



THE LONDON SCHOOL  
OF ECONOMICS AND  
POLITICAL SCIENCE ■



POLIS  
Journalism and Society

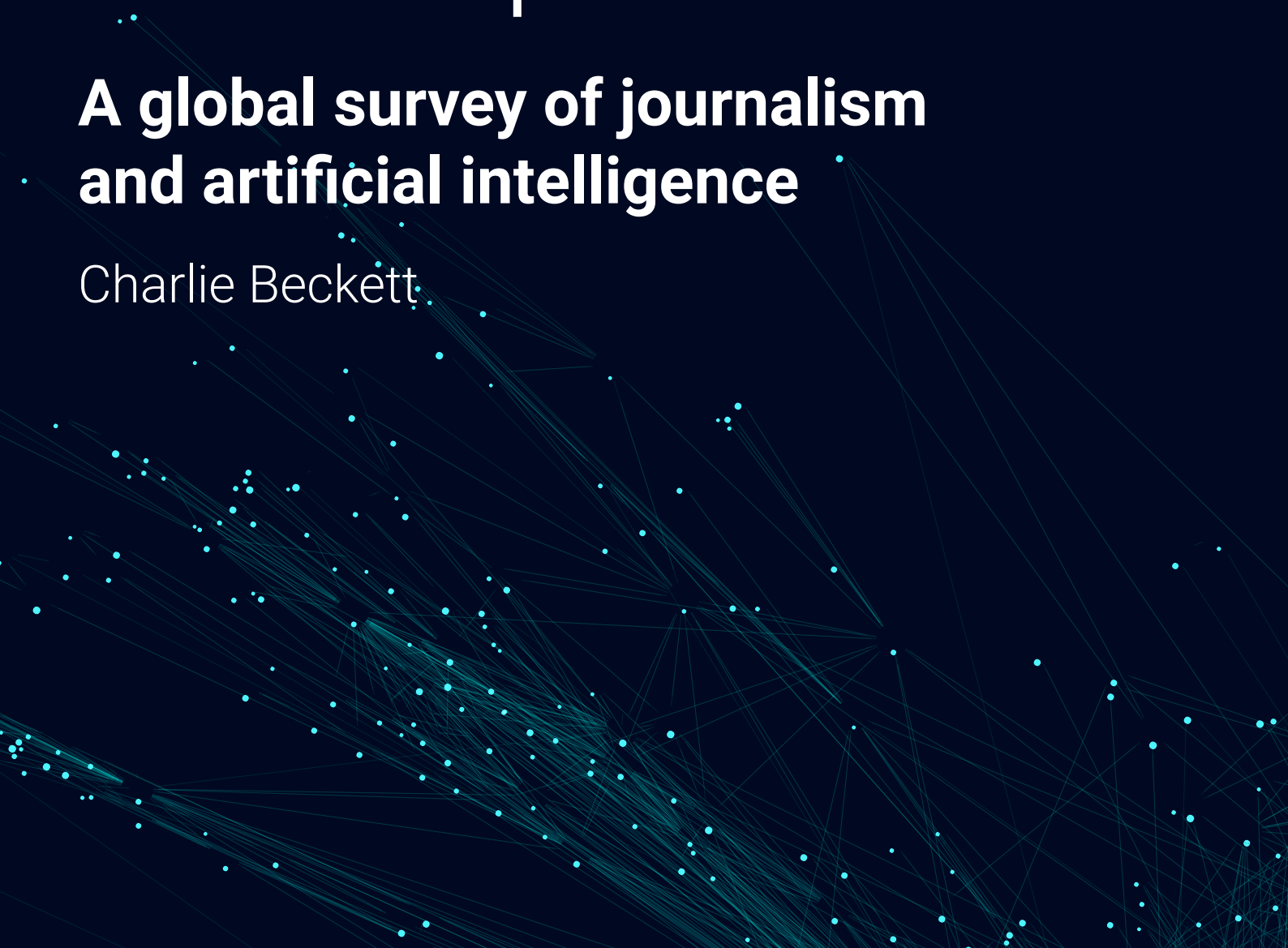
Think-tank at LSE ■

Google  
News Initiative

# New powers, new responsibilities

**A global survey of journalism  
and artificial intelligence**

Charlie Beckett



# Preface

## Preface

No, the robots are not going to take over journalism. Yes, the machines might soon be able to do much routine journalism labour. But the reality and the potential of artificial intelligence (AI), machine learning, and data processing is to give journalists new powers of discovery, creation and connection.<sup>1</sup>

The hope is that journalists will be algorithmically turbo-charged, capable of using their human skills in new and more effective ways. AI could also transform newsrooms from linear production lines into networked information and engagement hubs that give journalists the structures to take the news industry forward into the data-driven age.

Algorithms will power the systems. But the human touch – the insight and judgement of the journalist – will be at a premium. Can the news industry seize this opportunity?

The Internet, social media, and mobile communications have already provided new tools and pathways for journalism to meet the profound challenges of the digital age. Now AI technologies promise another leap forward.

But what of the economic, ethical, and editorial threats they also bring? The algorithmically-augmented journalist and the artificially intelligent news organisation of the 21st century are entering another major transitional phase. How will journalism sustain its public value?

This report is a first step towards understanding what the news media thinks about AI and what it might do next. Step away from the hype and paranoia for an hour and read what journalists reckon AI means for them.



**Professor Charlie Beckett**

LSE, November 2019

# Contents

## Contents

<b>Preface</b>	<b>1</b>
<b>Contents</b>	<b>2</b>
<b>The Journalism AI Survey</b>	<b>4</b>
<b>Executive Summary</b>	<b>6</b>
<b>Introduction: The Journalism AI Report</b>	<b>12</b>
Newsroom Definitions of Artificial Intelligence	15
<b>Chapter 1: How AI is Being Used in Journalism Today</b>	<b>20</b>
<b>1.0</b> What Newsrooms are Doing and Why	20
<b>1.1</b> Newsgathering	22
<b>1.2</b> News Production	23
<b>1.3</b> News Distribution	28
<b>1.4</b> Why Newsrooms Use AI	32
<b>1.5</b> What is Working and What is Not	34
<b>Chapter 2: AI Strategy</b>	<b>37</b>
<b>2.0</b> The Need for Strategy	37
<b>2.1</b> News Organisations' AI Strategies	39
<b>2.2</b> Ready for AI?	41
<b>2.3</b> How Newsroom Roles are Affected by AI	43
<b>2.4</b> The Strategic Challenges to AI Adoption	47
<b>2.5</b> The Pathway to an AI Strategy	51

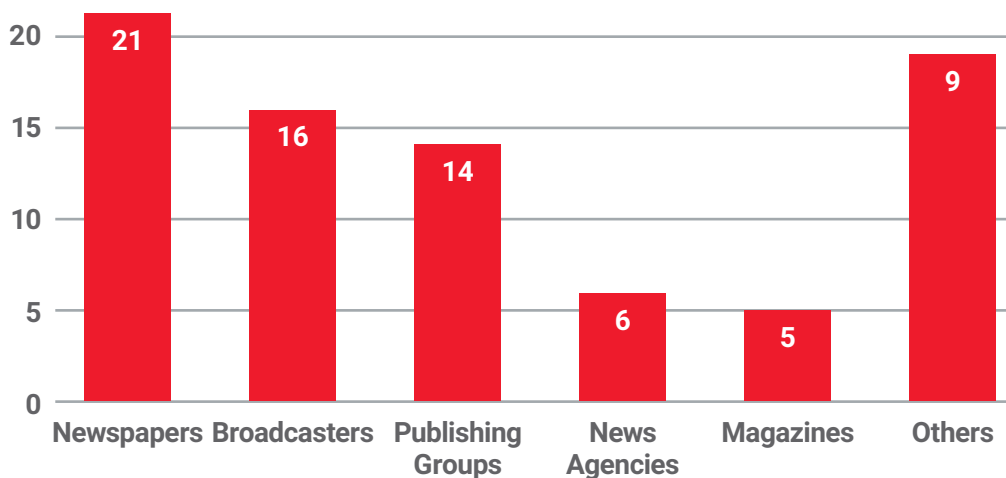
<b>Chapter 3: Ethics and Editorial Policy</b>	<b>52</b>
<b>3.0</b> What Difference Does AI Make?	52
<b>3.1</b> Economics: Savings or Investment?	55
<b>3.2</b> Algorithmic Bias	56
<b>3.3</b> Misinformation and ‘Filter Bubbles’	57
<b>3.4</b> Can AI Enhance Editorial Decisions and Transparency?	59
<b>3.5</b> Balancing Artificial and Human Intelligence	63
<b>3.6</b> The Role of the Technology Companies	64
<b>3.7</b> How Should Journalists Debate AI Ethics?	68
<b>Chapter 4: The Future of AI and Journalism</b>	<b>69</b>
<b>4.0</b> Where is This All Going?	69
<b>4.1</b> Future Applications and Strategy	70
<b>4.2</b> The Need for Education and Training	73
<b>4.3</b> Newsroom Collaboration	76
<b>4.4</b> Collaboration with Universities	79
<b>4.5</b> How Will AI Reshape Journalism?	81
<b>4.6</b> Augmentation or Transformation?	82
<b>4.7</b> What Can Newsrooms Learn from Other Industries?	86
<b>Conclusion: What Does AI Mean for Journalism?</b>	<b>89</b>
<b>Glossary</b>	<b>92</b>
<b>Endnotes</b>	<b>98</b>
<b>Readings and Resources</b>	<b>107</b>
<b>Acknowledgments</b>	<b>108</b>



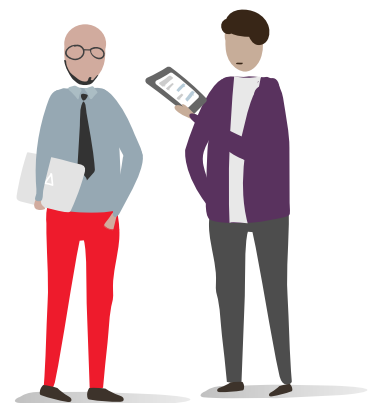
# The Journalism AI Survey

This report is based on a survey of the state of mind and state of play in 71 news organisations from 32 different countries regarding artificial intelligence (AI) and associated technologies. We asked a wide range of journalists working with AI to answer questions about their understanding of AI, how it was used in their newsrooms, their views on the wider potential and risks for the news industry, and about ethical and editorial implications. It was supplemented with interviews, workshops, and conversations at journalism conferences.

## NEWS ORGANISATIONS THAT COMPLETED THE SURVEY, BY TYPE

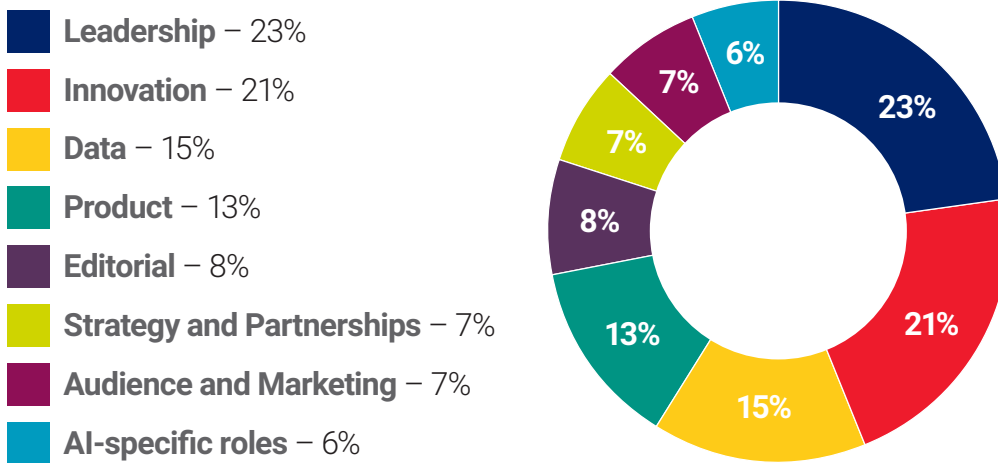


Most of the respondents were technologically expert and could be called 'digital early adopters', so they have more awareness of AI than a random sample of journalists. We encouraged news organisations to gather representatives from different departments to complete the survey collaboratively. 116 journalists contributed to the survey, bringing their perspective on AI from a number of different departments.



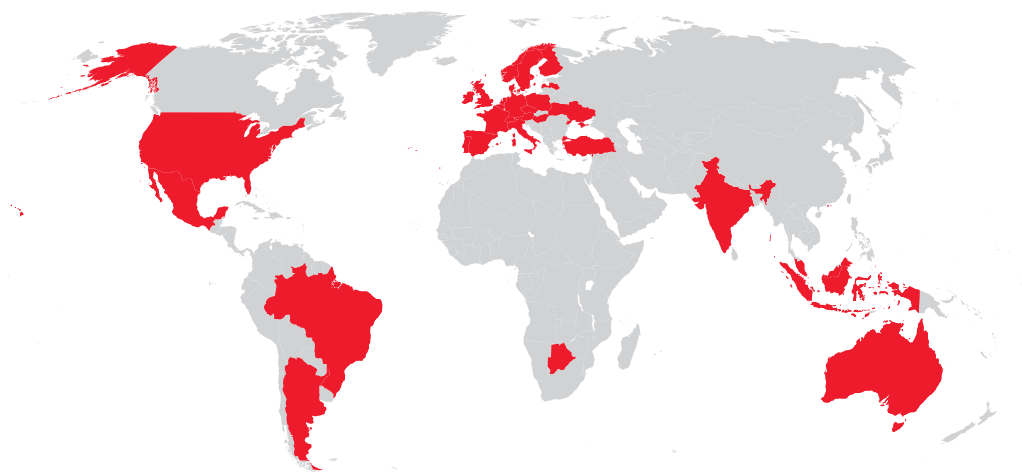


## SURVEY RESPONDENTS, BY DEPARTMENTS WHERE THEY WORK



Inevitably, the sample is skewed towards better resourced and more technologically developed markets such as the USA and Europe. We do not claim that the survey is representative of the global industry – that would be almost impossible on an international scale – nor does it reflect equally all viewpoints within the different parts of news organisations. But it does give an unprecedented insight into how these technologies are perceived by those people leading their development or application inside news organisations.

## COUNTRIES REPRESENTED IN THE JOURNALISM AI SURVEY



NB: The list of organisations that completed the survey can be found in the acknowledgments.

The published quotes have generally been anonymised. Some quotes were edited lightly to correct literals and for sense. The editorial responsibility for the report lies entirely with the author.



# Executive Summary

## Executive Summary

- 1 Artificial intelligence (AI) as a range of technologies including machine learning, automation and data processing is a significant part of journalism already but it is unevenly distributed.**
- 2 Its future impact is uncertain but AI has the potential for wide-ranging and profound influence on how journalism is made and consumed.
- 3 Even the newsrooms we surveyed that are furthest ahead in the adoption of AI described it as additional, supplementary and catalytic, not yet transformational.
- 4 The power and potential described in this report make it clear that all newsrooms should pay attention to AI.
- 5 AI is defined by newsrooms as human or technologically related and by its function.
- 6 It is important to have an organisational definition of AI to help shape strategy and to promote understanding and communication about AI in the newsroom.**
- 7 Just under half of respondents said they use AI for newsgathering, two-thirds said they used it for production and just over half said they employed AI for distribution.
- 8 There was a general aspiration to use any efficiencies to free up resources for enhanced newsroom functionality and for new or improved content and services.





- 9 The three key motives for using AI were:**
  - **To make journalists' work more efficient (68 per cent of replies)**
  - **To deliver more relevant content to users (45 per cent)**
  - **To improve business efficiency (18 per cent).**
- 10** Just over a third of our respondents claimed to have an active AI strategy.
- 11** There were four main approaches to creating an AI strategy:
  - Traditional management in existing departments
  - Separate teams working on AI projects
  - Integrated tech and editorial structures
  - Experimental teams - separate or integrated.
- 12** The newsrooms split approximately in half between those who felt they were AI-ready and those who were just starting or still planning to use AI.
- 13 There was a significant fear of their newsroom falling behind. This was a particular problem for small newsrooms, raising the prospect of growing inequality between small and large organisations.**
- 14** Newsroom roles were seen to be changing more through the augmentation of current roles rather than the replacement of jobs. There would be new tasks for people in existing roles and new workflows, but few AI-specific new roles.
- 15** The biggest challenges to adopting AI cited by our respondents were financial resources (27 per cent) and knowledge or skills (24 per cent). But as significant as either of those was cultural resistance (24 per cent) including the fear of losing jobs, of changing work habits, and a general hostility to new technology. Lack of knowledge about AI (19 per cent) across the news organisation along with a lack of strategic managerial insight (17 per cent) were also key issues. They also described AI as often expensive to build and manage.





**16 From our survey it is clear that there is a lack of strategic planning. AI strategies will always vary according to the nature of the news organisation and what adoption stage they have reached, but these are the key elements to consider that have emerged from this research:**

- Assess your stage and state of AI readiness
- Understand and categorise the kind of AI technologies you are considering
- Decide how AI might relate to your brand and general strategy, the problems it might solve, or the needs it could meet
- Evaluate what areas of your organisation might use AI and why
- Identify key obstacles: resources, skills, culture, management, etc and plan how to address them in a systematic way
- Assign roles and responsibilities and create a communications structure across the organisation to include all stakeholders
- Establish systems of monitoring and reviewing performance and priorities
- Create a role for external relations with partners, clients, and wider AI resources with a mission to investigate and incorporate AI innovation.

**17** The majority of respondents had confidence that overall, the impact would be beneficial if news organisations retained their ethical and editorial stance.

**18 The newsrooms identified six key areas where AI is or might make a difference to their organisations ethics and editorial policy and practice:**

- **Economics:** Making cuts from AI-generated savings could lower editorial standards. Reinvestments could instead be used to improve journalism quality and effectiveness
- **Algorithmic Bias:** Bad use of data could lead to editorial mistakes such as inaccuracy or distortion and even discrimination against certain social groups or views



- **Misinformation/Filter Bubbles:** AI can help the spread of ‘fake news’. Crude use of personalisation can make confirmation bias or conflict worse. But well-managed AI can help counter misinformation and improve the quality of public information
- **Enhancement of editorial decisions and transparency:** AI can help correct old newsroom biases and increase the diversity of stories and audiences. It can help promote transparency around the use of AI and of journalism in general
- **Balancing human and artificial intelligence:** It is vital that augmented journalism retains human values and even enhances the value of human judgement and creativity
- **The role of the technology companies:** There is concern over the power of ‘Big Tech’ as competitors and about their control of research and product development. They were also seen as a source of innovation, tools, and systems. There is a need for more transparency, dialogue, and support for journalism from technology companies.

