforce from tedious

and boring tasks. People seem to be still suspicious of this aspect of AI since creativity (also related to feeling, inspiration, innovative ideas, etc.) is mainly a characteristic attributed to humans. It is interesting to observe that media professionals are twice as sceptic about this issue compared to AI researchers. Most "I don't know" answers have been received with regard to AI's potential for monetising media assets, identifying business opportunities, and facilitating expansion to new markets. Obviously, these are complex issues that involve a lot of different factors (financial, social, business) and many media professionals may not be sure how exactly AI can fit in this equation (note however, that for all of these potential benefits, positive responds are much higher). As a general observation the results show that AI researchers are more eager to believe in AI's transformative role than the media sector is, although both groups undoubtedly acknowledge that it will significantly help the media sector.

This section also included an open question, focusing on what other benefits AI can bring to the media sector besides those included in the survey. The potential of AI to remove language barriers, automation of tedious tasks and content creation were the topics discussed more by the respondents. Some other interesting answers include:

- Leveraging existing content to repurpose it (learning from videos, for instance) will enable a lot of new products.
- Multilingual and transnational cooperation in content development and journalistic work.
- Democratisation and quality content generation by everyone and everywhere.
- Reducing marketing costs and providing the best possible ROI.
- Solid ground decisions on what content to create and when to release it (content and timing).
- Increase accessibility for disabled people, information accessibility and organisation for users, researchers' research.
- Information fact-checking and content verification, regardless of language.
- Enhanced VR applications for all media.

Finally, media professionals were asked whether they believe that the use of AI has a clear value or benefit for their media organisation. 71% answered 'Yes', 6% 'No', 6% 'I don't know', while 17% said that it was not clear to them. Although, there is definitely a positive expectation for AI, 23% of respondents are still not sure about how AI can or whether AI will benefit their organisation. This necessitates increased awareness campaigns about what AI is and what it can do and possibly more clear strategies for the adoption and operationalisation of AI across a media organisation.

1.4 Risks of AI technology for the Media Industry

This section of the survey aims to explore the **potential risks of AI technologies** for the media sector. Respondents were asked to assess each potential risk on a Likert scale (1: not worried, 5: very worried) both as professionals in their field but also as citizens. The list of potential risks that AI can bring to the media sector was devised based on the state-of the-art analysis of sections "*Overview of existing AI roadmaps, surveys and review papers*" and "*Challenges, risks, and regulation frameworks for AI for the media industry*" of this Roadmap. We examine risks of

AI automation, unethical use, lack of explainability, increased reliance on AI decisions, bias, vulnerability to attacks, user profiling etc. This question was asked to both the AI and media communities. The results are visualised in Figure 9.

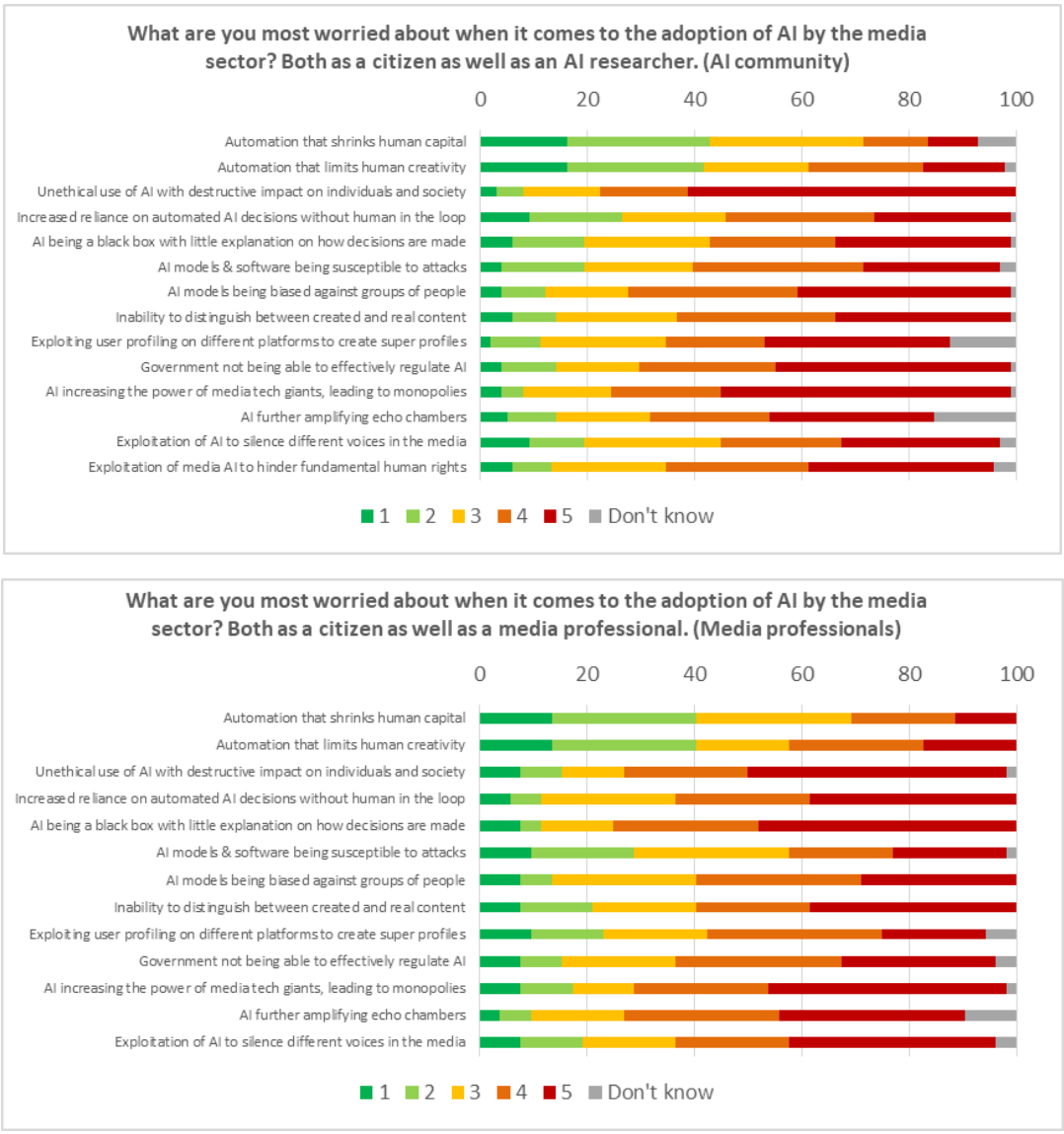


Figure 9: Assessment of potential AI risks for the media sector by a) members of the AI research community (top) and b) members of the media industry (bottom) (Likert scale: 1 = not worried, 5 = very worried).

We can see that survey participants worry less about the risks of automation with regard to the loss of human jobs or limitation of human creativity. But they seem to worry a lot about everything else, most importantly about the unethical use of AI and its impact on society, AI bias, AI's lack of explainability, and potential exploitation of AI to hinder fundamental human rights. It is interesting to note that media professional consider the former (unexplainable AI) a bigger risk than unethical use of AI. Media professionals also worry more about AI amplifying echo chambers, being used to silence voices in the media as well as about increased reliance on AI decisions - while researchers worry that governments will not be able to effectively regulate

AI, which will of course affect AI research as well. We also spot three areas where there is a non-negligible difference between the opinions of media professionals and AI researchers. Media professionals worry much more about reliance on AI decisions and non-explainable AI and much less for AI models & software being susceptible to attacks than AI researchers do. This is not hard to explain. AI researchers develop AI so they know more about how it works or how it can be attacked. Media professionals don't and that is why they worry about the increasing reliance on AI.

In addition to the previous question, media professionals where asked about the potential AI risks of top concern to media companies. The answer options were mostly inspired by the Deloitte survey. Note that here the focus is on the business side (what are the risks for the company) while the previous question also included a societal dimension, asking respondents to provide their opinion also as thinking citizens. The responds to this question are summarised in Figure 10. Risks of top concern include high expectations & low return, failure of AI in a critical mission, and ethical risks. Especially the first, about the hype of AI and what it can actually deliver, seems to be the most important issue: making big investments on AI having high expectations but then not receiving a lot of benefit in return. Failure in a critical mission is also important since one of the main motives for AI adoption is the potential for automation of various tasks – this can be both a blessing and a curse. For the news industry, risks related to editorial/creative practices and journalistic values are also high in the list of concerns. Media professionals seem to worry less about making the wrong strategic decisions based on AI, non-compliance with regulations or IPR issues related to new AI-generated content. Since adoption of AI in the industry is still in early stages, such issues may not worry people yet, especially since they still are not clear about the extent or repercussions of these risks (please note that for some of these risks we have received the most "I don't know" answers).

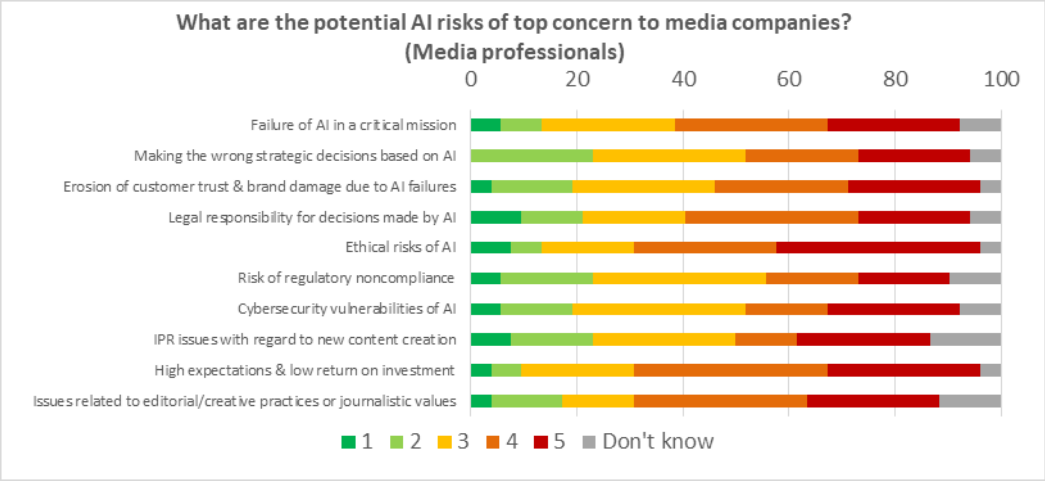


Figure 10: Assessment of top AI risks for media companies (Likert scale: 1 = no concern, 5 = great concern).

Finally, this section also included an open question, asking respondents to identify other risks not mentioned in the previous questions, elaborating on issues related to their own research area or media organisation. Creativity, diversity, bias, employment, access, and IP are among the issues mostly discussed by respondents. Some interesting answers include:

- Devaluing of human creativity due to mass production enabled by AI and reducing cultural diversity.
- More societal gaps (technology, digital competences, access to content and information, etc.) introduced.
- People with no AI skills or unable to adapt may see their salary decreasing.
- AI that misbehaves or AI that cannot be trusted (which can erode trust in media).
- We should understand the full impact of bias in AI before adopting it. Humans tend to hide personal responsibility behind systems.
- Wrong AI-based decisions are a serious threat, even small decisions may be biased.
- Massive IP infringement. Unauthorised use of IP as training material, or input material. Untraceable unlicensed use. Unlicensed derivative works created by AI.