**19** There were three levels of future thinking:

- First: To improve and iterate what is happening now with existing product and editorial teams
- Second: Medium-term innovation over the next 2-5 years with newer applications
- Third: Innovation and experimentation for the long-term that might include completely new approaches or structures.

**20** **When we asked what would help them meet the challenges of an AI future the two most frequent responses had not directly to do with the technology:**

- 44 per cent mentioned training, education and literacy in the newsroom
- 43 per cent mentioned the need for recruiting people with new skills.



**21** The three most common areas for our respondents' future AI-tool wishlist were for:

- More automatic tagging/entity extraction (newsgathering)
- Better machine-generated content (news production)
- Better personalisation/recommendation engines (news distribution).

**22** **The biggest future wish from respondents was for training and education in six different areas:**

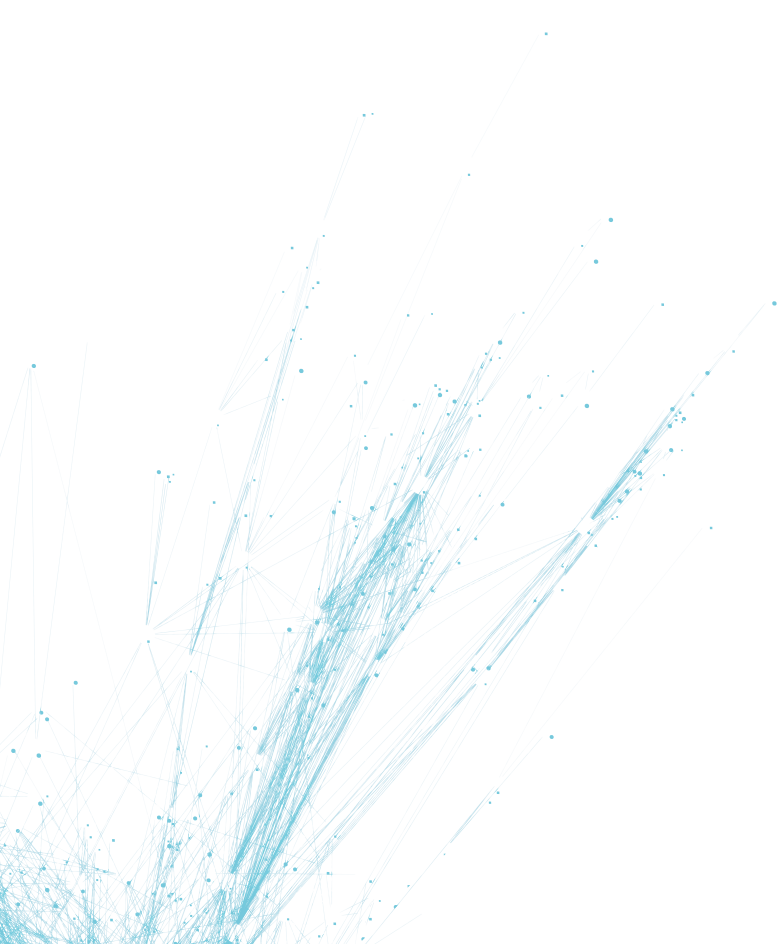
- **AI literacy:** To spread understanding across the news organisation
- **AI skills:** Basic skills such as coding and understanding data training
- **More advanced AI skills:** To foster innovation and as part of career development for all staff
- **For management:** To improve general awareness and also understanding AI systems and other AI adoption models
- **Ethics:** To understand how to reduce algorithmic or data bias and to improve accuracy and reliability
- **General AI insights:** More scientific and social understanding of AI and its impact on users and society.

**23** Despite competitive pressures there was a strong interest in collaboration to improve standards and innovation. Collaboration was suggested:

- Across departments within news organisations
- Between news organisations - on stories but also on tech development
- Across a country but also internationally
- With tech companies
- With start-ups and intermediary organisations
- With universities/researchers.



- 24** AI will re-shape journalism in an incremental way but with longer-term structural effects that reflect how news media is changing for other reasons: technological, social, and commercial. In a more networked world AI will become more important in all fields.
- 25 AI will make news media more 'unequal' and diverse and change the structure of work, the newsflow, and the relationship with public.
- 26 AI will power new platforms and tools, such as AR, drones, voice, image and text generation, and wearables.
- 27 AI will power the way information and debate happens, though often not through the news media. Newsrooms will have to adapt to new forms of editorial authority and trust.
- 28** There is much for journalism to learn from other industries, including technology companies and start-ups, marketing and advertising but also law, gaming, gambling, and music industries: How they use the technology, change their workflows, marketing practices, their relationship with users, and their ethics.





## Introduction

# The Journalism AI Report

**Artificial intelligence (AI) is a significant part of journalism already but it is unevenly distributed.** The technologies that come under the umbrella term of AI range from everyday functions such as search, to complex algorithms drawing upon deep learning to create text or videos. AI technologies are rapidly developing, alongside other radical changes in media production and business models. **The future impact of AI is uncertain but it has the potential for wide-ranging and profound influence on how journalism is made and consumed.**

Using AI is not as dramatic a step as when news organisations first went online. It has more in common with the adoption of social media as a source, production tool, and as a distribution and engagement vehicle for journalism. AI has the potential to enhance journalism throughout the process in significant ways that may, over the next few years, have structural effects. However, even the newsrooms we surveyed that are furthest ahead in the adoption of AI described it as additional, supplementary and catalytic, not yet transformational.

When fully integrated, pervasive, and operating at scale, AI could have high value in certain areas such as audience engagement, story discovery, and labour efficiency. Some of the possible uses, such as automated translation and text generation, may enable leaps forward into new areas of journalism, marketing and product development.

But overall, our respondents, while often enthusiastic, said that they don't expect an immediate revolution at scale through AI, compared to the advances that might occur in other fields such as security, retail, or health. This is partly because of the special nature and needs of journalism but also because of the relative lack of resources for research and development.





**The power and potential described in this report makes it clear that all newsrooms should pay attention to AI.** The world that journalism inhabits, especially the media and technology fields, will be reshaped by AI. If journalism wants to stay at the cutting edge, it needs to inform itself about AI and explore its uses and consequences for the newsroom as well as wider society. Most of our respondents are still at an early stage of AI adoption, some are deliberately exercising caution in their approach. But very few denied that it would play a significant part in their future and that of the industry as a whole.

We include our own analysis but for wider context and more detailed insights we recommend further readings in the appendices. There are links to case studies in the endnotes.

**This report should be read as an introduction to and discussion of journalism and AI. We hope it will help newsrooms make decisions around strategy, but it is not a manual for implementation.** We hope that further research, training, and a network will emerge from this process, to follow up on the issues raised by this report and dive deeper into specifics. Please get in touch if you want to be part of that process. You'll find the contacts at the end of this report.

**The Introduction** that follows deals with how the newsrooms defined artificial intelligence as an idea and as a practice.

**Chapter One** deals with what is happening now: How are newsrooms using AI, and what are their motives for using it? What works and what doesn't, so far?

**Chapter Two** looks at strategy: How do newsrooms do this? What kind of approaches to AI are taken by news organisations? What impact can AI have, and what are the key challenges?

**Chapter Three** looks at ethics and editorial policy: What difference does AI make? What positive and negative effects does it have on the quality of journalism? What issues are raised around bias or accountability? What about the role of the technology companies?



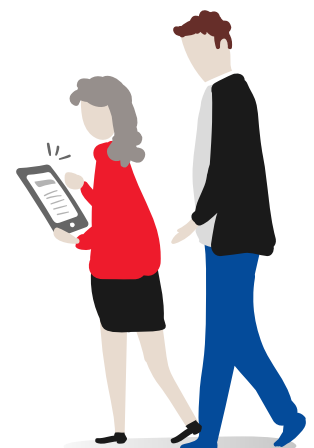
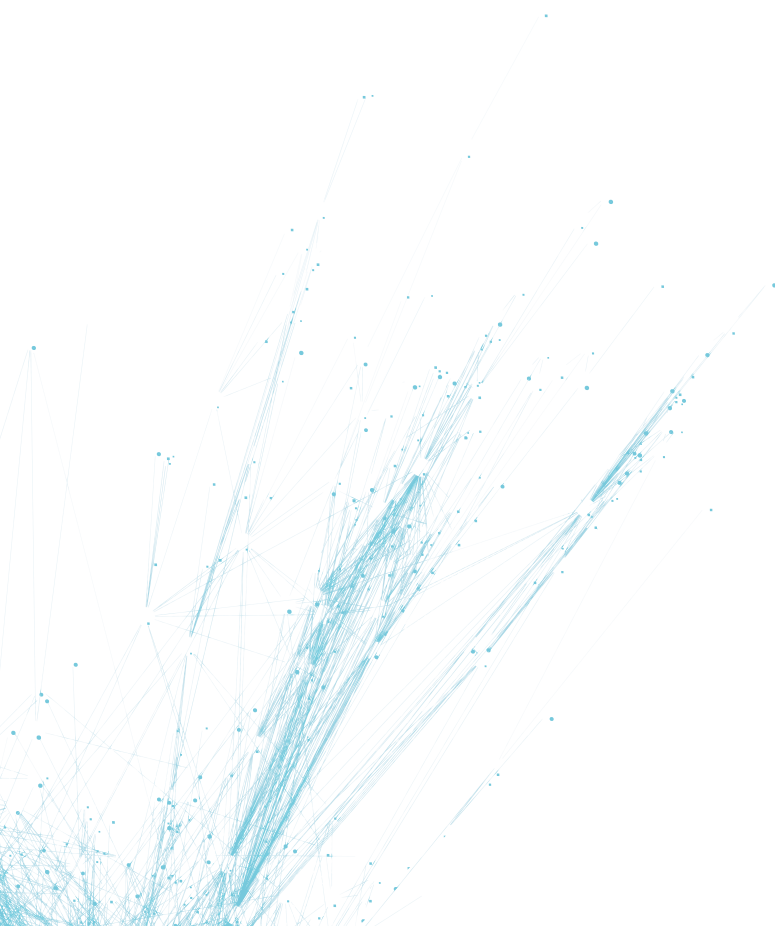
**Chapter Four** looks at the role of AI in the future of journalism: What is going to happen next and where will this lead? What uses of AI do newsrooms aspire to? What kind of skills, roles, training, and education do we need in the future? What is the role of collaboration? How will AI shape the way that journalism is going to evolve as a practice and a business?

**The Conclusion** sets out the author's view, based on the survey, of how the news industry should move forward and the challenges and opportunities AI presents.

**The Executive Summary** gives the main points of the report. At the end of it, you can find a glossary, endnotes, and a list of suggested readings and resources.

**This work was funded by the Google News Initiative<sup>2</sup> and carried out by a team led by Professor Charlie Beckett, director of the LSE's international journalism think-tank, Polis.<sup>3</sup>**

We would like to thank all the journalists, technologists, and researchers who took part in the project. Their enthusiastic efforts to help us demonstrated an impressive commitment to their work and to the value of journalism and its challenging future. The project was managed by Mattia Peretti and the lead researcher was Fabio Chiusi.

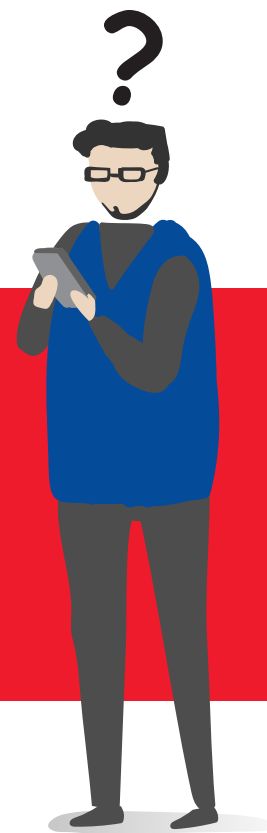




## Newsroom Definitions of Artificial Intelligence

Before we see what our survey respondents said about AI, it is useful to understand what they mean by the term. Artificial General Intelligence (AGI) does not exist operationally, it is still a hypothesis.<sup>4</sup> Machines can't think entirely for themselves like the Hal computer in *2001 Space Odyssey*. 'General' or 'strong' AI is still years away and might never be reached at all. AI as it is used today in news and other industries is defined as 'narrow', or 'weak' AI, a set of far more limited functions that are programmed.<sup>5</sup> They may well be faster or more effective than humans but in reality this is 'machine learning' (ML) or 'natural language processing' (NLP). Many processes described as AI often incorporate more conventional technologies. These are systems that are created or 'trained' by humans. Some are responsive and adaptable but can often carry out quite simple automation or data-processing tasks.

Artificial intelligence, machine learning, natural language processing... Is your head spinning already? We got you covered. Look for definitions in the **Glossary** at the end of this report.







For this report we borrowed a simple definition:

**Artificial intelligence is a collection of ideas, technologies, and techniques that relate to a computer system’s capacity to perform tasks normally requiring human intelligence.<sup>6</sup>**

We will use ‘AI’ as an umbrella term, always accepting that it refers to a portmanteau of related technologies.<sup>7</sup> AI is driven by algorithms, “a series of steps that is undertaken in order to solve a particular problem or to accomplish a defined outcome”.<sup>8</sup> These can be programmed as machine learning or automation. They may be manifested as tools such as ‘bots’.

The key factor is the degree of autonomy and adaptivity they have and this is on a spectrum.<sup>9</sup> At one extreme “the computer decides everything, acts autonomously, ignoring the human”. At the lower end the “computer offers a complete set of decision/action alternatives” for humans to act upon.<sup>10</sup>

There are three fields of operation for AI, covering almost all of the journalistic process: newsgathering, production, and distribution. We first asked our participants what kind of operational definition of ‘artificial intelligence’ they use. Their definitions reflect the complexity of the topic and the variety of approaches. Definitions partly reflect the respondent’s understanding but also the motive for engaging with this technology.

While some people had an objective or scientific definition, most related their definition of the technology to its use and purpose. This was invariably as additional to existing, human centred practice: ‘augmented journalism’. Sometimes the term was used in a very specific way, for example, to describe a tool to analyse data sets such as court records for an investigation. In other uses it means something more systematic, such as continuous personalisation of content for users through audience data.



The way that newsrooms defined AI for this survey usually reflected its role in their organisations. These were generally working definitions used to communicate with colleagues, the public, or partners. A broader understanding of AI in journalism would need to take into account the views of those stakeholders, too. Our respondents' replies divided broadly into technological and human- or task-related categories.

Technological definitions were based on ideas around algorithms, natural language processing, automation, and data analysis. For about a third of respondents, 'machine learning' was the key term:

“*Technically, I take it to mean machine learning/neural network-driven systems, but for the purposes of newsroom technology I think of it more as any system of automation that's more than a very simple tool.*”

Respondents recognised that their definitions could not be final, considering the fast-evolving nature of the technology. More concrete ideas were sought, partly to distance their definitions from the hype around the term 'artificial intelligence':

“*Usually, we don't use this term at all. We are using more narrow names like 'machine learning', or when we speak about some specific field we are using terms like NLP [Natural Language Processing] or deep learning. 'AI' feels like a buzzword for us.*”

These more technological definitions stressed the way that AI works. For example, by creating pattern recognition in managing large sets of data, or the principle of prediction and classification.

The human- or task-related definitional approach sees AI as the ability to perform, replicate, or mimic tasks commonly associated with human beings' cognitive abilities, or 'human intelligence'. Usually they are related to the journalists but also the audience. Almost always AI is defined as there to augment or expand human capabilities:



“ Using computing power to solve data-based problems and do analysis not achievable by human power – either by learning/self-improving or by processing and analyzing vast amounts of data. ”

Our respondents were all working in or with newsrooms rather than in pure research, so not surprisingly in nearly all cases there was a functional, problem-solving aspect to their definitions. At times, elements from different definitions combine to conform to Nick Diakopoulos’ idea of hybridised AI journalism: “We see AI broadly as technology that can acquire, understand and make conclusions from information, and then learn from its decisions”.<sup>11</sup>

A quarter of our respondents said that their organisation does not have a formal definition of AI or are in the process of creating one:

“ We don’t have one. We have a debate on this subject. ”

The BBC is an interesting exception. Perhaps because of its scale and the variety of its operations, it deploys multiple definitions:

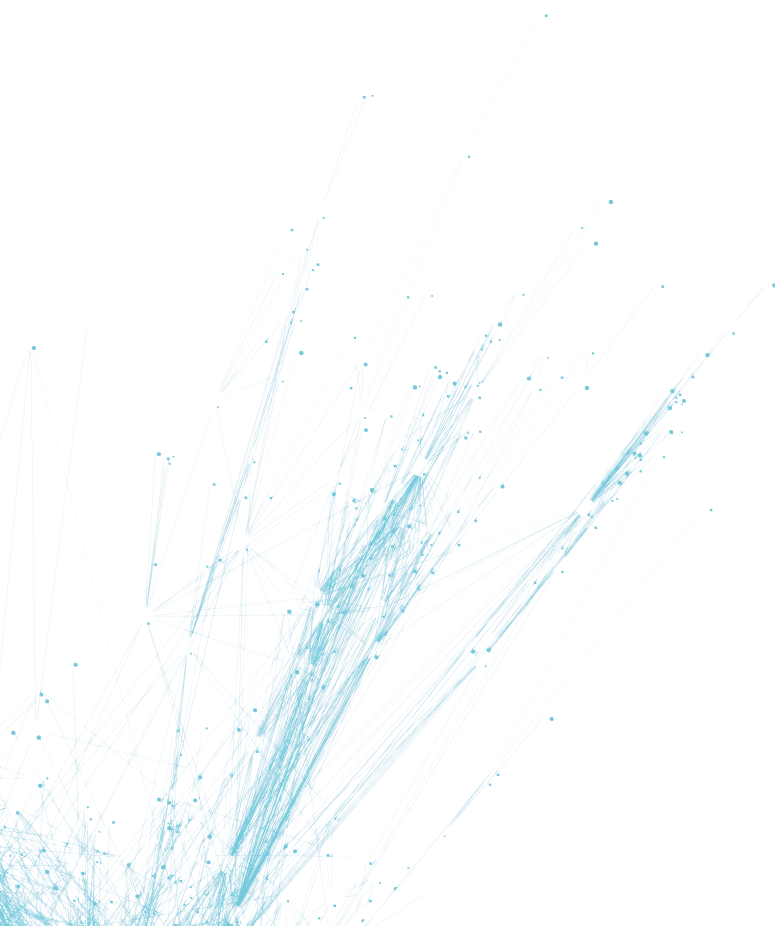
“ The BBC doesn’t have a single specific definition of artificial intelligence. The term is used to mean different things by different people, and is often used to refer generally to the frontier of advanced technology. Some common things that people mean by the term ‘artificial intelligence’ at the BBC are (1) technologies based on machine learning of any kind (especially neural networks), (2) technologies that are represented as intelligent agents (eg, voice agents, chat bots), (3) technologies that automate tasks that previously required people to do (eg, writing articles using NLG [Natural Language Generation], automated translation or transcription, etc). Products that use ‘artificial intelligence’ sometimes fit in all three of these categories. ”





The definition matters because it reflects how a newsroom might think about its AI strategy [See also *Chapter Two*]. Having a definition of some sort is a useful first step to help think about how it differs from other technologies. It reflects the levels of AI literacy in the organisation and the ability to communicate with colleagues as well as externally. One of the core tensions around the adoption of any new technology in the newsroom is the culture clash involved between tech specialists and other departments. How the news organisation defines AI may help towards clarifying roles.