1.5 AI challenges for the Media Industry

This section of the survey aims to explore the ***challenges encountered by AI researchers/developers*** when developing AI technologies for the media sector and the challenges encountered by media professionals with regard to the adoption AI. A different list of challenges was assessed by each group of respondents since the former develop AI while the latter are the users of this technology. The lists were devised based on the state of the art analysis of section "*Overview of existing AI roadmaps, surveys and review papers*" of this Roadmap as well as by discussions that have been happening in the consortium since the beginning of the project with regard to the challenges faced by both research/technical partners and media industry partners. Respondents were asked to assess the importance of each challenge on a Likert scale (1: not important, 5: very important). The results are visualised in Figure 11 and Figure 12, respectively.

With regard to the AI research community, we examine challenges such as lack of data, lack of understanding media sector needs, compliance with regulations, ethical challenges, lack of funding and talent, big-tech monopoly, etc. In Figure 11, we can see that AI researchers and developers consider by far the greatest challenges the lack of data in general to train and test their algorithms but also the reluctance of the media industry to share their data to help and accelerate AI research. The US-China big tech monopoly in AI software and data, facilitated by enormous funding and generally much less regulation, is also something that creates challenges especially for European researchers. Other important challenges include the lack of open access culture for sharing AI algorithms, lack of effective benchmarks and to a lesser extent lack of funding to develop AI for media. What is least challenging or worrisome is apparently the lack of AI talent in universities, research centres and ICT industry or collaboration with media industry and understanding of its needs.

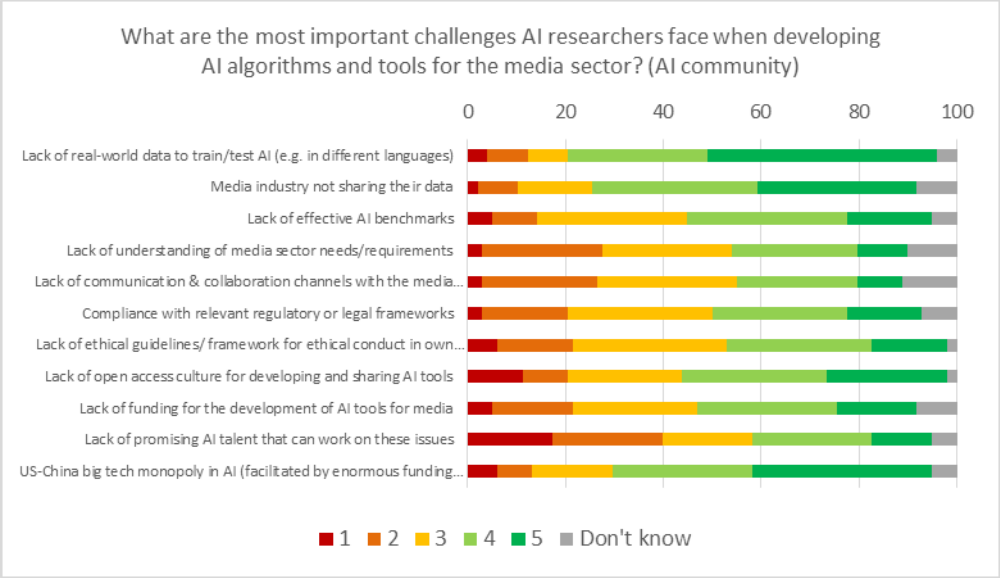


Figure 11: Assessment of most important challenges researchers face when developing AI algorithms and tools for the media industry (Likert scale: 1 = not important, 5 = very important).

This section also included an open question, asking respondents to describe challenges not mentioned in the previous question, elaborating on issues related to their own research area. Access to compute infrastructure, a more multi-disciplinary approach to AI development, and the public research sector are among the issues discussed by respondents. Some interesting answers are listed below:

- Access to computing resources.
- Getting a realistic representation of AI capability embedded in the media.
- Lack of reliability of open source tools as well as real-world data benchmarks.
- Consideration of full AI life cycle (incl. testing, certification, monitoring, etc.) in R&D ecosystem.
- Lack of involvement of media professionals and social scientists in AI development.
- Lack of proper education and sensitisation on non-technical issues (i.e., ethics, aesthetics, human behaviour, etc.).
- Limited usage of media archives because high-level executives in both worlds do not care about reciprocal existence (AI for archives - archives for AI).
- Lack of attractiveness of public research sector for AI research talent vs. non-EU corporations.

With regard to **challenges encountered by the media community**, on the other hand, we examine challenges such as understanding what AI has to offer, operationalising AI and measuring its business value, cost of developing AI solutions, AI explainability, ensuring ethical use or compliance with regulations, lack of AI skills in the media industry, etc. In Figure 12, we can see that media professionals consider by far the greatest challenges the integration of AI in business operations and processes, understanding what AI can do to improve or facilitate workflows and processes in the media industry, and lack of relevant skills in media professionals. The US-China big tech monopoly is also a challenge, since these companies seem to want to suck

the oxygen out of the traditional media industry by becoming the main providers of online content and thus increasing their profits and users. Other important challenges include AI explainability as well as data access and privacy. The least important challenges, according to media professionals, are the establishment of an internal ethical framework for AI use, attracting AI talent in the industry, or proving/measuring AI's business value.

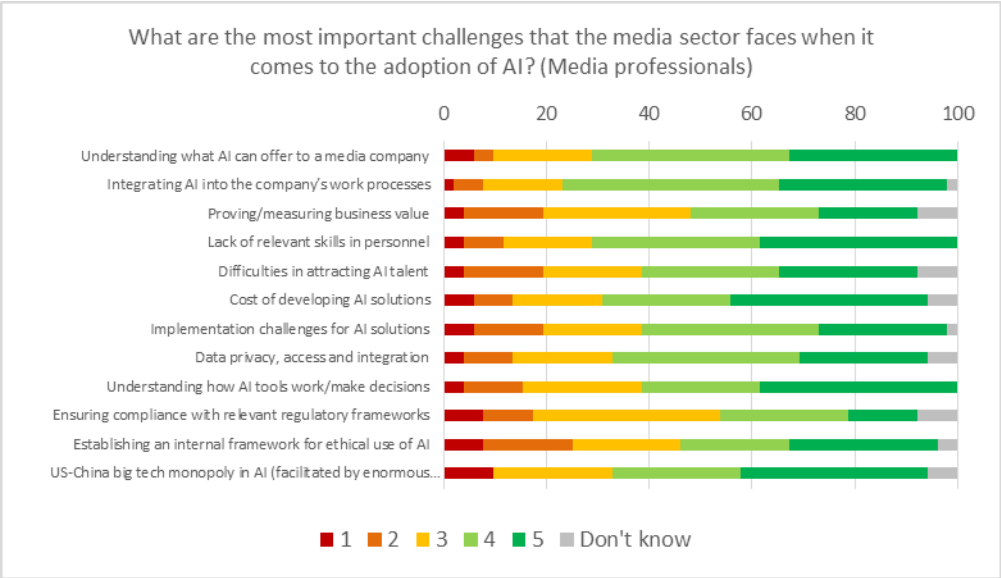


Figure 12: Assessment of most important challenges the media industry faces when when it comes to the adoption of AI (Likert scale: 1 = not important, 5 = very important).

The same open question was addressed to media professionals, asking respondents to describe challenges not mentioned in the previous question, elaborating on issues related to their own line of work. Compliance with upcoming EU regulations, need for transparency, IP issues, or how AI is currently integrated in a media organisation are some of the issues discussed by the respondents. Some very interesting answers are listed below:

- Establishing an internal framework for ethical use of AI is the 'easy' part. It is much more difficult to develop, purchase, integrate and maintain AI systems/tools within the media company (both in-house and from third-parties) that live up to these (paper-based) frameworks in terms of actual implementation and end user acceptance - due to the comparatively early and still immature status of transparent and trustworthy AI, and due to new regulation frameworks coming up.
- Need for content to have transparency and clear labels.
- Getting technology companies to respect copyright, rather than claiming training and other uses is "fair use" or similar.
- News is an ever changing landscape and therefore frequent update of AI models may be needed.

1.6 AI strategies and skills in the Media industry

This section of the survey includes four questions that aim to explore what kind of AI strategies are adopted by the media industry and also examine the issue of AI talent. The questions have

been addressed to media sector professionals (except one that is addressed to both targeted groups of responders).

The first question was about **investments on AI**. Respondents were asked whether their organisation has invested in AI during the last year. Only 50% of responders answered positively. One third (33%) said that their organisation had not invested in AI while 9% said they didn't know (Figure 13). One responder answered that they have in-kind investment through participation in projects and testing (a news agency), while another one said that an investment is planned. The respondents that answered "No" were mainly affiliated with NGOs and independent authorities (e.g. regulating media). Among those working in PSM or the media and entertainment industry, 73% have invested in AI.

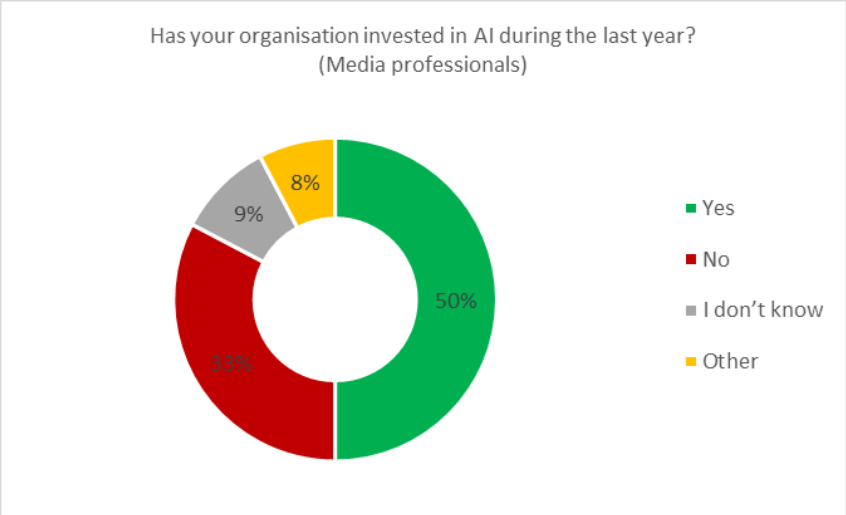


Figure 13: Investement in AI by media and media-related organisations.

The second question examined what kind of **AI strategies** media and media-related organisations have in place, if any. The responders were provided with a list of options from which they could select more than one. The available options include, for example: clearly defined AI vision and strategy, roadmap prioritising AI initiatives linked to business value, KPIs to measure the impact of AI initiatives, program to develop AI partnerships (e.g. with ICT companies, academia), program for the recruitment of AI talent, standard tools and development processes in place for developing AI models, clear data strategy that supports and enables AI, scalable internal processes for labelling AI training data, clear framework to manage AI-related risks, and high-performance computing cluster for AI workloads. This list has been inspired by McKinsey's Global Survey on "The state of AI in 2020"[3]. Results are visualised in Figure 14. An astounding 58% of respondents answered that their organisation had no specific AI strategy in place (see Figure 14(a)). Only 42% had some kind of AI strategy.

[3] McKinsey's Global Survey on "The state of AI in 2020" (2020): https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Analytics/Our%20Insights/Global%20survey%20The%20state%20of%20AI%20in%202020/Global-survey-The-state-of-AI-in-2020.pdf

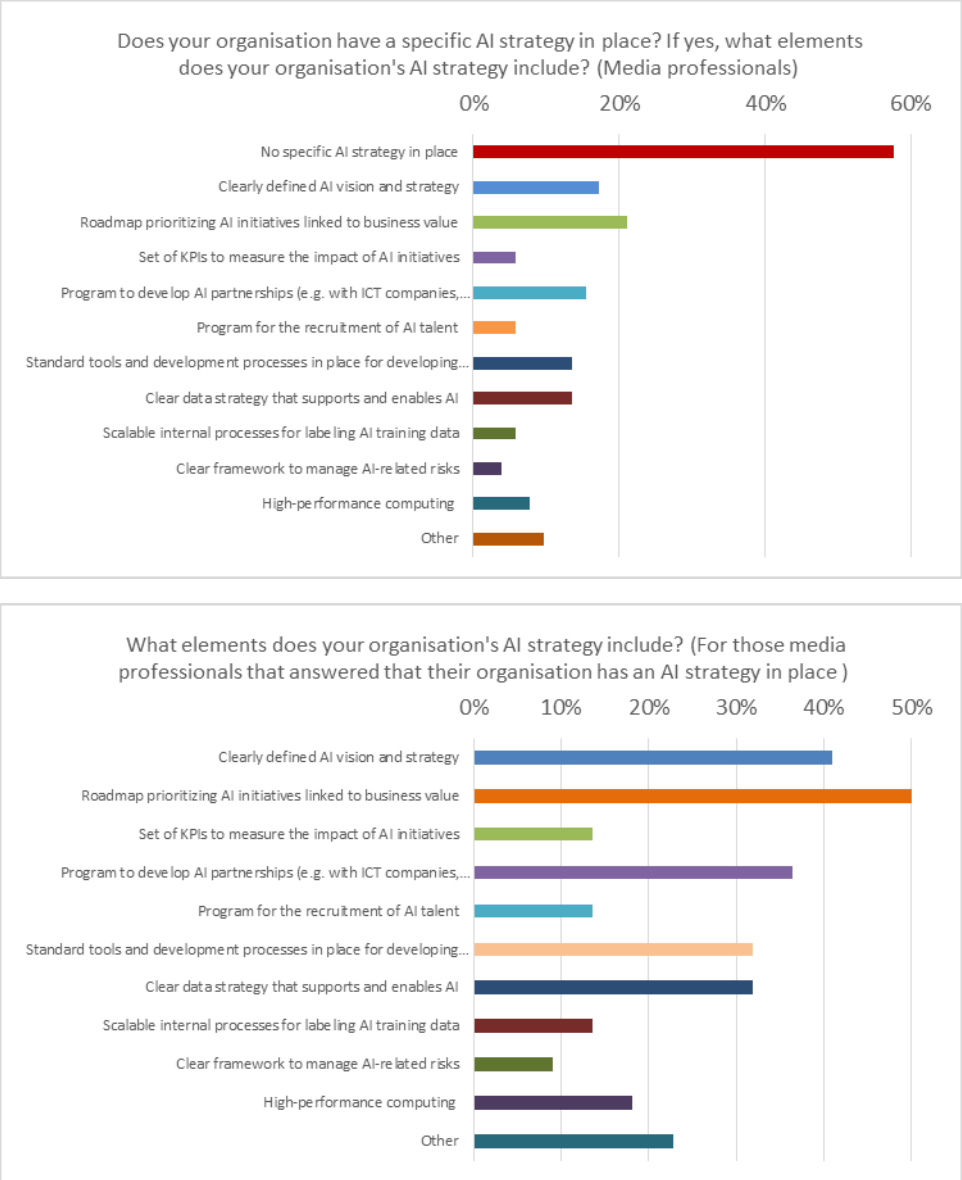


Figure 14: AI strategy of media and media-related organisations: a) all answers are shown, including "No AI strategy in place" (top); b) Those that have answered "No AI strategy in place" have been excluded from the analysis – the percentages refer only to those organisations who have some kind of AI strategy (bottom).

Trying to examine what kind of elements the adopted AI strategies have, we find that out of those who have reported some type of AI strategy (the aforementioned 42% of total respondents), 50% have a roadmap prioritising AI initiatives linked to business value, 41% have a clearly defined AI vision/strategy, 36% have a program to develop AI partnerships, 32% have standard tools and development processes in place for developing AI models, and 32% have a clear data strategy that supports and enables AI. The most amazing finding is that only 9% of those with an AI strategy in their organisation have a clear framework to manage AI-related risks (incl. ethical risks). That is approx. 4% of the total respondents. This clearly poses a significant danger for the organisation and its employees and has the potential to damage public trust in media, trust that is continuously eroding also affected by other factors. Similarly, only 13% of

those with an AI strategy answered that their strategy includes specific KPIs to measure impact of AI in organisation and only 13% have internal processes for labelling AI training data. Not being able to measure the actual impact and added value of the AI tools in the organisation may hinder further adoption of the technology in the long run (why pay for something if you do not know whether it actually works). Also, lack of processes for data annotation contributes to the problem of data availability mentioned already in the previous sections. With regard to the type of organisation, 46% of PSM and 46% of media and entertainment industry companies, 62% of large media networks and 30% of online news platforms have an AI strategy.

The next question was about whether media companies should ***train their own personnel to acquire AI skills or recruit new personnel with such skills*** (AI researchers, data scientists, etc.). As shown in Figure 15, opinions are split on this issue: 29% believe media organisations should recruit experts with AI/data skills, 27% believe they should train existing personnel to acquire AI skills, and 27% think that a new profile of media jobs will eventually emerge, combining both media and AI skills. Among those that provided alternative answers some said that a combination of the above would do the work, while one respondent pointed out that it all comes down to the budget available for this.

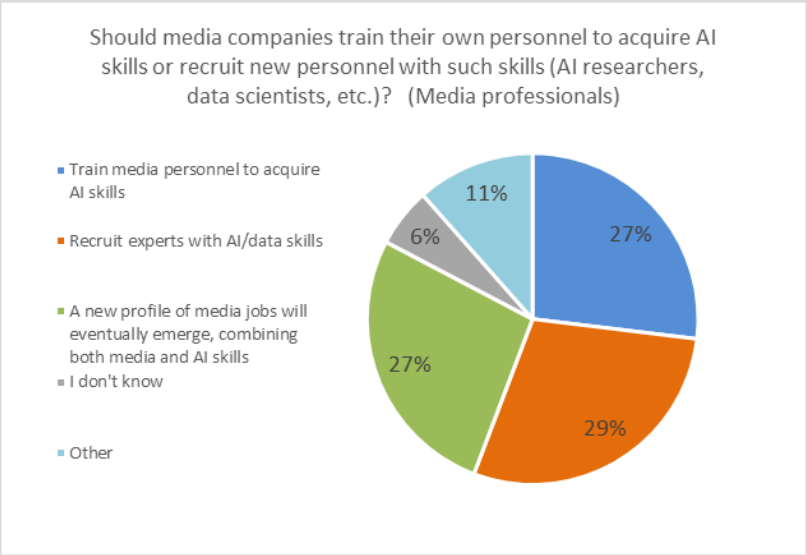


Figure 15: How to increase AI skills in the media sector.

Finally, the last question, addressed to both media professionals but also the AI community, complemented the previous one, examining **what kind of skilled personnel a media company needs to hire** to overcome the often encountered AI skills gap. The results are visualised in Figure 16. AI software developers (69%) and data scientists (67%) were by far the most popular choices among media professionals, followed by experts on AI ethics and legal issues (44%). For AI researchers, the most popular choice is AI software developers (64%), followed closely by data scientists (53%), AI researchers (52%), domain experts (51%) and ethics experts (50%). The most important difference between the two groups concerns domain experts. 33% of media professionals consider that they are necessary in contrast to the 51% of the AI community. Since media professionals are in many cases also domain experts they do not see the need to hire

more such experts. However, in the research community domain knowledge is a big need, with domain experts usually in high-demand. This survey result seems to reflect this reality. Other types of personnel not included in the list but mentioned by respondent include representatives of democratic society (e.g. NGOs) but also experts that are able to effectively integrate AI into media workflows and people that know how to develop energy-efficient software tools.

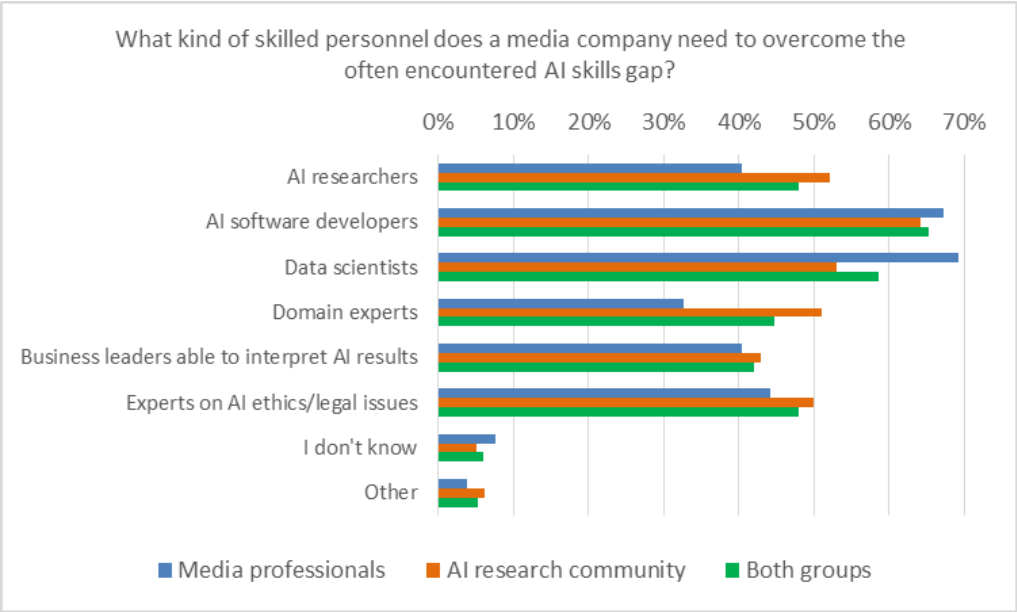


Figure 16: Skilled personnel that media companies need to hire to overcome the often encountered AI skills gap. Answers provided by responders from the media industry, the AI research community and both.

1.7 Adoption of AI solutions by the Media Industry

In this section of the survey, we explore adoption of specific AI technology applications by the media sector as well as the requirements that may facilitate further adoption of AI technologies.

The first question examines what kind of **AI/ML-enabled applications** most media professionals use. As can be seen in Figure 17, the most popular applications are image/video analysis and NLP (44% each), followed by audio analysis (35%), user experience/audience analysis (31%). Social media network analysis (27%) and recommenders (25%) are also used by many professionals. The use of fact checking tools is also considerable but that can be attributed to the fact that 21% of respondents are journalists. Applications with low penetration are automatic-decision making for business (6%) and market analysis/forecasting (10%). The former can be attributed to the fact that media professionals still do not trust AI to make decisions without a human in the loop and also that AI is not mature enough to be widely used for such applications. The latter is also probably attributed to this but also to the fact that our pool of respondents does not include a lot of representatives from media sectors where such technologies are more mainstream, like advertising, music/film, big streaming platforms or social networks. Note also how the use of automatic content creation tools, although considered one of the most promising fields of AI research, is still currently limited. Other technologies (not in the list) mentioned have mainly to do with AI for security applications.