As the technology advances, newsrooms will increasingly have AI that performs more systematic and autonomous functions. Understanding what AI is will be important to realising its potential and the opportunities and risks involved. However, newsrooms are highly diverse and so is AI. The technology and its uses are continually evolving so the definition will also change. A degree of flexibility in its definition reflects the complex reality of the technology and its applications.





## Chapter 1

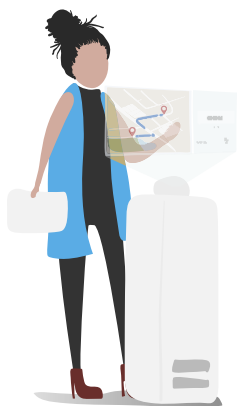
# How AI is Being Used in Journalism Today

## 1.0 What Newsrooms are Doing and Why

We asked newsrooms what AI they were using, why they used it and what worked. The replies split broadly into three areas:

- **Newsgathering:** sourcing of information, story idea generation, identifying trends, investigations, event or issue monitoring, extracting information or content.
- **News production:** content creation, editing, packaging for different formats and platforms, text, image and video creation, repurposing content for different audiences.
- **News distribution:** personalisation, marketing, finding audiences, understanding user behaviour, monetisation/subscriptions.

Just under half of respondents said they used AI for newsgathering, two-thirds for production and just over half for distribution. But in the context of contemporary 'networked'<sup>12</sup> or 'hybrid'<sup>13</sup> journalism, that traditional divide between input and output is better understood as a highly-interrelated process.



One of the key aspects of AI and journalism [as we shall explore in Chapter Two] is that it allows the whole journalism model to become more holistic, with a feedback loop between the different parts of the production and dissemination process. The moderation of user comments, for example, could be seen as a way of gathering content, creating or editing that content and as a key way of increasing audience engagement. Here is an example of one newsroom doing just about everything:



“ *Recommendation of related articles. Robot journalism (eg, for lower league football matches). Personalization of the newsfeed. Lookalike audiences based on user data to increase CPMs. Predictive analytics to optimize news curation. Speech-to-text services to increase our editors’ productivity. Churn prediction and prediction of the propensity to subscribe. Tagging/entity recognition. Spell check.* ”

As discussed in the introduction, the AI used would usually be better described more specifically as forms, for example, of machine learning, automation, and data processing. Some of the processes that come under the ‘AI’ label may be quite limited in their ‘AI-ness’. Inevitably there is some confusion and grey areas. Journalism continues to undergo a thorough process of reform and innovation and it is not always clear where a particular technology has an impact, or the boundaries of its influence.

Under-pinning all AI processes is data: data about audiences such as their behaviour; data about the reported subject such as official records; data about the journalism such as sentiment and language. Whatever the precise category, it is clear that the use of AI is permeating newsflows. That makes it harder to identify and evaluate what it does, but it also reflects the adaptability of the technology and its increasing integration into operations.

Thoughts from our respondents about how AI could improve their work grouped around ideas of being more competitive, efficient and time-saving. But the dominant motive was connecting better created content more effectively to audiences, who in turn would be more engaged and prepared to pay attention, or money, for journalism. There were also some specialised functions such as dealing with misinformation and verification. The overall aim was characterised by a general aspiration to use any efficiencies to free up resources for enhanced newsroom functionality and for new or improved content and services. Also driving respondents’ motivations was the need to keep up with technological and market changes. *[See the next two chapters for how that fits into wider planning]*. Results were described as mixed and often still provisional, but overall there was a sense that AI is gaining a significant role and proving worthwhile.



## 1.1 Newsgathering

Newsgathering related to AI is part of a data-driven production cycle. AI can help gather material but it is also tasked with helping editorial to assess what will interest users:

*“ For our editorial products we focus more on supporting our editorial teams in their editorial decisions without replacing those decision processes. One main area we focus on is to make information accessible: we ingest a lot of video content every day. We want to help journalists to work with this flood of information to help in deciding which information is most relevant for the audience. ”*

AI can help with the job of sifting through content from official sources but also from the public and social media, for example through the automated filtering of UGC (User Generated Content). AI programmes can categorise information or material at scale for different purposes:

*“ Image recognition APIs [Application Programme Interfaces] for analytics and journalism – genders and ages in images, genders in text. ”*

*“ Neural Networks for photo tagging and Natural Language sentiment (Google Cloud APIs). ”*

For the AI to work, it has to treat material as data and that means that the process of tagging that data or ‘metadata’ is critical. AI allows that to be automated to some degree. It is difficult to implement thoroughly but it underpins everything else:

*“ We built an automated tagger for our newspaper’s articles (which tags articles with topics/keywords – formerly done by editors), built into our CMS [Content Management System]. ”*

AI helps the newsroom to make decisions about how this raw material becomes content:

*“ We have an internal tool that combines data analysis and language generation systems to write all or parts of stories and to alert journalists to potentially interesting patterns in data. ”*



Story discovery is also made possible by machine learning algorithms that help journalists spot trends and facts that could otherwise remain hidden from human eyes:

“ We needed to find a news archive with the largest possible number of publications in Mexico so we could track daily coverage across the country. Google News’ vast collection of local and national news stories across Mexico was a good fit. The effort required us to identify the difference between the number of homicides officially recorded and the news stories of those killings on Google News. This required machine learning algorithms that were able to identify the first reported story and then pinpoint where the event took place. With that information, we were able to connect reported events by media with the government’s reports on homicides across more than 2400 municipalities in Mexico. ”<sup>14</sup>

## 1.2 News Production

AI can be a newsroom tool that helps with the process of content creation at a granular level:

“ Our sub-editors and journalists currently use Grammarly, which employs artificial intelligence techniques, to help check grammar and spelling for our English articles. ”

“ We have started using AI for general articles, we tried AI Writer together with Deepl.com for translation duties. ”

But even the most basic routine deployment of AI is always part of the data cycle process that enriches the journalism production with virtuous feedback loops:

“ We employ entity extraction tools that separate different types of entities and present them to the journalists during the article creation process. This improves the quality of the tagging we employ. We also use it in our internal news tracking tools. As we are pulling hundreds of thousands of articles from all over the world, it’s imperative for us to enrich the metadata of each and cluster them. Entity extraction gives us critical informational nuggets that can be used in further processing to display global trends. ”





Another important AI function is for verification, either as a support for building the credibility of content in a routine way or as a specialist function in itself. Initiatives such as *Chequeado*<sup>15</sup> and *Full Fact*<sup>16</sup> employ machine learning-powered tools for automated fact-checking:

“*Claim detection: We use machine learning to help us separate claims from other sentences. This helps our fact checkers in deciding what to check each day. Robochecking is automatically checking claims against databases of information. We use the Office for National Statistics data to check claims in real-time. For example, if someone says “Employment has fallen by 10 per cent since 2016” our system finds the correct numbers and generates a graph, and answer, in real-time. Claim matching: This is the ability to find claims we have already checked, in new places. We therefore need the ability to match a claim to a new sentence.*”

As misinformation exploits new technologies and continues to operate at scale, this will be a key growth area for newsrooms, such as the detection of ‘deep fakes’. Speech-to-text, automatic translation, image recognition, video-making, and narrative text generation are all rapidly evolving uses:<sup>17</sup>

“*Our archives are using AI for automatic tagging of content by automatically extracting keywords, topics, entities like persons and places. They are building their own training data set by using a face recognition algorithm to tag faces in news videos with the aim to build up a tagged data set with regional politicians that are usually not recognized by trained face recognition software. The archives are also using speech to text algorithms for creating subtitles. As dialect recognition is an issue, the archives have started a dialect recognition project by training an algorithm with dialect data.*”

This way of organising material through AI enables automated content creation, often for social media:

“*We use an algorithm for our posts on social media. Starting from RSS feeds or from email, it can write posts on Facebook and tweets. It manipulates the text, publishes updates at scheduled times, sends emails and reminders for our cross postings.*”



Finnish public service broadcaster Yle is confident enough in the technology to have built its own robot journalist:<sup>18</sup>

“*Voitto ‘robot journalist’ is today producing hundreds of pieces of content in a week (textual content and illustrations). Voitto produces tailored content for the news app as well as for various newsletters and several Twitter accounts. Voitto combines rule-based methods as well as early experiments with ML.*”

AI can enhance user information around an event, such as during Sky News’ recent live Royal Wedding coverage that used facial recognition technology to identify celebrities arriving at the ceremony.<sup>19</sup>

A project from *Le Monde* highlights how AI can further impact content creation at local level during an election:<sup>20</sup>

“*In 2015, we worked with Syllabs to automatize election reports. The French electoral map is made of approx 36000 cities, we can’t write pieces for each of those units. Robots will. We got structured data from the French Home Office. This data was analyzed and managed by Syllabs’ machines which created approx 36000 pieces displayed on 36000 pages where we displayed database information such as population, location, mayor, previous elections results, wealth, employment rate, etc.*”

Another respondent pointed to the “automatic creation and publishing” not just “of soccer match commentaries”, but also of “traffic accidents and weather forecasts”. Experiments with automation involve the creation of headlines and summaries of press releases.<sup>21</sup>

AI is used for routine, commodity journalism<sup>22</sup> but it can also be combined with human journalists to tailor mass data sets to specific audiences. The *Press Association’s* ‘RADAR’ (‘Reporters And Data And Robots’) news service<sup>23</sup> combines humans and machines to create localised stories at scale on topics such as “crime figures, hospital waiting times and pupil absences from school”.



The Guardian's 'ReporterMate' tool, is another example of this 'augmented journalism' that combines AI with humans:<sup>24</sup>

“ A robotic system that allows journalists to build simple templates to fit specific data sets. ReporterMate's first article, on political donations, was based on data from the Australian Electoral Commission and was published in January 2019. ”

AI is helping facilitate new forms of journalism, though for many of our respondents these were still in development [See also Chapter Four]:

“ We're also experimenting with new journalistic forms. Experiments with automated systems allow us to combine different kinds of data-powered storytelling methods (eg, one that allows you to follow individual parliament members). AI-powered experiments have also enabled us to create immersive content experiences in which the user can directly affect and personalise the content experience itself. ”

A lot of the editorial functions cited were related to investigative journalism that could not be done by humans alone:<sup>25</sup>

“ We used AI to analyze a trove of Housing and Urban Development inspection pictures to identify concentrations of problems (such as mold, missing smoke detectors, etc.) at various housing complexes, which isn't otherwise possible without lots of FOIA [Freedom of Information Act] requests. ”

AI can also add depth to general journalism:

“ We are using it to solve some specific tasks in our reporting. So, for example, we used Deep Learning Model (ResNet) to search for places of illegal mining on hundred of thousands of images.<sup>26</sup> Also we used Deep Learning (ULMFit based model) for Natural Language Processing (NLP) to process millions of news items to search for manipulative content; and Machine Learning to create a map of different topics.<sup>27</sup> We used Machine Learning in a couple of other projects with data from social networks such as sentiment analysis for Twitter messages. ”<sup>28</sup>



These investigative tools increase efficiency, enabling hard-pressed newsrooms to cope with the research labour involved, but they also reveal information that might otherwise be missed by human-only analysis:

“ ‘Laundrette’ is a tool that structures Freedom of Information requests and is already in the hands of the data journalism team, saving hours of work. ‘Giant’ identifies patterns in data that otherwise we might never see. For instance, we can link disparate emails from different inboxes into threads. We can automatically search for terms that we have identified with watchlists. ”

As we will see in section 4.3 on collaboration, newsrooms are often working with external partners on AI. Third-party organisations have vital specialist technical knowledge:

“ We have done one major analytics project in investigative journalism in collaboration with the Norwegian University of Science and Technology where we used advanced analytics tools to analyze manipulation of streaming figures in Jay Z-owned Tidal. ”<sup>29</sup>

“ We are using machine learning systems in our journalistic investigations. These include fast.ai, Google’s AutoML, Dialogflow NLP. ”

Or newsrooms can scale up the value and share the costs of AI with other newsrooms:

“ We have partnered with four major news organizations on projects currently underway, with publication expected in the coming weeks. ”

“ As part of the ICIJ [International Consortium of Investigative Journalists] we also contributed to the leak search engine. ”<sup>30</sup>



Not only can AI enable fresh investigations but it also allows the newsroom to follow up on the story in real time and keep track of how it develops:

“ We used machine learning to automate how journalists can find ways to track political funding and other disclosures by listed corporates in the absence of enabling legislative framework for transparency. We continue to work with Stanford computer scientists to find ways we can use open source code to automate alerts and make it easier for journalists to get notified through an email alert whenever there is new information on campaign funding. ”

Increasingly, innovation is supported by external sources such as foundations:

“ Under a pilot grant from the Knight Foundation, we are actively helping both our journalists and journalists at other news organizations. For example, we used machine learning techniques for a story about unique risk factors Lyft included in their IPO fling. We identified patterns in police helicopter flight data that could let local newsrooms know, in real time, whether something big is happening they don't know about. ”<sup>31</sup>

### 1.3 News Distribution

With AI-networked journalism there is not always a clear distinction between content creation and consumption. As mentioned above, an example is AI-powered comment moderation. It adds content but is also a vital way to engage readers. Human moderation of user comments was laborious but AI tools can reduce the toxicity and promote more engaging interactions:

“ Three years ago, [we created] a very simple but impactful tool that allows moderators to maintain a watchlist of key terms, stalls the publication of any comment mentioning them and alerts our moderators. Our developers used machine learning techniques on our existing body of moderated comments to build a model that classifies comments as good or bad. 22 per cent of comments that are flagged as bad are subsequently blocked – a much better rate than for abuse-reports from users. Only 0.3 per cent of comments identified as good are subsequently reported/blocked, a very high level of accuracy. ”



What users do with content – measured as engagement, shares, comments, pageviews, and time on page – can help inform content strategy. *The Times of London* spent three months using machine learning to relate 10 user metrics to 16 different pieces of content metadata such as headlines and article format to understand what worked best for readers.<sup>32</sup> The results led to changes in the amount and type of content created for certain sections or platforms and a sharpened focus on boosting engagement. For example, which stories to promote via social media. It made their content creation strategy more efficient and in terms of reader attention and subscription renewal, more effective.

Many newsrooms reported that they were adopting this more holistic personalisation approach with AI technologies to improve the quality of the user experience:

“ All of our websites include personalized recommendations of some sort. The homepage of our biggest site is about 50 per cent personalized. That personalization system uses real time data to recommend articles to users based on various factors. It uses some machine learning algorithms, such as collaborative filtering, to score articles. However, the system also has some simple rules. For example, an article will receive a lower score (and therefore appear further down on the page) the more times a user has already seen it. We use this technology to recommend content, as well as to deliver personalized campaigns (offers to buy subscriptions), and to decide when content marketing should appear for a user. In the near future, we will start personalizing and automating push notifications and newsletters. ”

Every newsroom has a different model for its relationship with the user, and for some of them AI processes can be limited:

“ I’ve only seen recommendation applications that were not super inspiring, to be totally honest. It’s very much focused on engagement rather than servicing the user. ”



But personalisation of content can work even when users think they don't want it:

*“ Our users don't show a lot of acceptance of personalized news products yet. Either they don't see the value of personalized lists or they don't want their news experience to be personalized. But in tests engagement increased over human-curated feeds. ”*

Some newsrooms were taking personalisation onto new distribution channels such as audio and newsletters:

*“ Our algorithms deliver audio content, tailoring it to users based on actions they take (listening all the way through to a story, skipping, sharing on social), combined with human curation. Through the combination of personalization algorithms and editorial choices, we have been able to optimize listening times on digital platforms that extend far beyond average listening times on terrestrial broadcast radio. ”*

AI allows the automated creation and tailoring of content to different audience segments. This has an impact on both the audience experience and content production. But the intended outcome is engagement that supports business models such as paywalls and subscription. Larger organisations such as the *Times of London* and *The New York Times* have adopted sophisticated AI-driven systems, but smaller publishers also report higher conversion rates with 'smarter, dynamic paygates' that deploy a range of AI uses:<sup>33</sup>

*“ Personalising marketing communications recommendations for topics of content automated curation of index/topic pages; making predictions about the relative potential for success of a story; to allow newsroom to make relevant promotional decision (Promotional Index); making predictions about optimal tagging (Discoverability Index); Topic tracker (tool that serves personalized further reading recommendations with a gamified incentive to read). ”*

Even when automating journalism our respondents agree that, however efficient the algorithms might be, human judgement remains vital in planning, executing, and monitoring these processes.



# THE FUTURE IS ALREADY HERE

## A selection of AI applications admired by our respondents:

### 1 – The Wall Street Journal's dynamic paywall: <sup>34</sup>

Machine learning-informed subscription decisions “to show different visitors, who have different likelihoods of subscribing, different levels of access to its site”.