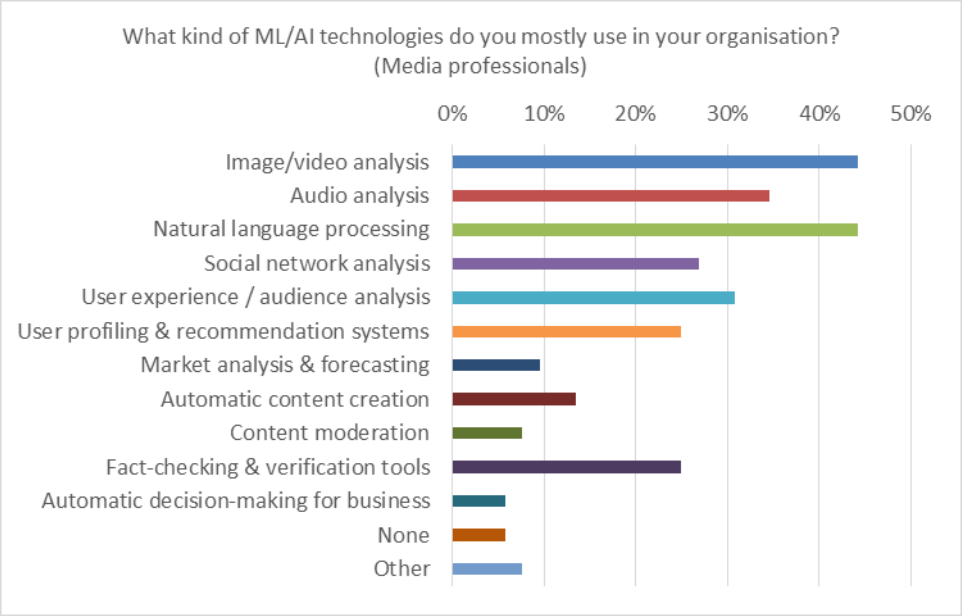
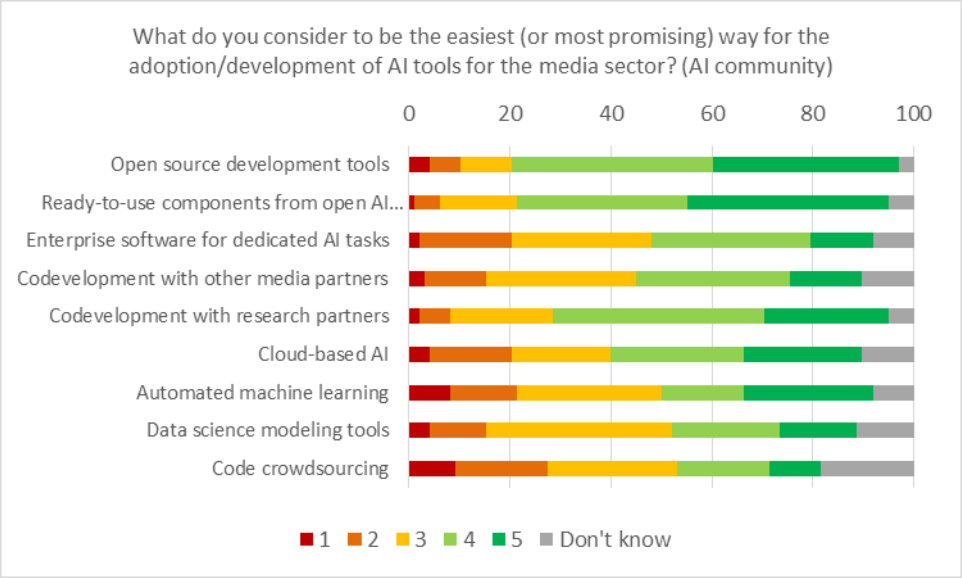


Figure 17: AI/ML-enabled applications used by media professionals.

The next question explores the **most promising ways for the easy adoption of AI** by the media sector. The list of answers to this question includes solutions like open source development tools, ready-to-use components from open AI repositories, enterprise software for dedicated AI tasks, co-development with other media or research partners, cloud-based AI, automated machine learning and data science modelling tools, and code crowdsourcing. The question and answers have been inspired by a similar question in the Deloitte survey. The respondents were asked to assess how easy it is to use each solution on a Likert scale (1: difficult, 5: very easy). The question was addressed to both AI researchers and media professionals and the results are visualised in Figure 18.



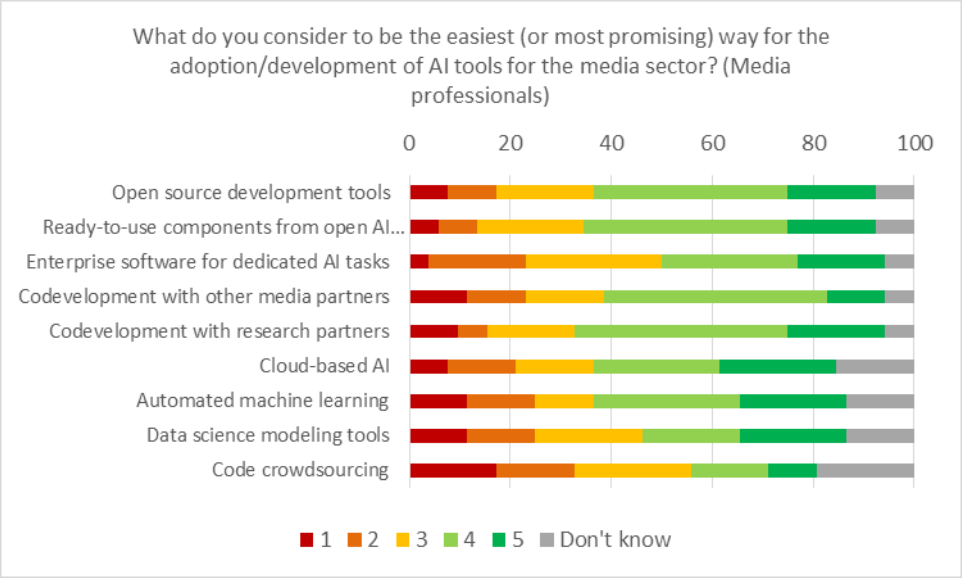


Figure 18: Most promising solutions for the easy adoption/development of AI tools in the media assessed by a) members of the AI research community (top) and b) members of the media industry sector (bottom) (Likert scale: 1=difficult, 5=very easy).

Both groups of respondents consider open source development tools, ready to use components from AI repositories and co-development of media with research partners to be the most promising solutions. The first two are by far the most popular among AI researchers while the third is the most preferable solution among media professionals, closely followed by the other two but also by co-development with other media partners.

The least favourable solution is code crowdsourcing, followed by enterprise software, automated machine learning for media professionals, and at some extent cloud-based AI. Code crowdsourcing also received by far the most "I don't know answers". Such approaches although desirable in order to increase the democratisation of AI development have inherent difficulties and have yet to prove that they can offer efficient and trustworthy solutions applicable in the industry. The answers of the respondents show a clear preference for open solutions for both AI development and deployment and for the co-development of solutions based on cooperation between researchers and industry or on collaborating clusters of media organisations. This is also confirmed by the way respondents evaluated enterprise software and automated tools, for which one cannot really know how they work or how they were trained or if they can be trusted since they are usually black-boxes performing a specific task. The need for AI that you can trust and for AI that you know how it has been developed is confirmed by the analysis of responses.

The previous question was also complemented by an open question, asking respondents to describe additional solutions not mentioned in the previous question, also taking into account their own experiences. Respondents insisted on the need for media-technology partnerships for AI development, also including potential users; increased leadership by broadcast or other media associations like EBU to guide the development of new AI tools; but also on scalable technologies and tools that could facilitate link existing media workflows with AI software. Some interesting views are listed below:

- Co-development with technology providers. The cost to build/train large scale models like GPT3 is outside the realm of possibility for most media companies.
- Co-design incl. participation of potential users, highest quality-of-service, proof of added-value, user-friendly navigation.
- Inclusion of highly interdisciplinary approaches, regarding epistemology, cybernetics, neuroscience, psycholinguistics, mathematics, philosophy (new realism) and linguistics.
- Use of AI systems developed by/within Industry Associations for their members.
- The EBU should be a "guiding" organisation that helps understanding, training and offering tools for AI.
- Having events that bring together the media sector and AI researchers. Usually, local versions of these can enable more broad impact, but international events breed better long-term collaborations.
- Making scalable technologies that work through older and newer platforms, energy-efficient tools that can be also applied on 8-, 16- and 32-bit environments.
- Tools for linking existing production and storage workflows to AI software.

The final question of this section of the survey explores the **most efficient ways to strengthen the transfer of AI knowledge, tools and best practices from academia/research to the media industry**. The list of answers to this question includes solutions like sharing media industry data; secondments/internships of AI researchers to the media industry; research scholarships on media AI funded by the media industry; collaboration of research labs and media industry on issues of common interest; sub-contracting of AI media solutions to external research labs; development of in-house AI research labs in media companies; collaboration of media, academia and NGOs on topics with wide media or societal impact (e.g. AI for disinformation detection); organisation of challenges/benchmarks to provide novel AI solutions; collaboration for the creation of open tools in open AI repositories; and training activities to increase AI skills in media industry. The respondents were asked to assess the potential of each solution on a Likert scale (1: not efficient, 5: very promising). The question was addressed to both AI researchers and media professionals and the results are visualised in Figure 19.

Figure 19: Most efficient ways to strengthen the transfer of AI knowledge, tools and best practices from academia/research to the media industry assessed by a) members of the AI research community (top) and b) members of the media industry sector (bottom) (Likert scale: 1=not efficient, 5=very promising).

As can be seen from this figure, respondents are generally very positive about most of the proposed approaches. However, some are more favoured than others. For example, by far and large AI researchers believe that transfer of knowledge, tools and best practices can be more efficiently achieved through sharing of media industry data and collaboration between research labs and media industry on issues of common interest, followed by research scholarships on media AI funded by the media industry and collaboration for the creation of open tools in open AI repositories. Media professionals, on the other hand, favour most collaborations of media industry with the research community and training to increase AI skills of media practitioners, followed by secondments/internships of AI researchers to the media industry and sharing of media data. Collaboration between the research and media communities is obviously the most

promising approach whatever form it takes. At the same time researchers put special emphasis on data sharing, which as we discussed before is a large impediment in AI development, while media professionals point out the importance of training initiatives so that they are able to follow up and contribute to AI developments instead of being mere bystanders to AI breakthroughs and simple users of the technology others develop. The solution respondents where less enthusiastic about is sub-contracting of AI media tools or applications to external research labs. AI researchers, also do not seem to favour so much development of in-house AI research labs in media companies since that would probably create counter-motives for the collaboration between the two communities.