### 2 – The Washington Post's Heliograf: <sup>35</sup>

A robo-reporting tool successfully adopted, for example, in reporting on the 2016 summer Olympics and congressional races on Election Day.

### 3 – The Press Association's RADAR: <sup>36</sup>

An automated news service set up by the Press Association and Urbs Media “to write local news stories at a frequency and precision impossible otherwise” – 50,000 in the first three months.

### 4 – The Times of London's JAMES: <sup>37</sup>

Acronym for ‘Journey Automated Messaging for higher Engagement through Self-Learning’, it “uses data to get to know the habits, interests, and preferences of readers, acting as a digital butler.”

### 5 – Bloomberg's Cyborg: <sup>38,39</sup>

An automated system that uses AI and extraction to identify key data points in earnings reports for thousands of companies and publish headlines and articles in seconds.

### 6 – ByteDance's Toutiao: <sup>40</sup>

Chinese mobile app using AI-powered personalisation engines “to source and curate daily news and articles for users via its 4000 partner sites”.

### 7 – DeepL: <sup>41</sup>

A company that builds deep learning-powered tools to understand and automatically translate texts.

### 8 – The New York Times's Project Feels: <sup>42</sup>

“A project to understand and predict the emotional impact of Times articles”, and then serve personalised ads accordingly.

### 9 – Texty's Leprosy of the Land: <sup>43</sup>

A piece of investigative journalism made possible by a “machine learning model” to find traces of illegal amber mining in Ukraine.

### 10 – Yle's Voitto: <sup>44</sup>

A smart news assistant that “ensures that you don't miss the news you want to read” by giving “smart news recommendations using notifications on your lock screen”.

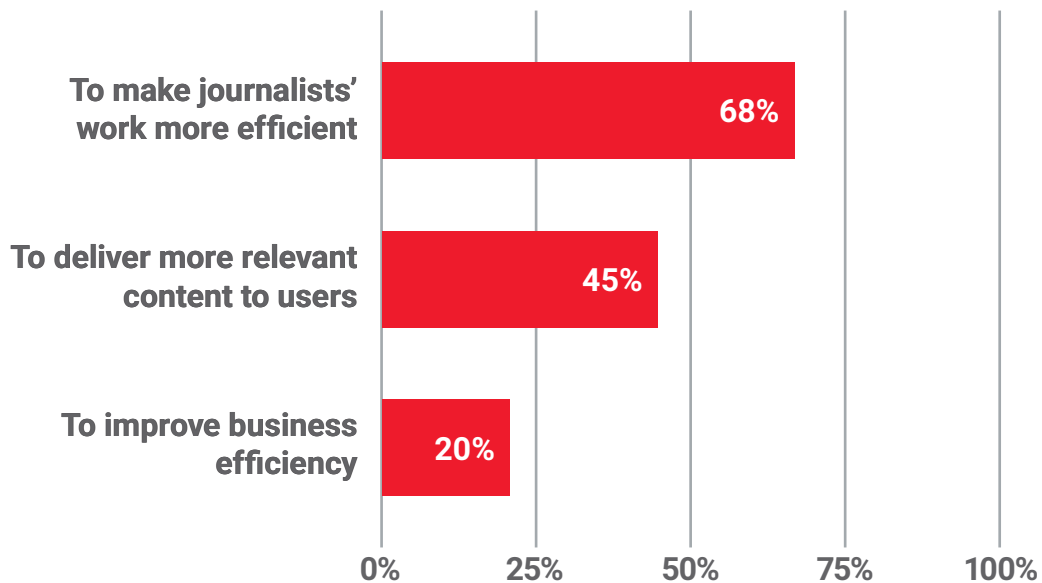




## 1.4 Why Newsrooms Use AI

We can see that there is a wealth of activity and development happening, but why? There were three core reasons given by our respondents:

### WHY HAVE YOU STARTED ADOPTING AI TECHNOLOGIES?



NB: Proportion of respondents who mentioned each motivation in their answers.

As we will see in Chapter Two, there were a range of approaches to AI adoption. A small minority had specific AI plans, while the majority were pursuing a more ad hoc approach. A minority of news organisations had sole objectives. Some were specialists so might focus on one aspect such as investigative journalism. Others were at an early stage and so had only implemented a limited range of projects with a narrow focus on one goal such as personalisation. But the majority had a range of motives and a significant number had a holistic approach:

“ The aim: augment the user-citizen, journalist, and the newsroom. And to create feedback loops that help us understand our users, content and our journalistic actions and the world around us in relation to each other. We aim to provide a more direct, meaningful, and engaging experiences in our main services. We aim to empower journalists in their news reporting and storytelling. And we want to create new methods and tools to better understand ourselves and the world around us. ”



The complexity of the technology is a practical and psychological brake, although another restraint seems to be the overload of newsroom development already occurring. Our respondents were generally tech early-adopters so not surprisingly the overall tone was positive. While there were fears of missing out, the predominant mood was pragmatic. The core goal was to improve the existing product and that means to support the journalist:

*“We believe that, in a world where resources are increasingly tight, we need to support journalists by reducing the amount of grunt work they need to do and improve the journalism by allowing them to focus on what really matters and what they do best.”*

Most respondents characterised the benefits of “simpler workflows, cost-cutting through automation, greater productivity” as ways to enable better work, not to cut costs:

*“Increased capability for investigations by looking at big data sets.”*

*“To be faster in finding news.”*

*“To improve fact-checking / fight disinformation.”*



But they also saw AI in the economic context where news organisations are not just competing with each other. They are fighting for attention and revenue with everything else online. AI is seen as a potential catalyst for renewal and to avoid being left behind:

*“The media industry is undergoing a crisis and every measure that might provide a competitive advantage must be taken.”*

*“News without technology can’t survive in the digital era.”*

They recognised that other industries are adopting AI and so must the next generation news media [See Chapter Four for lessons from other industries]:



“Advances in machine-learning algorithms have empowered banks, retailers, finance firms, law enforcement, social media companies, and so many more. And while we can (and should) debate how these industries use AI, there’s no dispute about the power these methods provide their practitioners. Now, in the same way spreadsheets, databases, and mapping programs have moved into the newsroom, machine learning methods are becoming accessible to motivated journalists – allowing them to use that power for their reporting into stories that would otherwise be difficult or even impossible. This is the next generation of data journalism.”

As we will see in Chapters Two and Three, this is primarily about additionality or replacement of existing products and processes but cumulatively it becomes a structural question for journalists.

## 1.5 What is Working and What is Not

The outcome of technological innovation in the newsroom is always unpredictable. The process of adoption is iterative and subject to the exigencies of the real-world news environment. Different tools will be subject to different measures of success. Though, as we will see in Chapter Two, there are some common approaches that can be useful to newsrooms. For many of our respondents it is just too early to tell:

“Most applications are still in nascent form and their success or failure is still uncertain. This is particularly true of products based on intelligent agents in voice and chat environments.”

For some there were clear failures, or they realised that AI was not the right solution for a particular problem:

“We experienced multiple failures in AI.”

“Most of our innovative applications that succeed aren’t based on artificial intelligence.”



It is difficult to generalise about failures but they tended to be related to either complex or emergent processes that were not relatable to newsroom needs:

“ *The NLP [Natural Language Processing] systems currently available to the news industry are not fit for purpose. Third-party NLP protocols do not provide signals that meet human editorial standards. There is an urgent need for the news business to develop a common approach to NLP as a tool for use in personalisation and content recommender systems.* ”

Some use-cases are innately tough: such as getting the public to hand over their money, or fact-checking complex claims. Some of the most clear-cut successes tended to be specific tasks with clear objectives. This is a fairly typical list:

- “ 1) *object extraction/automated tagging (it shone light to the metaphorical dark cave which is comprised of our untagged assets);*
- 2) *automated fact-checking (claim detection and robochecking, very promising);*
- 3) *content (pre)moderation;*
- 4) *speech-to-text (English mostly, though; other languages would still file under failure);*
- 5) *ad targeting tools;*
- 6) *propensity models;*
- 7) *machine-generated content.* ”

Just because something didn't work immediately did not mean that our digitally-enthusiastic respondents gave up:

“ *We think it's important to keep testing and working on this, creating transparency about how our personalization works, giving users control over personalization. We're testing what we call 'trust features' to increase acceptance and getting the mix between human curated and machine curated lists right.* ”



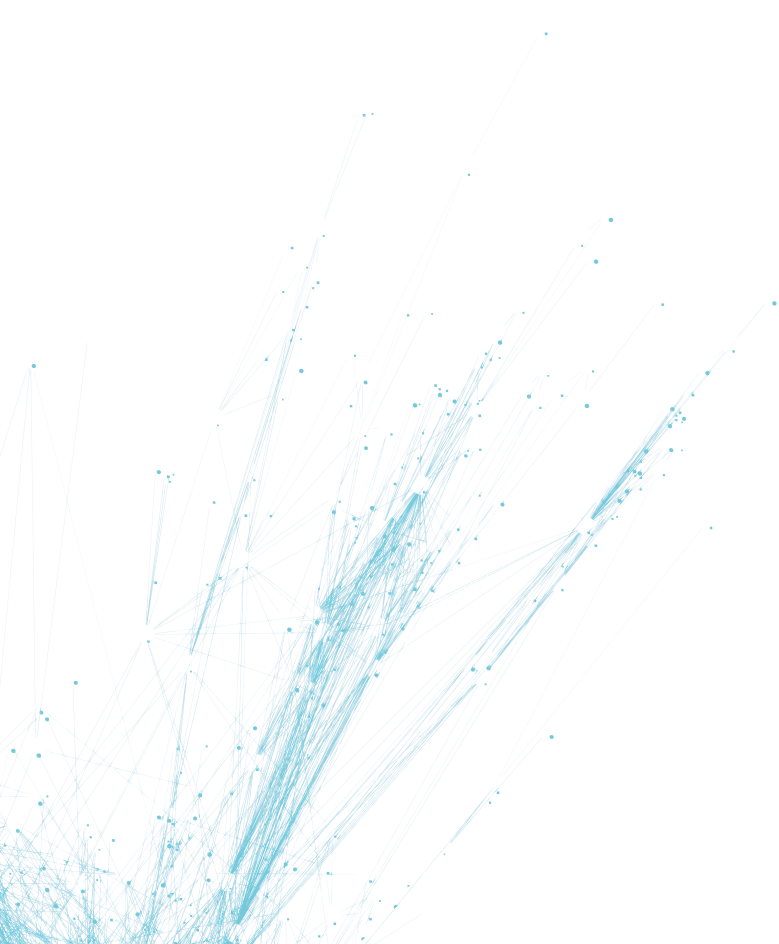
“ We take a MVP [Minimum Viable Product] start-up mindset when it comes to AI. Essentially, this means launching an early version of tools, getting feedback from its users, then rolling out new features and functionality, and then iterating on this feedback continuously. While AI may not solve every problem or challenge, we are big believers in creative innovation and think that AI-driven tools can help complement our content creation, advertising, and marketing efforts in meaningful ways. ”

While some newsrooms were able to experiment with a range of tools or products, most tried to concentrate on a few:

“ Trying to do too much usually results in something that fails at everything. ”

As we will see in Chapter Two, part of the problem is defining ‘success’. What works is not necessarily what is needed. The effort to adopt AI shown by our respondents is a powerful answer to those who accuse the news media of a lack of appetite for innovation:

“ It depends on how you define success. We’ve learned a lot from every single thing we’ve tried. ”





## Chapter 2

# AI Strategy

## 2.0 The Need for Strategy

**The introduction of new technologies in media is sometimes characterised by a romantic rhetoric of creative ‘disruption’. Yet generally newsrooms do not have the time or resources to allow for free-wheeling risky adventures.** In practice, even the most flamboyant of VC-funded start-ups needs to have a strategy if new ideas are to be translated into sustainable added value at significant scale. Strategies have to be flexible but there needs to be a structure to frame the investment of energy, time and money. When it involves innovation that may have structural impacts on newsroom development it becomes even more important that it relates to the overarching longer-term strategy of the organisation. Measurements of progress such as KPIs are needed to track impact.

Mass, effective application of AI is new so most organisations will not be AI-ready. They will have to build their knowledge, skills and, as data scientist Monica Rogati says in her *AI Hierarchy of Needs*, “the infrastructure to implement (and reap the benefits of) the most basic data science algorithms and operations, ...[and]... machine learning.”<sup>45</sup> Any AI strategy has to reflect these imperatives of AI-adoption. It has to have a diagnosis of the current situation, a vision of where you are trying to get to and an outline of coherent actions to get there.<sup>46</sup>





As our survey showed, how this happens may vary from a general plan to a much more detailed operational timetable and assessment procedure. In response to technological and market developments over the last two decades most news organisations have evolved business and production strategies. This idea of developing ‘strategy’ was something of a novelty for news organisations used to business models and technologies that had been fundamentally unchanged for half a century. Going online, being digital first, and building new business models based on subscriptions, paywalls, or memberships are all structural strategic responses. All have significant implications for workflows and audience relations. Within the overall strategy will be sub-strategies for specifics such as platforms, e-commerce, or content production. How do newsrooms strategise AI?

We took a qualitative approach to this part of our survey because it is crucial to understand what news organisations are thinking as well as doing. According to editorial technology strategist Francesco Marconi they might start by thinking like this: <sup>47</sup>

**Challenge:** What challenges are you trying to solve?

**Process:** How can you translate this challenge into practical steps?

**Data:** Do you have the right data to solve the challenge?

**Research:** Where is the data coming from and how is it going to be vetted?

**Pitfalls:** What errors can be expected from the algorithm and how can you add oversight?

In response to those questions, Marconi’s *Wall Street Journal*, for example, now has a sophisticated, holistic strategy that seeks to place AI-related technologies within a wider innovation infrastructure.<sup>48</sup>

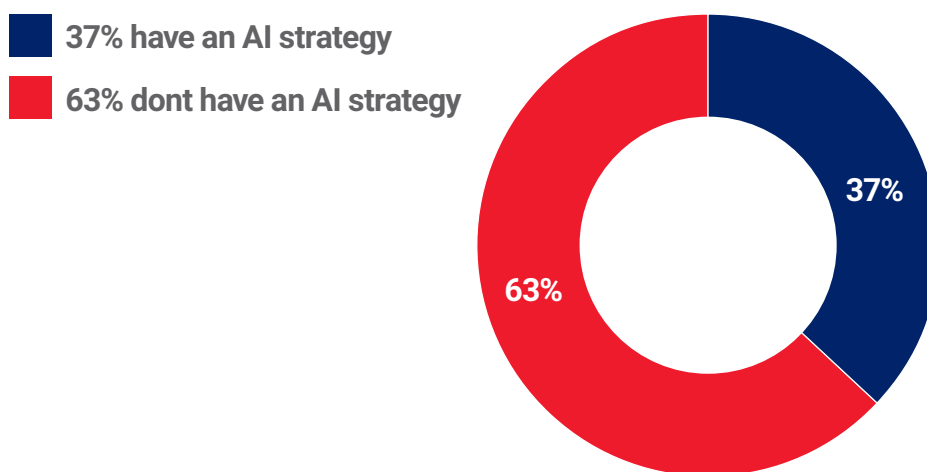
This report does not set out in detail how to create a strategy. There are more technical resources in the recommended readings at the end of this report. Our aim is to use the responses from the newsrooms we surveyed to suggest the different elements that have to be addressed, the kind of challenges that will be faced, and the priorities that need to be set.



## 2.1 News Organisations' AI Strategies

Just over a third of our respondents claimed to have an active AI strategy, two-thirds said they did not. This appears to be consistent with the high level of experimentation found in previous answers around the success or failure of current journalism initiatives involving AI [See Chapter One].

### DOES YOUR ORGANISATION HAVE A STRATEGY FOR AI?



Where there is an overt AI strategy it is usually the domain of the data/tech/digital/innovation team:

*“ The Data department is the one where all the AI-related initiatives converge; they will gather requirements from the rest of the areas of the company and set the roadmap for implementation. ”*

In one instance, responsibility lies with the Strategy Office. In another, with the Product team. One respondent said that “it is lead by the digital newsroom, involving different parts of the organization based on the relevant project”. So rather than a general strategy there were department- or team-level AI initiatives. Other organisations said that the responsibility for AI is entirely dispersed:

*“ The AI strategies are shared across the newsroom, technology, data science and product teams. ”*

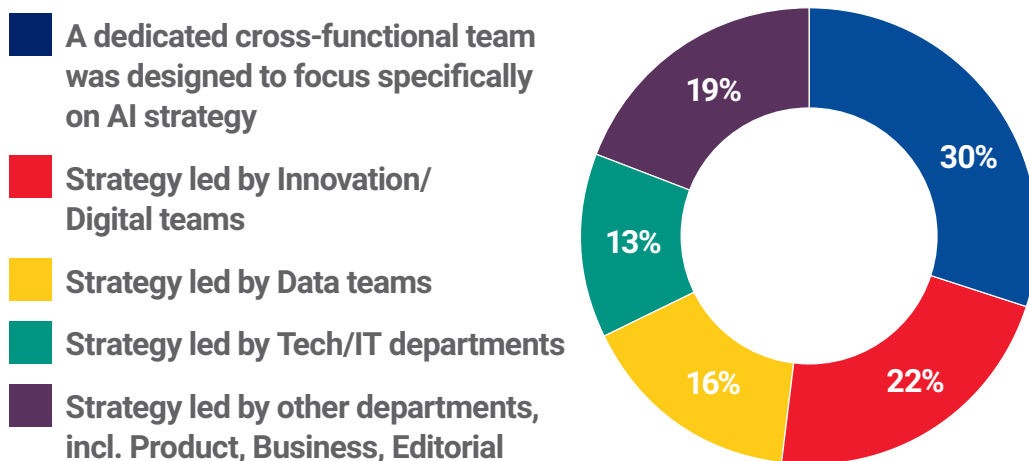




Sometimes the AI work is ring-fenced in a unit that is deliberately not subjected to the constraints of the wider organisation:

“ We have set down the team involved with AI as a separate incubator. Such a new thing as AI does not match current IT. Only by being independent, we are able to gain traction. ”

### WHAT DEPARTMENT OF YOUR NEWSROOM LEAD ON AI STRATEGY?



NB: Only the responses of newsrooms that said to have an AI strategy were considered.

Many respondents reported confusion around roles and responsibilities. Several respondents argued that at early stage adoption for AI it is better to have a series of approaches related to different AI applications, rather than a formal, overarching strategy:

“ Since the applications of AI-related tools are quite diverse, it would seem reasonable to set up several strategies – one for in-house developments in the field of automation, one for the implementation of tools in internal workflows, one for automated recommendations... So far, there are different departments involved: the newsroom, in particular the editorial R&D team, the data journalism department, the social media department, IT and marketing experts, product development teams. ”



That more plural approach was also reflected by a few respondents who were experimenting with different ways of organising their efforts:

*“ We work in cross functional Scrum teams which include product owners, data scientists, data engineers, software engineers and scrum masters. Depending on the project this mix can vary. Many of these team members will report to different people in the organisation but it is important for us to let them work as a team. ”*

One core idea that underpinned a lot of answers was ‘don’t run before you can walk’. Before you have an AI strategy you need to know how your newsroom works now, something that news organisations have often taken for granted in the past:

*“ You need to understand your workflows before automating part of them, so it really comes down to knowing yourself and what you do before deploying these solutions. When you are given an assignment, or come up with an idea, usually the next step is to just hand in the content you produced – and what happens in between is lost. That process needs to be made explicit when AI is involved, and that implies understanding that not all of your work as a journalist has to do with creativity. ”*

## **2.2 Ready for AI?**

These are still relatively new, diverse and complex technologies, coming in the wake of a series of other digital challenges. So it is not surprising that respondents are deeply divided on AI-readiness. They split approximately in half between those who felt they were catching the wave and others who hadn’t done more than dip their toes in the water. There was a vein of optimism, especially as many of our respondents were early-adopters who feel they have already made the first steps::

*“ We are aware of developments, we have units that deal with the topic, we have projects that tackle the issues. ”*



Many respondents had become aware by embarking on AI projects that their organisations were not ready to develop a broad strategy – yet. For example, there were cultural/managerial challenges specific to AI:

*“As a large newsroom, we are more familiar with the potential and challenges of automation/AI in the newsroom than most. However, we still have work to do in spreading this knowledge throughout the company so that everyone is aware and thinking about how to optimize the technology and also consider the risks.”*

These management challenges are frequently mentioned as serious obstacles to obtaining uniform or strategic change across the whole organisation:

*“There is an unbalance between the business areas and the newsroom. Cultural change is the biggest challenge, as well as having a strategy around AI that goes beyond tactical initiatives.”*

Among those who claim they are not ready there is a strong sense that getting up to speed is an urgent task:

*“We have too much dependency on third parties and lack of internal resources to pretend to be ready. We have to clarify use cases. We have to clarify profit and loss for a medium company. We hope to be able to have a real AI roadmap in 2-3 years.”*

This is a particular problem for smaller newsrooms:

*“We’ve started, and have ideas, but our organization is small and we lack dedicated resources to fully take advantage of AI for journalism.”*





## 2.3 How Newsroom Roles are Affected by AI

One of the key areas for any strategic discussion of AI is what will happen to jobs. Will the robots take over from humans? Will the computer wizkids displace the seasoned hacks? Will traditional skills be substituted by algorithms? Our respondents stressed that AI creates labour as well as reducing it. But certainly, what people do will change. Traditional journalism skills may become more important, but in a new setting. Many think AI will affect all areas of the organisation, though not in the same ways:

“ Production, distribution, and consumption of news will all be impacted by AI-powered technologies, probably in that order. Entirely new content experiences based on AI technologies are still the most distant opportunities. In production of news the daily routine of assembling audio and video programmes will likely be an early area of impact. In distribution and consumption of news the personalisation of content offering and, especially, the personalisation of the individual content item or experience, will likely be an early impact. Both of these are happening now in limited form. ”

This will mean augmentation rather than replacement. As one respondent puts it:

“ I think the impact will be subtle. I am highly critical of the idea of a ‘robot journalist’. It’s a nice sci-fi imagination, but not actually practical or realistic. I think most AI applications will become invisible fast and support workflows and reporting, but not replace it. Instead we’re going to see the automation and augmentation of tasks, such as translation, transcription, image search, augmented writing, automated summaries, maybe some form of personalization inside a journalistic framework. I am trying to not get carried away by big visions and ideas here. ”



One of the core functions of journalism is editing, the exercising of journalistic judgement. While that could become more important, it will change:

*“The editors of the front page will need to work in a different way. A year ago, they edited a front page the way they edited a paper: decide on a unified message, fit the pieces together, and make it look a certain way. Today, they understand that different users will experience the page differently. That is a different way of working. At the same time, the job of an editor is also becoming more exciting. Now, they can specify preferences at a more granular and dynamic level. For example, “Show this article, unless the user has already seen it, in which case show this other article”. That wasn’t possible before. If we look out 10 years though, ‘front pages’ might no longer have a major role to play. That will, of course, change how editors work.”*

That is fairly typical of how our respondents described emerging change and we will discuss what that means for the future in further detail in Chapters Three and Four.

As AI starts making an impact, new profiles and small teams are being brought into many newsrooms to handle the introduction of AI. But overwhelmingly, respondents state that few new AI-specific roles are being created within the newsroom, partly for resource reasons. Where they are, a key role is to act as ambassadors for the technology:

*“While data journalism is a highly promising field, we do not employ a team of data journalists, due to a lack of financial resources. Within our software departments, we have increasingly started to hire data scientists and data engineers as well as a team of AI specialists. Apart from big data analyses and the implementation of AI-related use cases, their task is to give internal talks and trainings to demystify AI and elaborate on its actual potential.”*



The majority view is that creating brand new, purely AI-related roles might be counter-productive. As the technologies become implemented the focus seems to be on adapting existing workflows and roles rather than creating completely new ones:

*“ While we have a growing data team that supports the buildout of these tools and AI-powered technology, the adoption of AI by our newsroom is less about the creation of new roles and more about the evolution, training, and education of existing resources into more AI and tech savvy ones. We believe that data and AI shouldn’t be isolated to a few roles, but that data fluency is necessary across the organization. ”*

This more incremental approach to building AI-literacy throughout the organisation is partly motivated by the fact that AI is not the only technology or process being developed:

*“ I don’t think we need an AI-specific role, but someone focussed on automation and augmentation of workflows. AI does play a role here, but so do dozens of different technologies and techniques. ”*

Workflows of currently employed journalists are changing, though:

*“ We don’t have specific roles exactly but a number of people are already being affected. Certain production jobs are naturally developing in response to this kind of technology. Investigative reporters are increasingly au fait with the kind of tasks that should be automated. Senior managers are increasingly being expected to understand basic concepts and watch out for opportunities and new developments. ”*

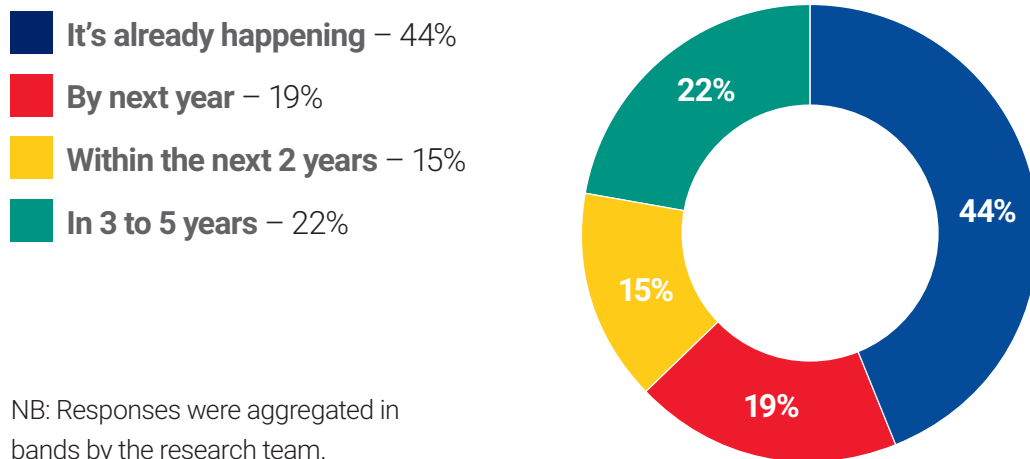
Some of those new workflows will mean the creation of AI-focused newsroom roles:

*“ We have many AI-specific roles now (currently working in a data science team of 8, with data scientists, a data engineer, and product owner). ”*



The overall direction is evolutionary, bringing change through an incremental process of adoption and adaptation. Nearly half of respondents said that they are already AI-active, but about a third spoke of timeframes for significant impact of 2 to 5 years.

### BY WHEN DO YOU EXPECT AI TO HAVE AN IMPACT ON YOUR ORGANISATION?



NB: Responses were aggregated in bands by the research team.

In most newsrooms there was uncertainty about how that impact will be realised. Ad hoc or flexible strategy may be a practical reality but it means that systematic planning is hard. As we shall see in Chapter Four, there is a wider debate about the real potential of AI in other industries and that is reflected in the responses from our newsrooms. At one extreme there is scepticism of any serious effect:

*“ I don't think it will ever have significant impact. ”*

At the other end the feeling among a few was more fundamentalist:

*“ This is happening: however, this is not a technological shift but a cultural paradigm shift. ”*

This reflects the way that AI technologies could reinforce inequalities between news organisations of different sizes and with different resources. Change is coming but it will be unevenly distributed.



## 2.4 The Strategic Challenges to AI Adoption

The biggest challenges to adopting AI cited by our respondents were resources and knowledge or skills. But as significant as either of those was cultural resistance: the fear of losing jobs, of changing work habits, and a general hostility to new technology. Lack of knowledge about AI across the news organisation along with a lack of strategic managerial insight were important too. But perhaps the biggest, concrete factor was the lack of specialist staff who know about the technology and how it can relate to the newsroom. Other issues were also significant such as the quality or relevance of much of the technology on offer and concerns around ethics such as filter bubbles, accountability, and legal issues *[We deal with those in more detail in Chapter Three]*.

### **THE MAIN CHALLENGES TO AI ADOPTION ENCOUNTERED BY OUR RESPONDENTS:**

- 1** Lack of financial resources and/or willingness to invest the available ones.
- 2** Lack of AI-related skills along with the difficulty to attract and hire talent.
- 3** Skepticism towards new technologies, combined with the fear of job losses.
- 4** Structural issues, including technical gaps between departments.
- 5** Lack of knowledge and understanding about the potential of AI.
- 6** Lack of strategy, especially at the management level.
- 7** Lack of time and difficulty to prioritise AI projects.

[Other challenges include: data quality, ethical concerns, complexity, inadequate tech infrastructure, language-related barriers, low accuracy of existing AI tech.]

Encouragingly, the challenges were not always seen as insurmountable. It is not surprising that there is a knowledge gap with such a relatively new and complex set of technologies, but it has wider significance than just an information shortfall. It is seen by respondents as a barrier to progress:





“ There is no common understanding of the term ‘AI’ and when implementing ML [Machine Learning] algorithms can actually be helpful. This does not only lead to false expectations but also turns the search for proper use cases into a challenging task. ”

Related to this is a wider cultural resistance, coloured by fears of ‘tech hype’:

“ I think one of the biggest problems of AI are the imaginations and visions communicated around this term. Most have their roots in sci-fi and speculation. We’ve been trying hard to make this field seem as boring as possible to the rest of the company! This helps manage expectations and also circumvent any unnecessary discussions, because people are afraid of literal job-terminators. ”

Journalists are aware that the introduction of new technology has sometimes led to more work:

“ The key challenge is a cultural challenge, as AI does reduce processes and thus giving more time to people in the newsroom. But that also means an ask of higher productivity, which a lot of people may want to avoid. That has been a key issue. ”

These cultural barriers may be grounded on valid concerns around editorial policy and need to be addressed in a collaborative process of internal engagement:

“ There is a cultural gap between computer scientists and journalists. Topics such as algorithmic personalization are straightforward and sensible directions for computer scientists, but raise concerns with journalists around editorial responsibilities, filter bubbles, etc. We need to keep everyone on board, and get commitment before developing solutions. The solution is to keep in touch/discuss with each other. We (AI team) currently have monthly meetings with editors to keep everyone on board, present our ideas and request feedback. ”



AI is not a magic solution that translates effortlessly into efficiency and innovation. It takes resources. That can create reluctance to engage:

*“ AI is expensive to build and manage. It takes a lot of work to ensure data is clean and machine learning is effective. It may be the domain of big companies, which can develop and sell AI services to smaller companies. ”*

In the past, as an industry, the news media suffered from a tendency to promote journalists into management roles without providing them with wider skills or experience. That is changing through the various technological and market disruptions of recent years but our respondents still report a strong sense that management, who are supposed to organise strategy, are not equipped for or even aware of AI issues:

*“ Too little understanding of the technical advantages and possibilities – managers don’t know enough about technology. Lack of imagination due to poor tech skills. ”*

AI is complex so it is not surprising that there are management problems:

*“ Among the many challenges we’ve encountered: prioritization. How to know what to automate? Which AI project comes first? As with all coverage, you have to weigh up the needs of the audience, the impact of the reporting, the gains for the newsroom and so on. ”*

But underpinning this is the lack of AI-skilled staff which creates very practical as well as cultural issues:

*“ Hiring talented data engineers and scientists is challenging in a competitive marketplace where we’re competing head to head with banks, hedge funds, and start-ups that can offer more in compensation or stock options. ”*



AI technologies have their own terminologies and logics and are often created for other industries. For some newsrooms it is not seen as worth the investment in knowledge and resources. There are issues around language and most of all around data quality:

*“ For many AI applications that we want to do, they rely on high quality, well-labeled data, but we don't have that yet. Labelling those data needs a significant capital investment. ”*

Responses indicate that there needs to be a strategic effort in newsrooms and across the industry to improve levels of AI literacy and to engage with cultural concerns. News organisations need to build a skills base to create relevant and efficient products and systems, as well as the metrics to measure success or failure:

*“ The transformation of the whole media industry has actually just really begun: no-one has silver bullet on how to build and redefine organisational culture that can transform its core business and products to thrive in the new emerging AI-powered world. The biggest challenge for the whole organisation is to understand what is optimisation of the current business and its activities and what is needed to innovate and build future business. Optimization and innovation need different kinds of metrics and KPIs to assess what actually works, and what doesn't. In short: how to coordinate resources in the best and most efficient manner to the activities that build the future success. ”*



Some of these are familiar challenges for an industry that has become used to grappling with change. But finding the investment for addressing the skills and training deficit, for example, is a huge task that will need collective action and possibly external support if the news media is not to fall behind other industries.



## 2.5 The Pathway to an AI Strategy

From our survey, it is clear that there is a lack of strategic planning around AI. The strategy will always vary according to the nature of the news organisation and what adoption stage they have reached, but these are the key elements to consider that have emerged from this research:

### HOW TO PREPARE AN AI STRATEGY FOR YOUR NEWS ORGANISATION

- 1 Assess your stage and state of AI readiness
- 2 Understand and categorise the kind of AI technologies you are considering
- 3 Decide how AI might relate to your brand and general strategy, the problems it might solve, or the needs it could meet
- 4 Evaluate what areas of your organisation might use AI and why
- 5 Identify key obstacles: resources, skills, culture, management, etc and plan how to address them in a systematic way
- 6 Assign roles and responsibilities and create a communications structure across the organisation to include all stakeholders
- 7 Establish systems of monitoring and reviewing performance and priorities
- 8 Create a role for external relations with partners, clients, and wider AI resources with a mission to investigate and incorporate AI innovation.

It is possible that AI might be deployed in quite narrow areas such as the automation of certain functions. But even when deployed in specific fields, AI will be most effective when a holistic approach is adopted. The experience of our respondents is that isolated efforts will always be inherently limited. A strategic approach has to consider the newsroom as a whole. AI is innately networked. It requires a skill set, knowledge base, defined roles, systematic appraisal, and a culture that relates the technologies to editorial or marketing.

AI will change the way that the newsroom works and its relationship to audiences and revenue. As we will see in Chapter Three, that has ethical and editorial implications as well as financial or business consequences. In Chapter Four we will see how organisations are thinking about these future strategies.



## Chapter 3

# Ethics and Editorial Policy

### 3.0 What Difference Does AI Make?

**AI changes the way that journalism is created and consumed but how does it change the journalism itself?** What kind of content is produced and how does it alter the relationship with the individual consumer and society? With any new technology come concerns about its impact on practitioners and people in general. Some of the hopes and fears are based on false premises and conjecture. We learn from media history that 'new media' such as printing, radio, or TV also raised utopian hopes as well as dystopian moral panics.<sup>49</sup> Technology should not be seen in isolation, but it does have effects that go beyond practical issues. AI raises concerns because of its power and its potential to influence all aspects of journalism and especially because it can seem a complex and hidden technology.

Our respondents were generally tech-savvy so were overall less worried about the negative impacts of AI than other parts of the news organisation or other stakeholders might be. But that familiarity means that they do have insights into the effects of AI on journalism. There were six key areas of debate they raised, which are all inter-related:

- Economics: savings or investment?
- Algorithmic bias
- Misinformation and 'filter bubbles'
- Enhancement of editorial decisions and transparency
- Balancing artificial and human intelligence
- The role of the technology companies



This chapter looks at what newsrooms thought about the ethical and editorial issues around using AI. This is what newsrooms are telling us, not a detailed guide to the technology or to solutions. By ‘ethics’ we took a wide definition: thinking and practice related to issues such as trust, accuracy, accountability, and bias. By ‘editorial policy’ we mean a broad range of issues around the idea of the ‘quality’ of news.<sup>50</sup>



How does AI change the standards or nature of the content, and the social value of its relationship with audiences? Journalism itself has a chequered ethical history and levels of public confidence are not particularly high at a time of unprecedented political and economic pressures.<sup>51</sup> At the same time there has been a public debate about AI in general: do the algorithms discriminate against certain groups of people?<sup>52</sup> Will this technology lead to mass unemployment?<sup>53,54</sup> How does society hold this technology accountable?<sup>55</sup>

Newsrooms told us how AI was impacting on their relationship both to content and to the public. We also asked about their attitudes to responsibility or control over the technology and its effects, especially about the technology companies that provide specific tools and general infrastructure. These were not just philosophical concerns, although they do get to the heart of the idea and purpose of journalism [See also *Chapter Four*]. They are also practical, immediate questions. In a world of increasing misinformation, for example, trust is key to securing the confidence and attention of users who might then support a newsroom.