The previous question was also complemented by an open question, asking respondents to offer additional ideas (not mentioned in the previous list) about the transfer of AI knowledge, tools and best practices from academia/research to the media industry. The main theme of the answers was the need for AI training on all levels (media, academia, society). Some respondents especially pointed out the resistance of parts of the media industry to change or to adopt new technologies. The views and suggestions presented below nicely make the case:

- Training activities to increase knowledge about and acceptance of AI, including aspects of AI trustworthiness.
- Training should start from a very early age; we should rethink and update teaching curricula at University Level, so that soft sciences (Humanities, Social Sciences, Journalism) can catch up on new trends.
- General training for the management level of businesses on the reality of AI currently would be valuable. Several senior leaders in industry are either entirely dismissive or unaware of the current and potential impact that AI/ML is likely to bring on their sector.
- A big obstacle for AI in the media industry is that the industry itself is very traditional and it is hard to change the mentality of decision makers (who are not AI savvy). Unless this changes at the decision-making level, any amount of change from the ground up (tool level and team level) is not going to have a massive impact.
- Exchange of AI researchers between different European countries for a limited time in order to enhance the AI research of countries under development (e.g. under a program like Erasmus for students).
- Permeability of membrane between public/private media sector and academia (à la triple helix approach) with strengthening of public media in the interest of citizens.

1.8 AI ethics and regulation

In this section of the survey, we explore AI & ethics as well as AI regulation. The section, addressed to both groups of respondents, includes four questions that aim to shed light on ethics-related practices and processes adopted by industry and researchers, to understand what are the main needs of AI developers and users with regard to guidance from policy makers on the use of AI for the media industry, and to explore the opinions of both communities with regard to AI regulation, especially given the increased legislative/policy making activity of the European Commission on the topic during the last few years (more on this issue in section "*EU*

policy & regulatory initiatives and their impact on future AI research for the media" of this Roadmap).

The first question is an open question that aims to examine what matters respondents would like to **have guidance on from policymakers**, concerning use of AI systems in media ("*On what matters would you like to have guidance from policymakers concerning use of AI systems in media?*"). From an analysis of provided answers, the following main areas were identified: addressing data privacy and finding a balance between privacy and the need for more data; addressing IP issues; addressing AI bias; addressing challenges of automated AI content creation; providing guidance on how to develop trustworthy and explainable AI; providing more information on regulation frameworks and their impact; and offering more clear information and guideline about how to implement AI ethics in practice. In the following, we briefly summarise the various areas of AI research & application where more guidance is required, as highlighted by respondents in both groups:

- User data privacy concerns. How to make sure that data used in AI are authorised.
- AI regulation and ethics with regards to automatic content generation and use of synthetic content.
- How to ensure respect of the principles of inclusivity and non-discrimination in disseminated media content.
- How to harmonise the need for data to train AI models with the need for privacy. How to make sure that we know what kind of data are used in open datasets or retrained models. How to ensure that those that play by the rules are not put in disadvantage in the market by those going around regulation. Best practices on how to collect and use data.
- Guidelines or regulation with regard to content moderation.
- More information on media rights in relation to training sets (e.g. what images/videos are okay to use for training models). Possible licensing schemes for AI models respecting established copyrights (are existing data copyrights inherited to derived models?)
- AI regulation on user profiling and affective computing.
- Consideration of systems composed of multiple AI components rather than standalone system in regulatory efforts.
- Guidance on development of trustworthy and explainable AI solutions and relevant certifications.
- More information on the AI act and its impact on both AI research and media companies (for example, with regard to regulatory impact/exceptions regarding "media innovation involving AI" in media sandbox environments). There should be an effort to take care of ethics without blocking AI research or adoption of AI.
- How to implement/enforce in practice AI legal responsibility.
- Ways of guaranteeing freedom of speech and existence of alternative sources of information, as well as elevating the level of political, social, economic and cultural discourse by means of the new technologies.
- Creation of public online tools so that AI researchers can do self-assessments (e.g. for AI bias or for legal compliance).

- More focus on the environmental impacts of AI and how to make green AI.

It is important to point out that among media professionals, the majority of respondents request not just guidelines but clear-cut regulations for most of the main issues raised above. There is a similar trend also in the research community but it is not that accentuated. What is obvious from the above list of issues is that both the research community and the media industry are in need of clear guidance and much more information when it comes to the ethics of AI. People are struggling either to understand the impact of regulations or to address important issues such as data privacy and AI trustworthiness.

The second question is also an open question that aims to examine **what aspects of AI for media should be regulated** ("*What aspects of AI use in media do you think should be regulated or further regulated?*"). Again, the list is long but the most important issues highlighted by respondents include: user profiling and monitoring, data privacy, synthetic content generation, bias, targeted advertisement, AI transparency, and disinformation. The following list offers a more in depth look on the issues that respondents of the survey feel that need to be regulated or regulated more effectively:

- AI bias and discrimination against underrepresented or vulnerable groups. E.g. regulating the development and deployment of machine translation systems or decision-making systems.
- Respect of fundamental human rights (special mentions were made to children, with regard to social media use and impact).
- Impact of social media on young population (providing protection against depression, harassment, manipulation and isolation from the society).
- Use of / access to personal data.
- Data collection and processing of any kind.
- Deployment of user profiling/monitoring tools (including face recognition and emotion recognition systems and psychological profiling). One respondent made a special mention to cloud gaming where AI is able to provide very accurate and complete psychological profiles of the players.
- AI-controlled advertisement targeting users; recommendation systems.
- Creation and deployment of AI-synthesised or AI-manipulated content (video, audio, text). Clear labelling of such content should be required.
- Traceability of provided content (origin, right owners, distribution path).
- Manipulation of AI to influence public opinion – disinformation and deepfakes.
- Deployment of AI of questionable quality (e.g. trained on known biased datasets without applying methods to improve fairness, failing to reach stated objectives).
- AI explainability and transparency about how models are trained or decisions are made.
- Ensuring a level playing field between media content creators and platforms and dealing with big tech monopoly.

It is clear that the appetite for regulation that will, first of all, protect humans and, also, introduce clear rules about the development and deployment of AI (governed by the principles of trustworthy AI) is huge. People feel that issues like user profiling/monitoring, user targeting,

illegal collection of personal data, generation of manipulated media content, and AI-enabled disinformation are getting out of control while they also increasingly worry about potential AI bias and discrimination or in general about AI that cannot be trusted. The EU should immediately address these fears, extending the dialogue with AI researchers, media industry, ethics and social science experts, and of course concerned citizens.

The third question examines what kind of measures different work environments have in place to **control the ethical risks of AI**. The respondents are asked to select more than one option from a list that contains measures like ethical AI principles, ethical AI checklist, following or being a member of a Code on AI ethics, ethical board committee, and ethics by design approaches. The results are visualised in Figure 20. As can be seen, 19% of the responders from the AI research community and 17% of media professionals do not even know whether their organisation has any processes or measures related to ethics management. In addition, 17% of AI researchers and 25% of media professionals state that they have no measures in place. These percentages show that lack of awareness or interest on ethics management (not only related to AI but in general) is a real problem both in the AI research community and also in the media industry. Among those who responded positively in the question whether they have any ethics related measures or processes in place the most common answer is ethical AI principles, followed by ethical board committees for AI researchers (mainly from academia and research centres) and ethical AI checklists for the media community. Only 13% of both communities is following or is a member of a Code on AI ethics. Finally ethics by design processes are followed by 23 % of the AI community and 19% of the media community. It is clear that much more work is required in order to raise awareness about the importance of ethics in both communities, especially in light of the AI breakthroughs that we expect to see in the next couple of decades.

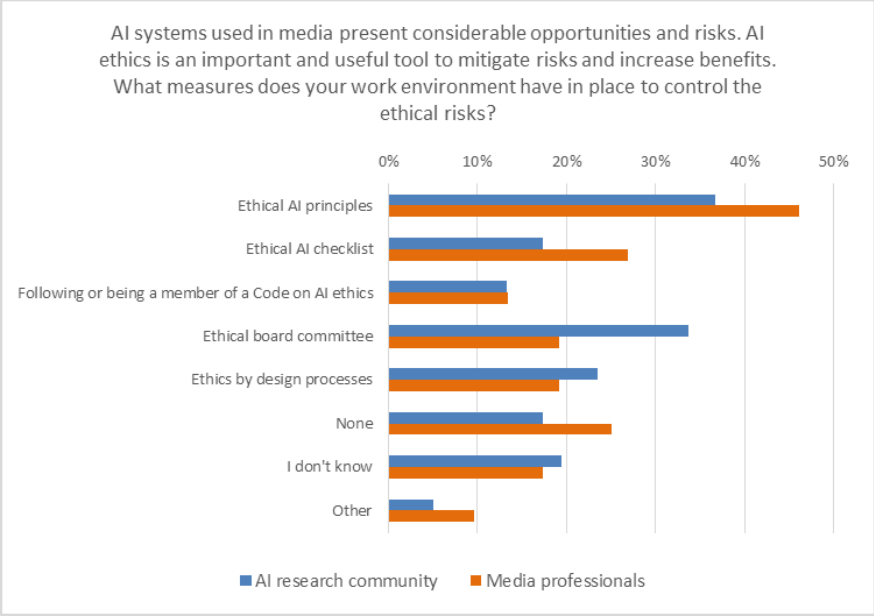


Figure 20: Workplace measures to control the ethical risks of AI.

The last question explores what kind of **impact assessments** are performed by media professionals and AI researchers. Three kinds of assessments are examined: data protection

impact assessment (DPIA), human rights impact assessment (HRIA) and assessment list for trustworthy AI (ALTAI). The results are visualised in Figure 21. The most popular type of assessment are DPIAs with 36% of AI researchers and 19% of media professionals ever having done one. With regards to human rights assessment, the situation is even more disheartening: only 3% of AI researchers and 10% of media professionals has ever done one. The situation is similar for the assessment list for trustworthy AI (although kind of inversed): only 11% of AI researchers and 4% of media professionals has ever done one. DPIAs are now required based on the GDPR. This is perhaps the reason that DPIAs are much more common. As mentioned above, it is clear that more effort is necessary in order to raise awareness about the importance of ethics and these kinds of impact assessments in both communities.