About one fifth of respondents stated that they are not particularly concerned, at least at the moment:

“*I am more excited than concerned regarding the impact of AI. As opposed to the current negative sentiment towards AI, these technologies will augment the newsrooms and save valuable resources to be directed toward serious issues that require the attention of journalists.*”



It might be that in certain areas of journalism work there is a legitimate trade-off between an element of quality lost and another value created. Journalism has often been about making compromises:

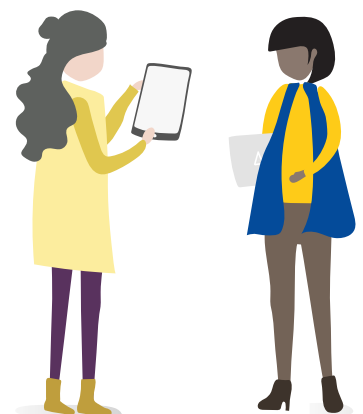
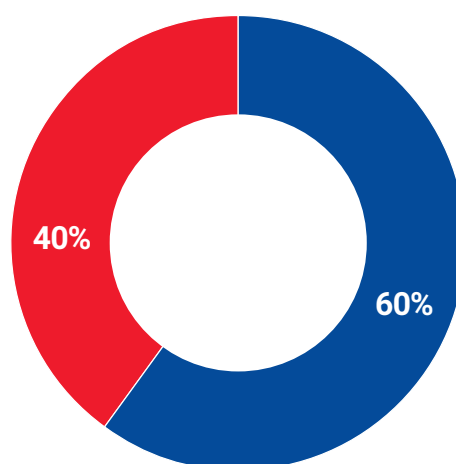
“Especially in the early days of robot journalism, we’re trading quality for quantity with the bet that as a whole it still provides a more relevant user experience. I personally think this is the right thing to do. It is however obviously important to carefully select what types of journalistic work this is done for.”

The majority had confidence that overall, the impact would be beneficial if news organisations retained their ethical and editorial stance. That might reflect the fact that our respondents work for news organisations with a good historical reputation for credibility and public service. Some argued that they did not see problems now but they could emerge if AI is not properly set up and monitored within the organisation:

“I am not concerned at the moment. I think keeping an eye on data bias will be essential, but also heartened that journalists and journalism organisations often consider (or at least try to consider) bias issues in their work.”

### ARE YOU CONCERNED ABOUT THE IMPACT THAT AI MIGHT HAVE ON YOUR JOURNALISM?

■ Yes – 60%  
■ No – 40%





### 3.1 Economics: Savings or Investment?

The most obvious issue was whether AI efficiency savings are ploughed back into editorial or used to cushion news organisations against wider financial constraints:

*“The big question is will savings (if any) be reinvested or used to counter generally declining incomes?”*

A minority were concerned that where AI is used for efficiency it could diminish the value placed on human input:

*“There is potential for higher rates of ‘low value’ journalism to be churned out quickly. The role of reputable news organisations to analyse and verify stories may become a scarce resource.”*

Most respondents were confident that savings would be used to invest in the development of the technology or to enable better journalism. However, there were broader fears that AI might accentuate inequalities between news organisations, with implications for media diversity and the sustainability of ‘quality’ journalism production:

*“The biggest concern around quality of work is how non AI-enabled work might suffer in comparison to newsrooms that have the resources to build/buy and deploy AI effectively. In other words, there may well be an arms race that only the most well-resourced newsrooms can compete in.”*

News organisations recognise that they face an ethical choice. If they take short-term financial decisions they risk undermining their value to the public as well as journalistic standards. Clearly this depends on their corporate mission and how they define ‘quality’:

*“Automatically generating articles from erroneous databases can lead to the spreading of false information, potentially under the label of a media brand that is considered trustworthy by the public. In general, it is essential to keep in mind that the objective of a high-quality newspaper cannot merely be economic success. If a machine learning algorithm is trained to maximize revenue, the risk of valuing click-bait articles more than investigative research projects is high. Therefore, it should be carefully considered what metrics to optimize for and how to maintain the quality standards.”*





Many respondents were confident that positive choices were being made:

“ I have a decent chunk of faith in established media organisations, working in one myself. Any new technology, no matter how automated and computerized, always lends itself to misuse and I am certain there are and will be those who take advantage of that. Still, truth is a commodity that never loses its value and most journalists, I’m sure, realize this and will use AI to empower truth to the best of their abilities. ”

## 3.2 Algorithmic Bias

All algorithms can have some kind of ‘bias’,<sup>56</sup> just as all journalism has some degree of ‘bias’ that reflects its production. Broadly it can be divided into a ‘production bias’ that is inherent to the data inputted, the training of the data and its operation. These might be quite technical factors, such as data classification categories, but they might still be significant in determining the quality of the content and how it is consumed.

Then there are biases that are perceived as ‘unfair’ such as racial or gender biases. This kind of bias is not only socially unacceptable, but it also runs the risk of moral, political, and even legal hazard. All systems will be biased in the sense that they will reflect the intentions and assumptions of the people who create and use them. What matters is how aware you are of the bias and how you manage and minimise it.<sup>57</sup> This means that the ethical and editorial issues will depend on systematic strategy. The overall feeling was optimistic, but around half of respondents did raise concerns about AI applications:

“ I am concerned about journalists’ complacency and over reliance on algorithms and how they may end up doing a disservice to our audience. There are currently many cases of bias in journalism that comes with use of AI. Poorly trained algorithms may do more harm to journalism. ”



The ability to monitor and correct algorithmic bias requires a high degree of knowledge.<sup>58</sup> It demands technological expertise and the time and resources to apply it within the constraints of a newsroom. Journalists have the additional responsibility of explaining it to their consumers:

*“Journalism needs to lead the way in transparency around how algorithms and data are used. If an algorithm is employed, we should try to demystify it, help users understand it and where possible control how it affects them.”*

### 3.3 Misinformation and ‘Filter Bubbles’

One concern was around the credibility of journalism, its role in countering misinformation and in promoting healthy public debate. In the battle against misinformation journalists need to have control of and confidence in their tools:

*“Errors in the application of AI can put credibility at risk in times of political attacks and fake news.”*

Others pointed out the wider ethical challenges of AI technologies and information. For example, its increasing role in promoting (and countering) misinformation generally:

*“Machine learning is perfect tool for generating deep fakes and fake content, and it will be a major problem for all news outlets and credible media. Also content verification will become much more difficult and/or tool-dependent. We need ML tools to spot ML fakes.”*

Many respondents highlighted the danger that algorithmic personalisation could further entrench what cognitive psychologists call ‘confirmation bias’, the human tendency according to which people prefer to be served up content that reflects rather than challenges their own beliefs and values.



This is a complex and often subjective issue. Recent academic research has shown that people who consume news online might actually get a more diverse range of content,<sup>59</sup> especially compared to traditional media habits which may have been even more aligned along partisan lines.<sup>60</sup> But regardless of the absolute or overall trends, respondents were concerned that commercial imperatives should not accentuate the problem of so-called ‘filter bubbles’, polarisation, and conflict:

*“ The filter bubbles in social media today are highly dangerous but we hope that these will be addressed over time, by changes to algorithms, better rules and standards on transparency and by audiences who are more familiar with these effects. ”*

Many respondents are already addressing these issues by shaping the AI to fit their ethical or editorial policies:

*“ Our systems are placing a higher value in the ranking of sources on certain key quality indicators such as originality (does this source specialise in this topic?), diversity (is this source providing a unique point of view or reflect an underrepresented voice?), truth (does this source have a record of misinformation?). There are other criteria possible for such de-biased work on AI including emotion and readability. ”*

For our respondents this was a good case for the idea of ‘augmented’ journalism: combining human editorial insights with AI:

*“ Something that we do to prevent pushing users into a certain ideological direction is to factor in an ‘editorial score’, which is driven by human judgement about the importance of a topic to scale up the curation service that our newsroom provides. ”*

But dealing with AI is not always straightforward and may mean that certain applications should simply not be used:

*“ In our experience using AI to measure, say, the fraction of sources who are male/female is very unreliable; it’s hard to automate the assessment of gender, particularly with foreign names. So if we are going to do things like that, it’s safer not to use AI at the moment. ”*



“ We are trying to get rid of biases in training data, but if we can't, we should identify them and inform users. If we can't identify biases (or biases are hard to characterize) within a dataset, then that dataset (and that AI algorithm) should not be used for editorial purposes. ”

How news organisations deal with algorithmic bias and the way that personalisation might shape public opinion will depend on their own ideological leanings and policies. But the first step is having the knowledge and information to understand how the AI creates bias in the first place:

“ Bias is inherent in all storytelling. AI is only as good as its inputs and, as it's made by humans, may have bias due to the creator's bias. ”

### **3.4 Can AI Enhance Editorial Decisions and Transparency?**

All newsrooms have 'biases'. Some can be 'positive' such as a particular focus on certain issues. However, recently there has been a debate about whether traditional journalism culture creates a lack of diversity in editorial agendas and whether newsrooms are out of touch with sections of the public or certain areas of public concern. Could AI help uncover issues, stories or facts that would otherwise have been missed? Could AI assist in creating journalism that is less limited by professional assumptions or norms?

A majority of respondents said that they had not experienced this corrective effect yet. Their focus is still very much on the bias of algorithms or the audience rather than journalistic 'filter bubbles'. But a substantial minority said that questioning AI bias in itself had led them to reconsider their assumptions and to think again about what readers want:

“ I think AI has a role to play in helping expose the biases and unintended consequences that already exist within the industry too. It is an opportunity to reflect on how we make decisions, to 'rearchitect' it in fairer ways. ”



One way that AI helps challenging newsroom assumptions is through audience data:

“The tools we have used (headline testing, propensity models, and recommendation) show us that what we think might interest readers is not always aligned with what really interests them. There is a strong bias towards what we consider ‘serious journalism’ that is not necessarily what our audience requests.”

Audience feedback can help optimise content provision even when that goes against newsroom instincts:

“Newsrooms tend to find new stuff so much more relevant that sometimes it’s hard to provide necessary context from older stories. It’s something that our personalization algorithms are better at.”

“I think it’s a cycle where we improve one another. AI made us realize our bias and vice versa. In newsrooms, editors tend to make decisions based on gut feeling and experience, and not data. AI made us realize that we have to change that bad habit.”

As we will discuss further in Chapter Four, underlying this is the potential for AI to make journalists reconsider the fundamentals of the industry: What is information? How do journalists decide what is true or important? What does the public use news for? AI has the power to gather, arrange and interpret data from a wider range of sources but how far can it reform traditional formulae and replicated practice?

“AI makes you question everything. AI models are only as good as the humans who structure and train them. It normally reflects the knowledge and understanding of journalists about certain topics. We are very careful to apply the same standards that we have in our news gathering to the AI tools we develop. It’s also necessary to constantly re-train the AI and test for biases, which is also part of our process.”

This trend towards greater awareness of processes led our respondents to cite greater transparency as a way of avoiding the damage of the issues such as algorithmic bias and to build public confidence:

“It always depends on how a news organization decides to handle it: Transparency is the key here. Users should never be kept in the dark about how content was generated and distributed.”



Newsrooms have become much better at showing their workings, partly in response to a perceived crisis of trust in the news media<sup>61</sup> and the need to distinguish between authoritative, credible, verified journalism from misinformation online.<sup>62</sup> AI can help because it can show who consumes what content:

*“Knowing which users get exposed to which content, and to a certain extent being able to factcheck the choices made by technology on journalists’ behalf.”*

But this will be hard because as they become a routine part of journalism work “most AI applications will become invisible fast”:

*“There is a need to start thinking about transparency in the distribution of our work to gain public trust. Algorithms should not mirror past or ongoing bias of its user, both at individual and institutional level. We must think deeply about embedded bias and the impact thereof.”*

To address that means paying more attention to what newsrooms mean by standards and how quality is demonstrated:

*“If we design and use the AI-based systems in a meaningful way, I don’t see any reason to worry about quality or creativity. But for that we have to clarify what journalistic quality means. Where do we need two primary sources, where is one sufficient? On the ethical side, I consider the question of communication and transparency to be crucial. In order not to gamble away the trust our readers have in us, we have to communicate effectively which contents of algorithms have been created and according to which principles this has been done.”*

One key area will be around the privacy of data used by AI, including around new platforms:

*“In the arena of AI Assistants, the concerns currently raised by social platforms around issues like privacy, choice, echo chambers, and so on, may very well be amplified and this is a very present concern.”*



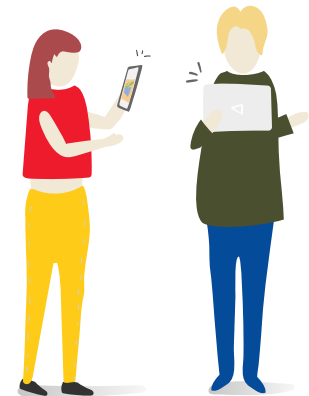
Newsrooms are thinking about how to formalise their oversight. There will always be bias, but what about accountability?:

“*In theory, smart skepticism and an open mind should drive newsrooms to constantly question their assumptions, data, and biases – but it’s hard to do in practice and harder to do when it’s codified in, well, code. There may well be a need for some kind of newsroom watchdog, internally or externally, to regularly question bias.*”

Transparency as an aspiration is noble but unless it is part of the work system and unless the standards are public, it is not effective. *The Associated Press*, for example, is reflecting on how to expand its stylebook to reflect these concerns, but there are a raft of possible ways of addressing it such as proper source attribution in the content itself.<sup>63</sup>

There are codes that attempt to grapple with the particular issues raised by digital technologies and journalism such as the ONA social media code.<sup>64</sup>

There is now a need for new codes or guidelines for AI. One critical element of creating that kind of effective transparency would be, as Paul Bradshaw has argued, for journalists to be more clear about the limits of AI and the degree of uncertainty.<sup>65</sup> This kind of transparency work could draw upon other disciplines such as finance and medicine.<sup>66</sup> But there are already practical ways that newsrooms can be more transparent such as citing AI in an article byline.<sup>67</sup> This is not a problem journalists can solve by themselves when so much of their work is dependent on the infrastructure provided by tech companies:



“*News media doesn’t really have the last say on editorial guidelines and editorial work. The current tech platforms and their algorithms become the all-encompassing editorial filter, which the news organisation can’t really directly affect.*”

As we shall see in section 3.6, this is part of wider concerns about the relationship with the tech companies.



### 3.5 Balancing Artificial and Human Intelligence

One of the key ethical and editorial concerns was losing the 'human' element of journalism:

“Automation could lead to less ‘human intelligence’ in reporting which may have unforeseen consequences.”

The concern included a variety of issues. We have already dealt with the cultural hostility towards technology and the fear of losing jobs within newsrooms. But there were a range of other fears around journalism becoming more algorithmic. One was the devaluing of newswork leading to diminution of the status of journalism:

“Does journalism become less attractive to the ‘master storytellers’ if and when content is co-created or even repackaged by AI? Does the automation of basic tasks lead to a decline of journalism fundamentals?”

When considering the ethics and editorial policy related to AI there is more of a need for journalists to monitor the machines:

“With the agreement of our audience, we could try to personalize everyone’s newsfeed based on similar behaviour, improve the completeness of our content metadata, recognize automatically faces, names and useful data in our stories, and so more. But we see the necessity to keep a strong human basis for each meaningful decision we make on a daily basis.”

It is a balancing act, but respondents were clear that the ‘human values’ of journalism must be imbedded in the adoption of the technologies from the onset:

“To make sure that the impact is a net positive, the journalistic values and principles need to govern the development of AI solutions.”

‘Human values’ according to our respondents apply to audiences and journalism’s social role:





“ If media outlets are too much driven by wrong technical metrics, they can encourage journalists to try to compete with robots or game the AI recommendation systems. Instead, patience, perseverance and curiosity are valuable human qualities and should be encouraged inside the newsroom. ”

In a world where so much information flows through networks, the use of AI in journalism raises ethical questions for society as a whole, not just for the news industry:

“ The biggest mistake I’ve seen in the past is treating the integration of tech into a social setting as a simple IT-question. In reality it’s a complex social process. ”

### 3.6 The Role of the Technology Companies

[Declaration of interest: this research is supported by the Google News Initiative.]

Technology companies all have different business models and company cultures and so their relationship to journalism as well as to AI varies greatly. Tech giants such as Google, Amazon, Apple, Facebook, and Microsoft all do research, create products and provide infrastructure used by news organisations. Some also fund journalism production and support newsrooms or journalism education and innovation.

Publishers argue that these companies compete with news organisations for advertising revenue and for people’s attention and time. They provide the devices and networks where much journalism is distributed and many of the tools vital to journalism production. Their appetite for data is massive and their spending on AI technologies is huge. So inevitably the relationship between news organisations and the tech companies described by our respondents is ambivalent:

“ They provide us with valuable tools, but media companies should always question the [tech companies’] motives. Content is still king and most of their products remain virtual without our products. ”



It is a constantly changing relationship. Shortly after our survey was completed, for example, Facebook announced its News Tab feature that will use a combination of journalists and personalisation algorithms to curate a separate news feed of content from publishers, some of which it will pay for.<sup>68</sup> Google has just announced that it will alter its algorithms to promote 'original' journalism content in its search results.<sup>69</sup>

Our respondents were generally well-informed about technology and positive about its role. But a few did express overtly hostile sentiments about the tech companies:

*“ Facebook, Google are AI-driven companies impacting the news industry by stealing eyeball time and advertising income. ”*

Our respondents were aware that they do not have complete control over the technology. News organisations already work with tech companies to create new tools or systems:

*“ Most ready-made solutions come in form of cloud-APIs from big tech corporations. This has consequences for the sort of data we can upload and disqualifies a lot of those solutions for our work. This structure also leads to a form of mild dependence on those companies. It's harder to switch from one to another, if you've implemented those solutions deep inside your own side. The positive side is the excellent quality of the models and frameworks. ”*

The New York Times and El País, for example, use Perspective, an open source tool developed by Jigsaw, a technology incubator within Alphabet, Google's parent company, to improve its comment moderation.<sup>70</sup> Our respondents realise that it might be the tech companies who produce the next big thing at the intersection of AI and journalism:

*“ Any future 'conversational news AI' will be generated by a big tech platform (eg Google), not a news organisation. ”*

If those tools or systems are to align with journalistic priorities and the public interest, then the relationship between the tech companies and the news organisations becomes critical. Respondents suggested a range of ways that relationship could be improved. It is an unequal one because the tech companies have the financial resources and the expertise and may have different values or priorities:



“What drives journalists and journalism – trust, impact, furthering understanding, fostering civic engagement and dialogue – is hard to measure as a KPI for an industry that is driven by hitting metrics. How do we work effectively with tech partners when how we think about success is often so different?”