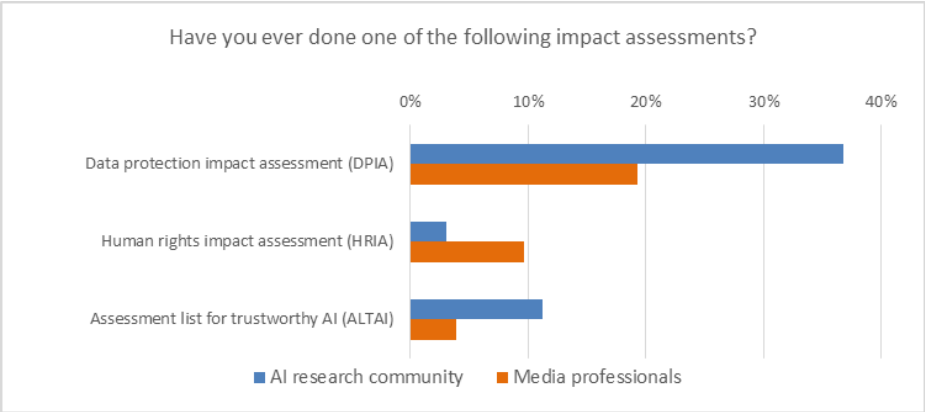
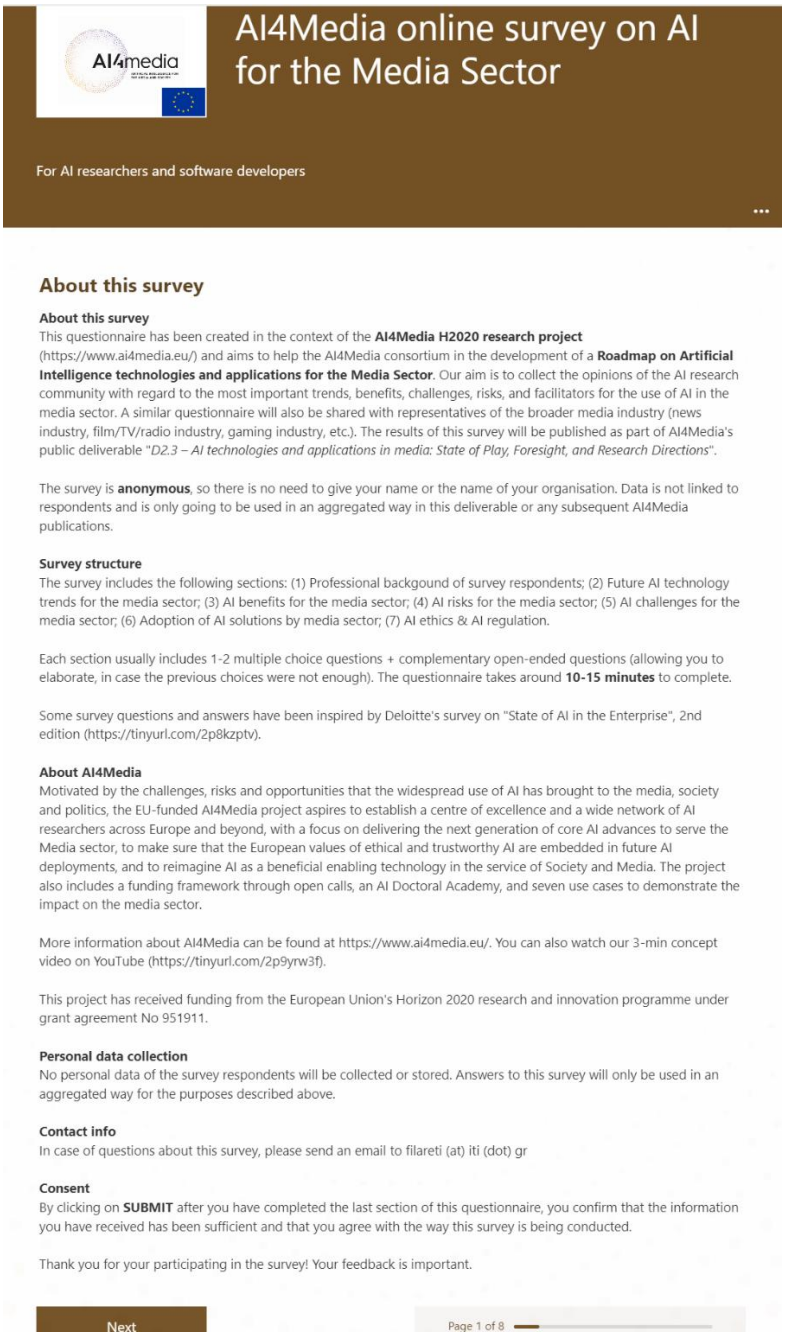


Figure 21: Impact assessments performed by AI researchers and media professionals.

2 Appendix

This Appendix presents the questionnaires used in the AI4Media survey on AI for the Media Sector: i) version for AI community in section 2.1; and ii) version for media professionals in section 2.2.

2.1 AI4Media survey on AI for the Media Sector (version for AI community)



AI4Media online survey on AI for the Media Sector

For AI researchers and software developers

About this survey

About this survey
This questionnaire has been created in the context of the **AI4Media H2020 research project** (https://www.ai4media.eu/) and aims to help the AI4Media consortium in the development of a **Roadmap on Artificial Intelligence technologies and applications for the Media Sector**. Our aim is to collect the opinions of the AI research community with regard to the most important trends, benefits, challenges, risks, and facilitators for the use of AI in the media sector. A similar questionnaire will also be shared with representatives of the broader media industry (news industry, film/TV/radio industry, gaming industry, etc.). The results of this survey will be published as part of AI4Media's public deliverable "*D2.3 – AI technologies and applications in media: State of Play, Foresight, and Research Directions*".

The survey is **anonymous**, so there is no need to give your name or the name of your organisation. Data is not linked to respondents and is only going to be used in an aggregated way in this deliverable or any subsequent AI4Media publications.

Survey structure
The survey includes the following sections: (1) Professional backgound of survey respondents; (2) Future AI technology trends for the media sector; (3) AI benefits for the media sector; (4) AI risks for the media sector; (5) AI challenges for the media sector; (6) Adoption of AI solutions by media sector; (7) AI ethics & AI regulation.

Each section usually includes 1-2 multiple choice questions + complementary open-ended questions (allowing you to elaborate, in case the previous choices were not enough). The questionnaire takes around **10-15 minutes** to complete.

Some survey questions and answers have been inspired by Deloitte's survey on "State of AI in the Enterprise", 2nd edition (https://tinyurl.com/2p8kzptv).

About AI4Media
Motivated by the challenges, risks and opportunities that the widespread use of AI has brought to the media, society and politics, the EU-funded AI4Media project aspires to establish a centre of excellence and a wide network of AI researchers across Europe and beyond, with a focus on delivering the next generation of core AI advances to serve the Media sector, to make sure that the European values of ethical and trustworthy AI are embedded in future AI deployments, and to reimagine AI as a beneficial enabling technology in the service of Society and Media. The project also includes a funding framework through open calls, an AI Doctoral Academy, and seven use cases to demonstrate the impact on the media sector.

More information about AI4Media can be found at https://www.ai4media.eu/. You can also watch our 3-min concept video on YouTube (https://tinyurl.com/2p9yrw3f).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 951911.

Personal data collection
No personal data of the survey respondents will be collected or stored. Answers to this survey will only be used in an aggregated way for the purposes described above.

Contact info
In case of questions about this survey, please send an email to filareti (at) iti (dot) gr

Consent
By clicking on **SUBMIT** after you have completed the last section of this questionnaire, you confirm that the information you have received has been sufficient and that you agree with the way this survey is being conducted.

Thank you for your participating in the survey! Your feedback is important.

Next

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* Required

Professional background

Professional backgound of survey respondents

1. What type of organisation do you work for? *

- (●) Academic institution
- ( ) Research institution
- ( ) Public Service Media (PSM)
- ( ) Media & entertainment industry
- ( ) ICT industry
- ( ) Non-governmental organization (NGO)
- ( ) Independent authority
- ( ) Public sector
- ( ) Other

2. What kind of position do you hold in your organisation? *

- ( ) AI researcher
- ( ) AI software developer
- ( ) Data scientist
- ( ) AI ethics/legal expert
- ( ) Innovation or R&D manager
- ( ) Other

3. What are your current research interests and expertise? *

You can select more than one.

- [ ] Machine learning
- [ ] Deep learning
- [ ] Data science
- [ ] Multi-agent systems
- [ ] Forecasting & predictive modeling
- [ ] Decision support systems
- [ ] Image/video analysis
- [ ] Computer-generated imagery (CGI)
- [ ] Audio analysis & synthesis
- [ ] Speech analysis & synthesis
- [ ] Text analysis
- [ ] Social network analysis
- [ ] User experience / audience analysis
- [ ] User profiling / recommender systems
- [ ] AI privacy and security
- [ ] Symbolic AI
- [ ] Trustworthy (robust, explainable, fair) AI
- [ ] AI ethics & legal issues
- [ ] Other

4. In which country do you conduct your main professional or research activity? *

Please write the name of the country where your (main) affiliated organisation is located.

Enter your answer

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* Required

Future AI technology trends for the media sector

In this section, we explore future AI technology trends for the media sector.

5. In your opinion, what is the potential of the following AI technology trends to significantly help or transform (parts of) the media sector in the next decade?
*

Only to be answered by those who understand these technologies and their potential. Please assess the potential of each technology on a scale from 1 (limited potential) to 5 (significant potential).

	1	2	3	4	5	Don't know
Learning with limited data	○	○	○	○	○	○
Reinforcement learning	○	○	○	○	○	○
Evolutionary learning	○	○	○	○	○	○
Transformers for computer vision	○	○	○	○	○	○
Bioinspired learning	○	○	○	○	○	○
Causal AI	○	○	○	○	○	○
Emotion AI	○	○	○	○	○	○
Multi-language NLP	○	○	○	○	○	○
Automatic content analysis & knowledge extraction	○	○	○	○	○	○
Automatic content creation	○	○	○	○	○	○
Explainable AI	○	○	○	○	○	○
Trusted & fair AI	○	○	○	○	○	○
AI at the edge	○	○	○	○	○	○
Quantum computing	○	○	○	○	○	○

6. Are there other important AI technology trends that could help the media sector, which are not mentioned in the previous question?

This is an open-ended question aiming to complement the previous question. Please elaborate, if necessary.

Enter your answer

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AI benefits for the media sector

In this section, we explore the benefits that AI technology can bring to the media sector.

7. What are the main benefits that AI can bring to the media sector in the next decade? *

Only to be answered by those who understand these concepts/benefits. Please assess the importance of each benefit on a scale from 1 (not important) to 5 (very important).

	1	2	3	4	5	Don't know
Personalisation of content & services	○	○	○	○	○	○
Automation & optimisation of routine tasks	○	○	○	○	○	○
Enhance current services & products	○	○	○	○	○	○
Create or enable new services, products, content	○	○	○	○	○	○
Enhanced decision making	○	○	○	○	○	○
Increased productivity & operational efficiency	○	○	○	○	○	○
Increased creativity	○	○	○	○	○	○
Big data analysis to identify business opportunities, maximise revenue or conduct journalistic research	○	○	○	○	○	○
Facilitate expansion to new markets / target new audiences	○	○	○	○	○	○
Better monetisation of collected knowledge & data (e.g. video archives)	○	○	○	○	○	○

8. Are there other benefits that AI can bring to the media sector in the next decade that are not mentioned in the previous question?

This is an open-ended question aiming to complement the previous question. Please elaborate, if necessary.

Enter your answer

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AI risks for the media sector

In this section, we explore the potential risks of AI technologies for the media sector.

9. What are you most worried about when it comes to the adoption of AI by the media sector? Both as a citizen as well as an AI researcher.
*

Please assess the following risks on a scale from 1 (not worried) to 5 (very worried).

	1	2	3	4	5	Don't know
Automation that shrinks human capital	○	○	○	○	○	○
Automation that limits human creativity	○	○	○	○	○	○
Unethical use of AI with destructive impact on individuals and society	○	○	○	○	○	○
Increased reliance on automated AI decisions without human in the loop	○	○	○	○	○	○
AI being a black box with little explanation on how decisions are made	○	○	○	○	○	○
AI models & software being susceptible to attacks	○	○	○	○	○	○
AI models being biased against groups of people	○	○	○	○	○	○
Inability to distinguish between created and real content	○	○	○	○	○	○
Exploiting user profiling on different platforms to create super profiles	○	○	○	○	○	○
Government not being able to effectively regulate AI	○	○	○	○	○	○
AI increasing the power of media tech giants, leading to monopolies	○	○	○	○	○	○
AI further amplifying echo chambers	○	○	○	○	○	○
Exploitation of AI to silence different voices in the media	○	○	○	○	○	○
Exploitation of media AI to hinder fundamental human rights, like freedom of expression	○	○	○	○	○	○

10. Are there other potential risks from the adoption of AI by the media sector, which are not mentioned in the previous question?