There was a call for the tech companies to engage with news organisations in a dialogue about ethics as well as engineering:

“I would like to see tech companies that have successfully utilized AI, or are indeed developing it, to spread awareness of the many uses and act as ambassadors. Technology companies are crucial for the successful transition into an AI-powered future. They bear a great responsibility in terms of not only getting it right but also in terms of creating a healthy ecosystem.”

For that to happen there needs to be mutual critical attention paid by both sides to these issues:

“An extremely important job for journalists nowadays is to follow the steps of big technology companies and to try to analyse its algorithms. It’s also important that companies understand the importance of this kind of journalism and that they are open to talk about it.”

As discussed in Chapter Four, training is vital and the tech companies are well-placed to support it:

“Platforms have a vital role to play in training, educating, and creating a culture of transparency about AI. For journalists, this is critical to the question of trust.”

Many respondents felt under pressure from the hype emanating from the technology sector. But they also credit the tech companies – however reluctantly in some cases – with leading the way in terms of addressing ethical issues in media technology and supporting research:

“Some of the big tech companies take leading positions around fairness and AI (eg, Microsoft invests a lot in this), and most big tech companies do a lot in terms of (academic) publishing and sharing, which drives us all forward.”



Our respondents said that transparency of the technology companies' AI-related operations was imperative:

“Technology companies make AI technologies more available through their cloud services, but at the same time they don't reveal enough insights about how they build up those AI machines. They should be more transparent about their algorithm and biases in the dataset.”

The platform's algorithms have a big impact on how news organisations can strategise their own marketing. In the wake of changes to search and recommendation algorithms in recent years, the most common plea was for the tech companies to “be more transparent about changes to search and newsfeed algorithms.” This is more than a business issue. Recent academic studies have argued that the role of AI technology is changing what it means to be transparent. What does it mean to be a trusted communicator in the AI age? For the public, the ‘machines’ can become the source.<sup>71</sup> It sounds theoretical but some have argued that this means that the very nature of journalistic authority is challenged by this technology if it shifts some of that responsibility to a ‘machine’.<sup>72</sup> That is why some of our respondents want a more shared, open-source approach to evaluating the inner workings of the technologies:

“Technology companies already propose API to experiment with AI at a low cost, and that's really interesting for every innovator in media companies. I'd like to see more open-source and offline-first projects that can be manipulated and contributed to by us also.”

Respondents argued that a much better grasp of journalism and its current problems would be appreciated:

“They have the resources to move the needle: see DeepMind and Google. But they also make huge mistakes around data and ethics. I'd like them to genuinely embrace some of the problems posed in the journalism space and offer us meaningful expertise and support to explore some of the questions it poses. I believe all the key platforms would also benefit from this: look at the trouble they get into whenever they touch journalism recommendation and publishing.”



This is a shared problem. The journalism industry has a poor record on open debate about its workings. It has argued that transparency could compromise their independence. The technology companies have also been slow to adopt transparency. They argue that it is commercially sensitive and divulging their codes or algorithms might help bad actors.<sup>73</sup> But the overall message from our respondents was that much more honest dialogue is needed. The agenda around ethics and editorial policy (as well as business issues) is large:

“*Technology companies can and should be part of the discussion on how to minimize bias in creating these tools, particularly since they employ some of the leading AI researchers and build many of the foundational tools and papers in this field. We would like to see continued growth in conversations and funding from the likes of the Google News Initiative and the Facebook Journalism Project. Ultimately, these conversations need to lead towards better policy and protocols.*”

### **3.7 How Should Journalists Debate AI Ethics?**

The debate about ethics and editorial policy and AI needs to be embedded in product development, not just addressing the outcomes.<sup>74</sup> Journalists need to be technologically competent enough not to leave that discussion to developers or technologists. And that debate must always include the user perspective.

The ethics/editorial debate also needs to consider the wider social impact – including the benefits of AI. That is something that is starting to happen. The Knight Foundation ‘AI and the News Open Challenge’, for example, has seeded a range of initiatives to identify and address these issues.<sup>75</sup> The responses to this report suggest that it is a debate that is welcomed by newsrooms.



## Chapter 4

# The Future of AI and Journalism

### 4.0 Where is This All Going?

**We asked our respondents to think ahead. If you had the resources what would you do next? What aspects of AI would be most useful for your organisation in the future?** We also wanted to know what might help that happen. Finally, we asked them to consider how the industry as a whole might be changed and how the nature of journalism itself could be transformed. The news organisations we surveyed are all at different stages of AI adoption, so for some people the future is already here, while for others it is still science fiction.

There were three levels of future thinking:

- **First level:** To improve and iterate what is happening now with existing product and editorial teams
- **Second level:** Medium-term innovation over the next 2-5 years with newer applications
- **Third level:** Innovation and experimentation for the long-term that might include completely new approaches or structures.

Our respondents were generally involved in technology and editorial, so other parts of the organisation might have different visions of what is to come.

The future development of AI in general is not a smooth upward curving graph. There are still fundamental debates within the AI world about the best pathways forward. Much long-term AI research is currently based on the idea of deep learning but some computer scientists argue this might be an 'evolutionary dead end'.<sup>76</sup> That kind of debate goes beyond the scope of this report but more immediate concerns were raised.<sup>77</sup>



What surprised us was that when we asked what would help them meet the challenges of an AI future, the two key concerns cited by our respondents had not directly to do with the technology itself. 46 per cent mentioned training, education, and literacy in the newsroom, and 43 per cent cited the need for recruiting people with new skills.

Another strong non-tech theme for the future that emerged from our survey was the potential for collaboration between newsrooms and with other organisations, such as universities, and the need to learn from other sectors and how they use AI. Our newsroom respondents insist that journalism can thrive in an AI world, but there is a real fear of being left behind in the wake of technological advances.

## 4.1 Future Applications and Strategy

The three most common areas for our respondents' future AI-tool wishlist were for:

- More automatic tagging/entity extraction (newsgathering)
- Better machine-generated content (news production)
- Better personalisation/recommendation engines (news distribution)

There was a strong interest in AI that can help with the relationships between the newsroom and content, or newsrooms and audiences, in more nuanced ways:

“ I believe the most radical change in our case as a broadcasting company isn't AI integration within newsroom processes but a layer of AI between our content and audience. It would be exciting to understand voice request from our audience and to be able to articulate answers based on our archive content AND not to be dependent on third parties and their frameworks (Google, Amazon, etc) between us and our audience. But of course that's not doable at this time. ”



Those kinds of new AI-assisted relationships would often require structural changes in other newsroom technology to properly integrate and facilitate AI, turning a level one innovation into a medium or even long-term newsroom development:

*“ We would rebuild the IT systems from scratch and a generation change at key positions in the newsroom management. ”*



This kind of grander ambition may simply be beyond individual newsrooms:

*“ I would build a system that can ingest gigabytes of text and answer questions about current affairs, in a conversational format. No news organisation has the resources to do it, and the corpus of available articles from any one publisher is too small to be used to train a big deep-learning system in any case. ”*

Some respondents were weary of the pace of change and reluctant to think big about the future:

*“ We will focus first on understanding what we have already done. ”*

But most had ideas for newsroom structural change to build, manage and develop AI.

As we saw in Chapter Two, strategy is understood to be critical but evolving. While there were cultural and knowledge barriers to developing AI, staffing was seen as the key resource issue for the future. More resources to develop particular tools or products will not be sustainable without a different, AI-cognisant organisational structure:

*“ Having the ability to experiment much more on technologies, products and formats would be great, but integrating those innovations into the existing organization would be difficult without (probably) some significant organizational change. ”*





The first step to this future would be to understand how to get there:

“ I would invest resources into explaining where we need to go as legacy media company and devise a strategy where employees and departments are able to pave the road as we go. It’s not possible to make detailed plans with the current speed of tech development. Without understanding the potential and the limits it’s impossible to devise a strategy and be competitive in the future. ”

The majority of our respondents suggested creating teams to develop an integrated AI and data strategy, and then prioritise and enforce it with adequate funding. Perhaps this is not surprising as some of our respondents work already in teams like this. But while these would be distinct units, often working on specific projects, most respondents stressed the need to integrate with the wider newsroom. The respondents suggested two approaches, experimental and multi-disciplinary:

#### **i. Experimental:**

“ I would build a small team tasked with experimenting with AI. Any project would need a relevant editor or journalist attached. They would be asked not to build final products but to start identifying promising routes and possible dangers. ”

“ I’d set up an internal lab with a core team of AI experts that colleagues from every department could join for one or two months to analyze their processes, to do research on our readers’ understanding of AI-driven content, to test new tools or to invent them themselves. ”

#### **ii. Multi-disciplinary:**

“ I think we would need a small team focussed on a broader aspect, such as automation and augmentation. The team should also be comprised not only of journalists and developers, but also social scientists and designers. The team should also not be anchored inside the newsroom, but instead be a bridge to different parts of the company, so resources and knowledge aren’t used inside a silo alone. There’s a lot more to a newspaper than the newsroom alone. ”



“ I would create a side team with approx 15-20 journalists (text, video) + a dedicated project team (PO + UX + UI designer + graphic designer + motion designer + 3 devs and 1 tech lead + 1-2 developers) + 2 PMs + 4 data analysts + 1 growth analyst and one Project Director. This team would play on a dedicated support and on 5 per cent of our audience (volunteers of course). It would have its roadmap and defined priors/KPIs. But it would be a very nice place to work :-). ”

## 4.2 The Need for Education and Training

The biggest future wish from respondents was for general education and specific training for AI. Literacy was seen as vital throughout the news organisation to change culture and improve understanding of new tools and systems. Explaining and demystifying AI was seen as a way to get others to use it:

“ Literacy is crucial. We are looking at how to better educate our journalists on everything from rudimentary coding through to data science. The more that the newsroom at large embraces the technology and generates the ideas and expertise for AI projects, the better the outcome, in our experience. ”

This training could be done via online courses or by third-parties but it would be as much about the development of the newsroom as a whole, as individual learning:

“ Basic training around how this technology works and around what potential applications are might lead to people identifying applications that we have missed, hence enabling the discovery of opportunities. ”

Skills training could be for specific functions but might also include basic, foundational knowledge for journalism such as coding:

“ We all need specific AI training: even the ones working closely on the initiatives don't fully understand the technology and, therefore, can't envision the possibilities. The new competences would be, for the newsroom, AI literacy and data analytics; for the technology teams, low level knowledge of the AI solutions. ”



Lurking behind this need for AI training is the shortage of editorial staff with STEM (Science, Technology, Engineering, and Mathematics) subject literacy and the ability to reflect on how that relates to their existing journalism practice and principles:

“*All journalists don't need to suddenly know how to write code, but they should want an understanding of the basic tools needed to navigate the brave new world. That means building core competencies around math, data and computer science. With some automation projects, you are often trying to codify news experience and judgement. That requires journalists to think in a structured way about why they make certain types of decisions, so the machine can learn.*”

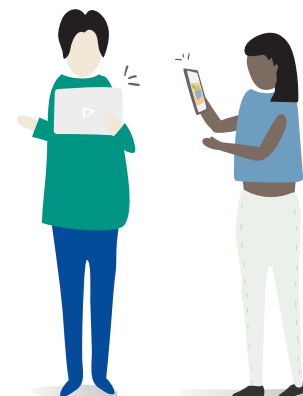
Some respondents suggested that innovation training should include an experimental element rather than simply handing down templates for action:

“*I think that training should focus on experiment ideas with small teams composed of people from different fields. It would help communicate each others ideas that could have a great impact in the future.*”

AI training was seen as required for all involved as part of career development:

“*Those who have no prior training in computational journalism need to have basic training. That also includes basic training on data scraping techniques. Those with more understanding need more training on ways to apply deep learning or machine learning on real life stories.*”

Understanding AI was seen as vital knowledge for management throughout the news organisation. Not just to improve their systems but to foster learning from other places about how the newsroom needs to adapt strategically:





“ Awareness-raising: what is the state of the art among competitors, understanding what is actually happening in newsrooms elsewhere, and then identifying how this tech might change different roles in our newsroom – and just capturing that. Identifying how it might augment our performance and output and not replace us. Looking at similar/other industries that we think are doing it well. ”

As we saw in Chapter Three, the broad issue of ethics needs to be understood to help tackle AI bias and other ethical concerns. Only with better insight can transparency operate in a systematic way:

“ A basic understanding of the inputs and variables that feed the algorithms to minimize bias. Established feedback and iteration process. Open and transparent discussion on filter bubbles, ethics, and Q&A on AI initiatives in editorial town halls or other forums. Establish a test group across multiple desks with various editorial functions (eg, subs/reporters) to demo new features and provide feedback. ”



Beyond training, newsrooms need systems for continuous information-gathering about trends in technological change:

“ Newsrooms and journalists need more discussion and training around where technology is heading, how it might change the world they live in, and what role news might play in it. That’s less about learning specific technology or AI skills, and more about understanding the pace of change, what’s possible, and how to stay current. ”

Not everyone in a newsroom needs to know everything about AI. But at least some people need to have a much more sophisticated overview of the overall, systematic impact that these technologies can have:



“ I think anyone who uses AI in a newsroom needs to know a few things: at a relatively high level, how an AI system works. eg, define a problem, collect data, build a model, evaluate the model, productionise, feedback into the problem definition, iterate. I think there is a misconception that building the model or tool is the hard part, when in fact the complexity lies in the definition and evaluation phases. I think it’s also important to understand exactly what the system is doing, before you can make editorial judgement. What are its constraints, what are its limitations? Then there are specific things that a more involved person might need to know, eg, evaluation metrics. ”

A minority felt that more high level training or education should not be wasted on the newsroom. They saw it as the job of the tech people to create tools that don’t require special knowledge:

“ It is for technologists to create products and services which are easy for journalists to use, and they should only be introduced to journalists when they are intuitive and user-friendly. Training on them is then no different to training on other pieces of technology. AI needs to be demystified. ”

“ If we do our job right, AI will become invisible in the daily work. The only exceptions might be our data teams, but they’re already on it. ”

### 4.3 Newsroom Collaboration

For an industry that has traditionally competed rather than cooperated, the enthusiasm from our respondents for collaboration around AI represents a significant shift in thinking and even in the way that news will be produced. Our respondents tended to come from varied career backgrounds so might have more experience of collaboration than others in the newsroom, but it is a real trend in the news industry.<sup>78</sup> Technology drives this but it is also a response to market and audience changes and even ethics. All but a couple of respondents agree: more collaboration is needed. Collaboration within newsrooms was a theme in the earlier sections but it is also a precondition of collaborating externally:



“ A major barrier to innovation with AI technologies is the insufficient understanding that news organisations have of their own internal processes and workflows. It’s hard to know how to automate a process that is only vaguely understood by the organisation that’s doing it. Clarifying those processes/workflows would be a good starting point for collaboration. ”

AI offers opportunities for working with other organisations. This could be across a wide range of activities including R&D, investigative journalism, data sharing, and training. Collaboration could include working on certain problems together with other news media:

“ Newsrooms across the country would benefit from a centralized database of historical articles for AI and ML purpose. ”

Collaboration could also involve technology companies, academia, and civil society organisations. A few respondents felt that either they were already doing enough practical collaboration or that it was too early, but generally there was an openness to working together:

“ More collaboration would be good amongst media organisations, but also with other disciplines like social scientists to help operationalise data. Also a united approach to ethics in data and AI. ”

Collaboration can be economically efficient. Working collectively would help fund research for example:

“ More collaboration would be useful, because individual publishers may be unable to invest sufficiently in the innovation and product development necessary to exploit AI technologies for news. Pooled innovation teams, with clear strategic goals that align with each collaborating organisation, might enable more impactful R&D. ”

The news media is incredibly competitive at the moment and is rightly proud of its independence. It is often the smaller organisations that are most open to collaboration but the idea of intermediaries to facilitate was suggested:



“ It can be difficult for competing newsrooms, often with a strong culture of independence, to work closely together. Ironically, it’s the smallest newsrooms that can often put that aside more easily. What may be needed are honest brokers – in academia, non-profits or funders – who can get people around a table and work out terms of engagement that everyone can agree to. ”

Collaboration has benefits but it also has costs:

“ We believe collaboration is absolutely vital to the success of AI in this field. However, collaboration is a job in itself. Organising across geographies and organisations is very resource intensive. But if we want to build globally applicable tools you have to make that trade off. ”

In a world where news is often transnational, collaboration can make sense for coverage of global issues:

“ Cross-border newsroom collaboration is a hot topic in journalism. We see examples and would like to see more in case of bigger global topics (eg, cross-border corruption, climate change). ”

It can also have value within individual countries, with respondents from the Czech Republic, the Netherlands, and Scandinavian countries all citing examples of cooperation that could become models for the future:

“ The Danish equivalent of the Associated Press is trying to establish a collaboration on NLP, analyzing and tagging of content between Danish media companies. Hopefully just the beginning. ”

“ At least in Scandinavia, the guards are down when it comes to sharing progress and findings on the topic of AI technologies. This is due to the fact that everyone sees the real competition moving from competing newsrooms to the big influential tech platforms. ”



One organisation set up specifically to collaborate is *The International Consortium of Investigative Journalists (ICIJ)* that not only helped deliver some outstanding multinational journalism with the Panama Papers,<sup>79</sup> but also acts as a resource for training and collaboration more generally. It has collaborated with the Quartz AI Studio, Stanford University, and numerous news organisations. It is a good example of an intermediate body funded independently able to provide resources and expertise on AI-related journalism.

## **4.4 Collaboration with Universities**

Universities that teach and research AI are increasingly partnering with news organisations.