This is an open-ended question aiming to complement the previous question. Here you can also elaborate on risks that are specific to your own research area.

Enter your answer

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AI challenges for the media sector

In this section, we explore the challenges of developing AI technology for the media sector.

11. What are the most important challenges AI researchers face when developing AI algorithms and tools for the media sector?
*

Only to be answered by those who understand these concepts/challenges. Please assess each challenge on a scale from 1 (not important) to 5 (very important).

	1	2	3	4	5	Don't know
Lack of real-world data to train/test AI (e.g. in different languages)	○	○	○	○	○	○
Media industry not sharing their data	○	○	○	○	○	○
Lack of effective AI benchmarks	○	○	○	○	○	○
Lack of understanding of media sector needs/requirements	○	○	○	○	○	○
Lack of communication & collaboration channels with the media sector	○	○	○	○	○	○
Compliance with relevant regulatory or legal frameworks	○	○	○	○	○	○
Lack of ethical guidelines/ framework for ethical conduct in own organisation	○	○	○	○	○	○
Lack of open access culture for developing and sharing AI tools	○	○	○	○	○	○
Lack of funding for the development of AI tools for media	○	○	○	○	○	○
Lack of promising AI talent that can work on these issues	○	○	○	○	○	○
US-China big tech monopoly in AI (facilitated by enormous funding & flexible regulations)	○	○	○	○	○	○

12. Are there other important challenges that AI researchers face when developing AI algorithms and tools for the media sector, which are not mentioned in the previous question?

This is an open-ended question aiming to complement the previous question. Here you can elaborate on challenges that are specific to your own research area.

Enter your answer

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Adoption of AI solutions by media sector

In this section, we explore requirements for facilitating the adoption of AI technologies by the media sector.

13. What do you consider to be the easiest (or most promising) way for the adoption/development of AI tools for the media sector? *

Only to be answered by those who understand these technologies and their potential. Please assess each option on a scale from 1 (difficult) to 5 (very easy).

	1	2	3	4	5	Don't know
Open source development tools	○	○	○	○	○	○
Ready-to-use components from open AI repositories	○	○	○	○	○	○
Enterprise software for dedicated AI tasks	○	○	○	○	○	○
Codevelopment with other media partners	○	○	○	○	○	○
Codevelopment with research partners	○	○	○	○	○	○
Cloud-based AI	○	○	○	○	○	○
Automated machine learning	○	○	○	○	○	○
Data science modeling tools	○	○	○	○	○	○
Code crowdsourcing	○	○	○	○	○	○

14. Are there other promising ways for the adoption/development of AI software/tools for the media sector that were not mentioned in the previous question?

This is an open-ended question aiming to complement the previous question. Please elaborate, if necessary.

Enter your answer

15. What kind of skilled personnel does a media company need to overcome the often encountered AI skills gap? *

You can select more than one option

- ☐ AI researchers
- ☐ AI software developers
- ☐ Data scientists
- ☐ Domain experts
- ☐ Business leaders able to interpret AI results
- ☐ Experts on AI ethics/legal issues
- ☐ Don't know
- ☐ Other

16. What are the most efficient ways to strengthen the transfer of AI knowledge, tools and best practices from academia/research to the media industry?
*

Please assess the efficiency of each option on a scale from 1 (not efficient) to 5 (very promising).

	1	2	3	4	5	Don't know
Sharing media industry data with the AI research community	○	○	○	○	○	○
Secondments/internships of AI researchers to the media industry	○	○	○	○	○	○
Research scholarships on media AI funded by the media industry	○	○	○	○	○	○
Collaboration of research labs and media industry on issues of common interest	○	○	○	○	○	○
Sub-contracting of AI media solutions to external research labs	○	○	○	○	○	○
Development of in-house AI research labs in media companies	○	○	○	○	○	○
Collaboration of media, academia and NGOs on topics with wide media or societal impact (e.g. AI for disinformation detection)	○	○	○	○	○	○
Organisation of challenges/benchmarks to provide novel AI solutions	○	○	○	○	○	○
Collaboration for the creation of open tools in open AI repositories	○	○	○	○	○	○
Training activities to increase AI skills in media industry	○	○	○	○	○	○

17. Are there other promising ways to strengthen the transfer of AI knowledge, tools and best practices from academia/research to the media industry that were not mentioned in the previous question?

This is an open-ended question aiming to complement the previous question. Please elaborate, if necessary.

Enter your answer

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AI ethics & AI regulation

In this section, we address ethical use of AI & AI regulations

18. On what matters would you like to have guidance from policymakers concerning use of AI systems in media? *

This is an open-ended question. Please elaborate.

Enter your answer

19. What aspects of AI use in media do you think should be regulated or further regulated? *

This is an open-ended question. Please elaborate.

Enter your answer

20. AI systems used in media present considerable opportunities and risks. For addressing these aspects, AI ethics is an important and useful tool to mitigate risks and increase benefits. What measures does your work environment have in place to control the ethical risks? *

- [ ] Ethical AI principles
- [ ] Ethical AI checklist
- [ ] Following or being a member of a Code on AI ethics
- [ ] Ethical board committee
- [ ] Ethics by design processes
- [ ] None
- [ ] I don't know
- [ ] Other

21. Have you ever done one of the following impact assessments?

Please select the assessments you have made.

- [ ] Data protection impact assessment (DPIA)
- [ ] Human rights impact assessment (HRIA)
- [ ] Assessment list for trustworthy AI (ALTAI)

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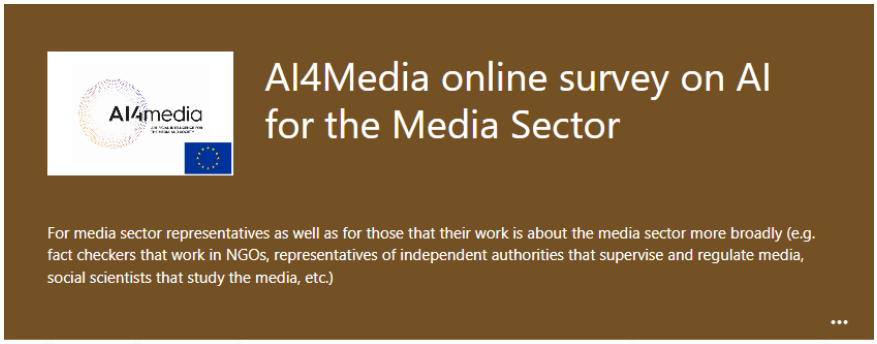
2.2 AI4Media survey on AI for the Media Sector (version for media professionals)



AI4Media online survey on AI for the Media Sector

For media sector representatives as well as for those that their work is about the media sector more broadly (e.g. fact checkers that work in NGOs, representatives of independent authorities that supervise and regulate media, social scientists that study the media, etc.)

About this survey

About this survey

This questionnaire has been created in the context of the **AI4Media H2020 research project** (https://www.ai4media.eu/) and aims to help the AI4Media consortium in the development of a **Roadmap on Artificial Intelligence technologies and applications for the Media Sector**. Our aim is to collect the opinions of media sector representatives (news industry, film/TV/radio industry, gaming industry, etc) with regard to the most important trends, benefits, challenges, risks, and facilitators for the use of AI in the media sector. A similar questionnaire will also be shared with the AI research community. The results of this survey will be published as part of AI4Media's public deliverable "*D2.3 – AI technologies and applications in media: State of Play, Foresight, and Research Directions*".

The survey is **anonymous**, so there is no need to give your name or the name of your organisation. Data is not linked to respondents and is only going to be used in an aggregated way in this deliverable or any subsequent AI4Media publications.

Survey structure

The survey includes the following sections: (1) Professional backgound of respondents; (2) AI benefits for the media sector; (3) AI risks for the media sector; (4) AI challenges for the media sector; (5) AI strategies & skills in media sector; (6) Adoption of AI solutions by media sector; (7) AI ethics & regulation.

Each section usually includes 1-2 multiple choice questions + complementary open-ended questions (to elaborate, in case the previous choices are not enough). The questionnaire takes around **10-15 minutes** to complete.

Some survey questions and answers have been inspired by a) Deloitte's survey on "State of AI in the Enterprise", 2nd edition (https://tinyurl.com/2p8kzptv), and b) McKinsey's Global Survey on "The state of AI in 2020" (https://tinyurl.com/yckmce3n).

About AI4Media

Motivated by the challenges, risks and opportunities that the widespread use of AI has brought to the media, society and politics, the EU-funded AI4Media project aspires to establish a centre of excellence and a wide network of AI researchers across Europe and beyond, with a focus on delivering the next generation of core AI advances to serve the Media sector, to make sure that the European values of ethical and trustworthy AI are embedded in future AI deployments, and to reimagine AI as a beneficial enabling technology in the service of Society and Media. The project also includes a funding framework through open calls, an AI Doctoral Academy, and seven use cases to demonstrate the impact on the media sector.

More information about AI4Media can be found at https://www.ai4media.eu/. You can also watch our 3-min concept video on YouTube (https://tinyurl.com/2p9yrw3f).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 951911.

Personal data collection

No personal data of the survey respondents will be collected or stored. Answers to this survey will only be used in an aggregated way for the purposes described above.

Contact info

In case of questions about this survey, please send an email to filareti (at) iti (dot) gr

Consent

By clicking on **SUBMIT** after you have completed the last section of this questionnaire, you confirm that the information you have received has been sufficient and that you agree with the way this survey is being conducted.

Thank you for your participating in the survey! Your feedback is important.

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Professional background

Professional backgound of survey respondents

1. What is your main professional background? *

- ◯ Journalist
- ◯ Newsroom staff member
- ◯ Fact checker or verification specialist
- ◯ Media regulator
- ◯ Music creator
- ◯ Film/TV industry creator
- ◯ Radio producer
- ◯ Podcaster
- ◯ Game developer
- ◯ Social media developer
- ◯ Content creator
- ◯ Content provider
- ◯ Advertising/marketing expert
- ◯ Sales manager
- ◯ CEO/business leader
- ◯ Innovation or R&D manager
- ◯ Media technology/Project manager
- ◯ AI researcher
- ◯ AI developer
- ◯ AI ethics/legal expert
- ◯ Social scientist
- ◯ Political scientist
- ◯ Other

2. What type of organisation do you work for? *

- ◯ Academic institution
- ◯ Research institution
- ◯ Public Service Media (PSM)
- ◯ Media & entertainment industry
- ◯ ICT industry
- ◯ Non-governmental organization (NGO)
- ◯ Independent authority
- ◯ Public sector
- ◯ Other

3. Please indicate the kind of media or media-related organisation you work for. *

- ◯ Media network (incl. TV, Radio, Online Media and News)
- ◯ TV station
- ◯ Radio station
- ◯ Streaming service
- ◯ Online news platform
- ◯ News/press agency
- ◯ Newspaper
- ◯ Magazine
- ◯ Fact-checking organisation
- ◯ Media regulatory authority
- ◯ Film industry
- ◯ Music industry
- ◯ Gaming industry
- ◯ Publishing industry
- ◯ Social media network
- ◯ Advertisement/marketing industry
- ◯ Content providers
- ◯ Other

4. In which country do you conduct your main professional or research activity? *

Please write the name of the country where your (main) affiliated organisation is located.

Enter your answer

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AI benefits for the media sector

In this section, we explore the benefits that AI technology can bring to the media sector.

5. What are the main benefits that AI can bring to the media sector in the next decade? *

Only to be answered by those who understand these concepts/benefits. Please assess the importance of each benefit on a scale from 1 (not important) to 5 (very important).

	1	2	3	4	5	Don't know
Personalisation of content & services	○	○	○	○	○	○
Automation & optimisation of routine tasks	○	○	○	○	○	○
Enhance current services & products	○	○	○	○	○	○
Create or enable new services, products, content	○	○	○	○	○	○
Enhanced decision making	○	○	○	○	○	○
Increased productivity & operational efficiency	○	○	○	○	○	○
Increased creativity	○	○	○	○	○	○
Big data analysis to identify business opportunities, maximise revenue or conduct journalistic research	○	○	○	○	○	○
Facilitate expansion to new markets / target new audiences	○	○	○	○	○	○
Better monetisation of collected knowledge & data (e.g. video archives)	○	○	○	○	○	○

6. Are there other benefits that AI can bring to the media sector in the next decade that are not mentioned in the previous question?

This is an open-ended question aiming to complement the previous question. Here you can elaborate on benefits that are specific to the media sub-sector you work in.

Enter your answer

7. In your opinion, does the use of AI have a clear value or benefit for your media organisation? *

- ○ Yes
- ○ No
- ○ It's not clear to me
- ○ I don't know

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* Required

AI risks for the media sector

In this section, we explore the potential risks of AI technologies for the media sector.

8. What are the potential AI risks of top concern to media companies? *

Only to be answered by those who understand these risks. Please assess the concern for each risk on a scale from 1 (no concern) to 5 (great concern).

	1	2	3	4	5	Don't know
Failure of AI in a critical mission	○	○	○	○	○	○
Making the wrong strategic decisions based on AI	○	○	○	○	○	○
Erosion of customer trust & brand damage due to AI failures	○	○	○	○	○	○
Legal responsibility for decisions made by AI	○	○	○	○	○	○
Ethical risks of AI	○	○	○	○	○	○
Risk of regulatory noncompliance	○	○	○	○	○	○
Cybersecurity vulnerabilities of AI	○	○	○	○	○	○
IPR issues with regard to new content creation	○	○	○	○	○	○
High expectations & low return on investment	○	○	○	○	○	○
Issues related to editorial/creative practices or journalistic values	○	○	○	○	○	○

9. What are you personally most worried about when it comes to the adoption of AI by the media sector? Both as a citizen as well as a representative of the broader media sector (or media researcher).
*

Please assess the following risks on a scale from 1 (not worried) to 5 (very worried).

	1	2	3	4	5	Don't know
Automation that shrinks human capital	○	○	○	○	○	○
Automation that limits human creativity	○	○	○	○	○	○
Unethical use of AI with destructive impact on individuals and society	○	○	○	○	○	○
Increased reliance on automated AI decisions without human in the loop	○	○	○	○	○	○
AI being a black box with little explanation on how decisions are made	○	○	○	○	○	○
AI models & software being susceptible to attacks	○	○	○	○	○	○
AI models being biased against groups of people	○	○	○	○	○	○
Inability to distinguish between created and real content	○	○	○	○	○	○
Exploiting user profiling on different platforms to create super profiles	○	○	○	○	○	○
Government not being able to effectively regulate AI	○	○	○	○	○	○
AI increasing the power of media tech giants, leading to monopolies	○	○	○	○	○	○
AI further amplifying echo chambers	○	○	○	○	○	○
Exploitation of media AI to hinder fundamental human rights, like freedom of expression	○	○	○	○	○	○

10. Are there other potential risks from the adoption of AI by the media sector, which are not mentioned in the previous questions?

This is an open-ended question aiming to complement the previous questions. Here you can also elaborate on risks that are specific to the media sub-sector you work in.

Enter your answer

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AI challenges for the media sector

In this section, we explore the challenges of developing AI technology for the media sector.

11. What are the most important challenges that the media sector faces when it comes to the adoption of AI?
*

Please assess each challenge on a scale from 1 (not important) to 5 (very important).

	1	2	3	4	5	Don't know
Understanding what AI can offer to a media company	○	○	○	○	○	○
Integrating AI into the company's work processes	○	○	○	○	○	○
Proving/measuring business value	○	○	○	○	○	○
Lack of relevant skills in personnel	○	○	○	○	○	○
Difficulties in attracting AI talent	○	○	○	○	○	○
Cost of developing AI solutions	○	○	○	○	○	○
Implementation challenges for AI solutions	○	○	○	○	○	○
Data privacy, access and integration	○	○	○	○	○	○
Understanding how AI tools work/make decisions	○	○	○	○	○	○
Ensuring compliance with relevant regulatory frameworks	○	○	○	○	○	○
Establishing an internal framework for ethical use of AI	○	○	○	○	○	○
US-China big tech monopoly in AI (facilitated by enormous funding & flexible regulations)	○	○	○	○	○	○

12. Are there other important challenges that the media sector faces when it comes to the adoption of AI, which are not mentioned in the previous question?

This is an open-ended question aiming to complement the previous question. Here you can elaborate on challenges that are specific to the media sub-sector you work in.

Enter your answer

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AI strategies and AI skills in media sector

In this section, we explore what kind of AI strategies media companies adopt

13. Has your organisation invested in AI during the last year? *

- ○ Yes
- ○ No
- ○ I don't know
- ○ Other

14. Does your organisation have a specific AI strategy in place? If yes, what elements does your organisation's AI strategy include? *

If your organisation has no AI strategy in place, please only check the first option below and leave the rest unchecked.

- ☐ No specific AI strategy in place
- ☐ Clearly defined AI vision and strategy
- ☐ Roadmap prioritizing AI initiatives linked to business value
- ☐ Set of KPIs to measure the impact of AI initiatives
- ☐ Program to develop AI partnerships (e.g. with ICT companies, academia)
- ☐ Program for the recruitment of AI talent
- ☐ Standard tools and development processes in place for developing AI models
- ☐ Clear data strategy that supports and enables AI
- ☐ Scalable internal processes for labeling AI training data
- ☐ Clear framework to manage AI-related risks
- ☐ High-performance computing cluster for AI workloads
- ☐ Other

15. Should media companies train their own personnel to acquire AI skills or recruit new personnel with such skills (AI researchers, data scientists, etc.)? *

- ○ Train media personnel to acquire AI skills
- ○ Recruit experts with AI/data skills
- ○ A new profile of media jobs will eventually emerge, combining both media and AI skills
- ○ I don't know
- ○ Other

16. What kind of skilled personnel does a media company need to overcome the often encountered AI skills gap? *

You can select more than one option

- ☐ AI researchers
- ☐ AI software developers
- ☐ Data scientists
- ☐ Domain experts
- ☐ Business leaders able to interpret AI results
- ☐ Experts on AI ethics/legal issues
- ☐ I don't know
- ☐ Other

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Adoption of AI solutions by media sector

In this section, we explore the adoption of AI technologies by the media sector.

17. What kind of ML/AI technologies do you mostly use in your organisation? *

- [ ] Image/video analysis
- [ ] Audio analysis
- [ ] Natural language processing
- [ ] Social network analysis
- [ ] User experience / audience analysis
- [ ] User profiling & recommendation systems
- [ ] Market analysis & forecasting
- [ ] Automatic content creation
- [ ] Content moderation
- [ ] Fact-checking & verification tools
- [ ] Automatic decision-making for business
- [ ] Other

18. What do you consider to be the easiest (or most promising) way for the adoption/development of AI tools for the media sector? *

Only to be answered by those who understand these technologies and their potential. Please assess each option on a scale from 1 (difficult) to 5 (very easy).

	1	2	3	4	5	Don't know
Open source development tools	○	○	○	○	○	○
Ready-to-use components from open AI repositories	○	○	○	○	○	○
Enterprise software for dedicated AI tasks	○	○	○	○	○	○
Codevelopment with other media partners	○	○	○	○	○	○
Codevelopment with research partners	○	○	○	○	○	○
Cloud-based AI	○	○	○	○	○	○
Automated machine learning	○	○	○	○	○	○
Data science modeling tools	○	○	○	○	○	○
Code crowdsourcing	○	○	○	○	○	○

19. Are there other promising ways for the adoption/development of AI software/tools for the media sector that were not mentioned in the previous question?

This is an open-ended question aiming to complement the previous question. Please elaborate, if necessary.

Enter your answer

20. What are the most efficient ways to strengthen the transfer of AI knowledge, tools and best practices from academia/research to the media industry?
*

Please assess the efficiency of each option on a scale from 1 (not efficient) to 5 (very promising).

	1	2	3	4	5	Don't know
Sharing media industry data with the AI research community	○	○	○	○	○	○
Secondments/internships of AI researchers to the media industry	○	○	○	○	○	○
Research scholarships on media AI funded by the media industry	○	○	○	○	○	○
Collaboration of research labs and media industry on issues of common interest	○	○	○	○	○	○
Sub-contracting of AI media solutions to external research labs	○	○	○	○	○	○
Development of in-house AI research labs in media companies	○	○	○	○	○	○
Collaboration of media, academia and NGOs on topics with wide media or societal impact (e.g. AI for disinformation detection)	○	○	○	○	○	○
Organisation of challenges/benchmarks to provide novel AI solutions	○	○	○	○	○	○
Collaboration for the creation of open tools in open AI repositories	○	○	○	○	○	○
Training activities to increase AI skills in media industry	○	○	○	○	○	○

21. Are there other promising ways to strengthen the transfer of AI knowledge, tools and best practices from academia/research to the media industry that were not mentioned in the previous question?

This is an open-ended question aiming to complement the previous question. Please elaborate, if necessary.

Enter your answer

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AI ethics & AI regulation

In this section, we address ethical use of AI & AI regulations

22. On what matters would you like to have guidance from policymakers concerning use of AI systems in media? *

This is an open-ended question. Please elaborate.

Enter your answer

23. What aspects of AI use in media do you think should be regulated or further regulated? *

This is an open-ended question. Please elaborate.

Enter your answer

24. AI systems used in media present considerable opportunities and risks. For addressing these aspects, AI ethics is an important and useful tool to mitigate risks and increase benefits. What measures does your work environment have in place to control the ethical risks? *

- [ ] Ethical AI principles
- [ ] Ethical AI checklist
- [ ] Following or being a member of a Code on AI ethics
- [ ] Ethical board committee
- [ ] Ethics by design processes
- [ ] None
- [ ] I don't know
- [ ] Other

25. Have you ever done one of the following impact assessments?

Please select the assessments you have made.

- [ ] Data protection impact assessment (DPIA)
- [ ] Human rights impact assessment (HRIA)
- [ ] Assessment list for trustworthy AI (ALTAI)

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AI4media

ARTIFICIAL INTELLIGENCE FOR THE MEDIA AND SOCIETY

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 951911

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