This falls into three broad areas: collaboration on specific projects; support for research and development; and training/recruitment. *The Washington Post* has set up a computational political journalism R&D lab in collaboration with Professor Nick Diakopoulos, director of Northwestern University's Computational Journalism Lab. The partnership has a relatively narrow focus: "to experiment with algorithmic and computational journalism tools to support The Post's political data efforts in advance of the 2020 election". But it is a model for how newsrooms and universities can find ways to work together for mutual benefit.<sup>80</sup>

Universities have access to research funding and specialist researchers with broad and deep understanding of AI, often working at the cutting edge of this emerging technology. They have long-term timeframes. While they have budget constraints they are not under the same commercial pressures as news organisations. They are also keen to develop links with practitioners to share expertise, test ideas and prototypes and to demonstrate relevance to the 'real-world'. They can connect news organisations to other partners such as technology companies. Collaboration with the news industry gives university researchers access to data and professional insights. It also provides inputs for the growing number of AI and journalism courses.<sup>81</sup> Inevitably, there may be culture clashes and any collaboration has to allow for academic issues such as the publication of results and ethical considerations.





Our respondents were positive about this opportunity and some were already in formal or informal partnerships with higher education institutions:

*“ We have different programs working closely with computer science students solving problems or building tools for us. We have multiple relationships with technology teams in academic institutions – for example in natural language processing. We also meet regularly with small technology companies and start-ups. They all help and those relationships are very useful to us. ”*

One advantage is the ability to work on both practical and ethical issues in a cross-disciplinary way:

*“ We need to connect technical expertise to industry expertise. In doing that we help solve real problems and hopefully educate technologists about the dangers and ethics in different sectors. ”*

Working with universities is seen as a way of helping to promote understanding of journalism and AI more generally:

*“ Universities/Journalism Schools should improve AI literacy, demystifying the concept and eliminating that perception of the technology as a threat or as a competitor to journalism itself. ”*

It was also seen as a good way to counterbalance the dominance of Big Tech:

*“ These organisations can act as a neutral firewall between media houses and technology groups. ”*

In recent years journalists have become better at developing networks for discussing their work and to promote innovation and share ideas. Many respondents cited that kind of collaboration as a vital source of information on newsroom development alongside other sources such as industry media:

*“ A regular dialogue about how other companies are creatively leveraging AI, solving problems, sharing best practices, and how to address challenges would be very insightful and practical. ”*

One outcome of this survey has already been the emergence of an informal network of newsroom experts that could act as a platform that allows this dialogue to flourish.



## 4.5 How Will AI Reshape Journalism?

This report has shown us what newsrooms are doing with AI and what kinds of things they would like to do in the future. We have seen the impact that it is already having on newsflows and relationships with the public and how it raises new challenges such as the role of the technology companies and the need for training. But how do our respondents see AI trends in the longer-term? The respondents to this report are generally engaged with AI so it is perhaps less surprising that they see it as critical to shaping its future:

*“ Adopting AI is not a choice, it’s a marathon that every organization needs to start running if they haven’t already. ”*

We know from media history that technology can have both relatively superficial and much more profound impacts:

*“ Technology has always affected journalism: the internet changed distribution; typewriters and then computers improved productivity; the printing press helped newspapers scale. Automation and AI are already changing all aspects of the industry and that trend will continue. ”*

Most of our respondents saw the future impact of AI as incremental, augmenting existing trends in journalism. But a minority believe that it will be at the heart of a more substantial transformation into a ‘structured’ journalism<sup>82</sup> where the process of automation and personalisation drives the content creation:

*“ AI is the technology that actually allows us to go from unidirectional, broadcast communications to readers, to a bidirectional, interactive one. ”*

This kind of journalism will have to be interdisciplinary around AI, and that means creating new skill-sets, organisational modes, and approaches to journalism.<sup>83</sup> New tasks could lead to new job titles related to AI, such as Automation editor, Computational journalist, Newsroom tool manager, AI ethics editor.<sup>84</sup> But how will what they do be different?



## TEN WAYS NEWSROOMS EXPECT AI TO RESHAPE JOURNALISM:

- 1 Better personalised distribution of content
- 2 More efficient, automated production of content
- 3 Dynamic pricing both for ads and subscriptions
- 4 Find more stories in data; find more data in stories
- 5 Better automated transcriptions
- 6 Make content moderation manageable
- 7 Fake news/deep fakes recognition
- 8 New tools for debunking
- 9 Enhanced image/video search
- 10 Deeper sentiment analysis on UGC

### 4.6 Augmentation or Transformation?

The majority of our respondents felt that AI would add to existing workflows or make them more efficient and effective:

*“I think any part of the newsroom could be augmented with AI, the real question is should it? Is it worth our time? Some promising areas could be... to evaluate own content, to make moderation of comments easier, to provide better recommendations, to supply better context. Areas like ‘identifying news stories or scoops’ could use AI but I would tread carefully, as the context shifts regularly, and editorial judgment is key.”*

There were lots of specific ideas for imaginative uses of AI:

*“Automatic text to anything – text to voice, text to video – probably will be most useful application in the near future.”*



But even if the impact is to augment, news media is now in a race to exploit the technology:

*“ Optimizing workflows with the help of AI will be a must to stay competitive. To do so, news media companies will increasingly have to become tech companies and build up their own software development departments. ”*

Augmentation could have cumulative qualitative effects and these could be positive:

*“ AI could help us to increase the depth of content of our articles and to include more primary sources in our research. The production of news content enriched with personal aspects via widgets also seems promising to me. ”*

Newsrooms have spent the last two decades dealing with expanding scale and increased complexity in newsgathering, production, and distribution. Most recently many have combined this with more focused but often no less complex models of customised content, subscription and user engagement. There have been huge shifts in revenue sources and audience behaviour as well as industry ‘restructuring’, with the loss of capacity in many areas as well as new entrants. Many of our respondents argue that AI will be another major force for change across the industry:

*“ There is potential for complete disruption of existing workflows in news production and entirely new categories of news products (eg, automated journalism and programme assembly). It’s not yet certain how quick or significant this AI-driven disruption will be, but it probably has the potential to change the news industry beyond all recognition. The distribution of news content to AI-enabled platforms, which then build on these published assets to create data-driven experiences, is potentially a major disruptor to the business models of the news industry and its ability to create distinct editorialised experiences. This is amplified by an industry structure which sees fewer platforms with significant market power. As of yet there is no established paradigm for the distribution of news in these environments. ”*



This vision of the future would entail a re-thinking of journalism as a practice and the structure of the industry:

*“ We will all have to define much more strongly what we stand for, what our mission is and what tasks we can assign to systems. If we do not cooperate more closely, developments in AI could increase concentration, as smaller media houses cannot afford their own projects in this area. ”*

The news media is no longer just competing amongst itself:

*“ It’s about finding our place and our usefulness in a world where most competitors are out of the press and have far more resources than the information industry. ”*

AI may be a reform or a revolution, but will its benefits be equally distributed? Is AI in journalism for the many or the few?:

*“ As AI becomes more central to the discovery, production and distribution of news and information, a key question is the role of traditional - and resource-strapped - newsrooms in that ecosystem. Will they even have the tools to compete? Will they provide ‘artisanal’ content as feedstock for larger organizations to use in AI-driven news engines? What parts of the news ecosystem will remain the domain of newsrooms? ”*

One change factor that AI will help drive is the ‘journalism of things’, the shift of distribution onto different devices. As everyday devices become connected, they offer opportunities to channel new forms of journalism in fresh ways and contexts to consumers.<sup>85</sup>



Francesco Marconi has described experiments while at the *Associated Press* such as using sensors to gather data for journalism that open up new ways of news-making: “We can monitor vibration and noise from entertainment and political venues to identify the most popular songs at a concert, or the biggest plays of a game, or even the quotes that resonate the most at campaign rallies.”<sup>86</sup>



Drones, wearables, voice, and VR are all becoming part of news production and dissemination and usually it is forms of AI that make them functionable and scalable. This kind of augmented journalism will come in different forms and require new skills and creativity.<sup>87</sup> Key to understanding this new kind of 'distributed journalism' will be data about audience behaviour:

*“ We wanted to transform from one side communication to bi-directional feedback system, and AI seems to be a way to help us understand the user and engage them at a very granular level. ”*

Newsrooms have become more used to the idea that their journalism is now more 'networked'<sup>88</sup> or 'distributed' through audience engagement, social media, and multi-platform dissemination.<sup>89</sup> AI could increase that diversity:

*“ I think developing increased capacity for abstraction and better analytical sophistication about these technologies and their implications in the newsroom is a necessary starting point. We need to increase the proportion of people in newsrooms who work with patterns of news rather than just with case-by-case stories. ”*

Yet as well as understanding data and abstraction, journalists may have to work even harder at the human touch. With so much tech involved can you still keep the human dimension and put the user at the heart of the experience?

*“ I find it exciting to see whether AI can also support us in our interaction with readers without this having an artificial effect. There would be great potential here if we would make our work more transparent and relevant for more people. ”*

Key to public trust and interest in journalism is emotions.<sup>90</sup> Users need to feel that journalism sees the world from their perspective, that it reflects their values and identity and feelings. Emotions have always been part of journalism as 'human interest' but in the digital and social era they are now a key element of gaining attention and promoting sharing and engagement. As AI becomes better at understanding 'sentiment' it might be that the technology can help better connect newsrooms and audiences.



## 4.7 What Can Newsrooms Learn from Other Industries?

Journalism is a peculiar industry with many special conditions to its work: the news cycle, public interest, regulatory regimes, multiple business models, multiple formats, highly differentiated audiences and varied but strong ‘professional’ cultures. It prizes independence for both ethical and commercial reasons. So some of our respondents (about 10 per cent) felt it need not spend too much time looking at what other industries do with AI:

“ I’d rather [prefer] that we thought VERY particularly about ourselves in this space. ”

However, the majority view was that the news media has been too insular:

“ I think journalism should look at ALL other industries. In fact, I worry that journalism as an industry looks too often for guides within journalism itself. What is the New York Times doing? What is the Washington Post doing? We need to look at other industries and see how their innovations, stumbles, and concerns could apply to us. ”

Some of our respondents have careers that involved working in other industries and many suggested that there are continuing lessons to be learnt by looking beyond the news media. Calls for the creation of a ‘Spotify for News’ or a ‘Netflix for Journalism’ have become clichés but comparisons can be instructive. Those are the new companies that have made the most of the affordances of AI technologies. But respondents also looked to legacy industries that have restructured themselves and turned technology-driven threats into more sustainable models:

“ If we take a long-term view, we should look to any industry with supply chain management problems. For example, the music industry from 20 years ago. ”

Clearly, media sectors like advertising and marketing are closely related to the news industry but other less obvious industries were cited such as online retail companies such as Ebay, Amazon, and Alibaba:



“ Online retail is an industry that has already deeply integrated AI into its automated processes. This is partly due to the fact that online retail generates large amounts of highly structured data, which makes the deep analysis of user behaviour as well as advanced targeting a lot easier. Even though the media industry might not be able to copy the techniques employed in online retail one-to-one, it is definitely worthwhile to look at the state-of-the-art machine learning models used for product recommendation, dynamic pricing, customer journey analysis and even automated product description / title generation. ”

Even the gambling industry could offer lessons in how to use technology to understand audiences:

“ The betting websites are really interesting to look to, they track behaviour more than any other industries (influence on getting hooked), and that is what we want to do really – better to be hooked to local news. ”

Some of the cleverest adoptions of new technology for fresh content formats has been in gamification, such as the *Financial Times*' Uber Game,<sup>91</sup> but our respondents saw wider relevance in the gaming industry:

“ Personally I look to the gaming industry as a plethora of best practice in the field of different formats of AI employment. What stands out as particularly impressive is the seamless implementation of AI into the HCI [Human-Computer Interaction]. ”

Comparisons can give positive and negative lessons. Law for example has benefited from AI-powered data search, but AI has also had an impact on legal labour patterns. The lessons are not just about techniques or economics. AI in other industries is provoking a whole new debate about what trust means when the relationship with the user is automated.<sup>92</sup> Medicine, pharmaceuticals, and biotech industries are all facing profound ethical challenges that journalism should consider:





*“ We should look to them for the standards they uphold, in terms of data precision, verification, data integrity, and the anonymised large pools of data used. ”*

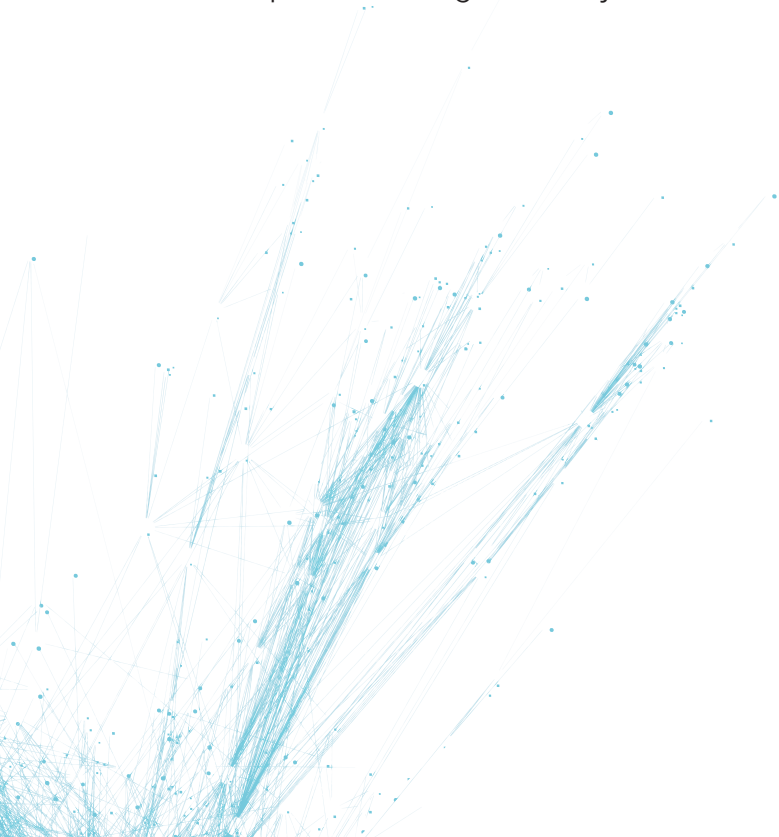
But the most common reference was to the technology companies. They dominate this space in terms of research. They are creating new products and networks that journalists might use. They are also facing market and ethical challenges that journalism can learn from:

*“ Software giants and digital tech like Microsoft, Google, and Facebook are the leading example in this area and we need to learn and learn and learn from them. ”*

*“ Tech companies are an obvious example – they make a lot of errors and assumptions we can learn from and avoid. ”*

The news industry has proved remarkably resilient and adaptable in the face of technological change through recent history. Yet it continues to shrink in size and struggle for resources.

According to our respondents, AI promises yet more change with huge challenges as well as opportunities for those able to understand and deploy it to enhance their work. But journalism is a relatively small business and AI is a big and expensive technology. News organisations will once more have to show imagination as well as determination if the AI-powered augmented journalism is to thrive.





## Conclusion

# What Does AI Mean for Journalism?

This report represents the views of a large sample of people working with AI in a variety of news organisations across the world. The respondents tended to be familiar with AI and have a positive approach to its adoption. So it is even more interesting when they point out the limits of AI and the need for much more effort to make it work well. They demonstrate that AI is giving them more power, but with that come editorial and ethical responsibilities.

The respondents strongly believe that AI is there to make journalists more efficient and to increase capacity to do two key things:

- 1** To free up journalists to work, with or without AI, on creating better journalism at a time when the news industry is fighting for economic sustainability and for public trust and relevance.
- 2** To help the public cope with a world of news overload and misinformation and to connect them in a convenient way to credible content that is relevant, useful and stimulating for their lives.

To do this, news organisations have to change (again). They need to adopt some form of AI strategy. They need to change their workflows, systems, and recruitment.

Even then, it's going to be tough. This is an emerging technology that can be complex and expensive to apply. It has some serious downsides in terms, for example, of algorithmic bias or the temptation towards short-term financial gains. Some of the challenges go beyond individual organisations. As an industry there has to be more internal and external collaboration. Newsrooms need to make serious investments to attract the skills, knowledge, and innovation that journalism needs to optimise the opportunities of AI and reduce the potential harms.



This will require a change in thinking from an industry that has always been ultra-competitive and relatively insular. It will demand a degree of flexibility and long-term planning that can go against the priorities of the news cycle and the pressures of the market-place. The public media sector will face a similar challenge to adapt itself. The news media will need a robust but pragmatic approach to dealing with other stakeholders such as the technology companies.

AI technologies will not save journalism or kill it off. Journalism faces a host of other challenges such as public apathy and antipathy, competition for attention, and political persecution.

Perhaps the best hope for journalism in a world where AI becomes more powerful in so many areas, from politics to medicine, is that AI and the world need good journalism more than ever. To misquote President Kennedy, newsrooms should not just be asking what AI can do for them, they should be asking what they can do for an AI world.

First of all, they need to get their AI act together. This does not mean succumbing to the hype. It means making informed judgements about the value of this technology and the way it can be deployed strategically. It means accepting that, once again, news organisations will have to adjust to the fact that what journalism is and how it is consumed, is changing. The 'vision thing' still matters for journalism, especially while the world around it appears to be more confused and conflicted.

AI offers a range of tools for journalism. Not to re-establish its preeminence as the information gatekeeper. But instead to find new ways of being the creator and curator of credible information; a source of critical and independent analysis; and a forum for diverse and relevant public debate.<sup>93</sup> As Clay Shirky said over a decade ago, "there is no such thing as information overload, there's only filter failure".<sup>94</sup> Human journalistic skills and values combined with these technologies can help.



Newsrooms can't do this alone. We don't know enough about what is happening with algorithms and the new networks of communication.<sup>95</sup> We need to understand better how AI is shaping the information ecosystem for new generations of citizens.<sup>96</sup> News organisations need to find ways to tap into the resources and expertise of others. They need to make the case to the public and society that journalism can be a critical factor in the healthy development of this technology.

Perhaps the biggest message we should take from this report is that we are at another critical historical moment. If we value journalism as a social good, provided by humans for humans, then we have a window of perhaps 2-5 years, when news organisations must get across this technology. The good news that we take from the responses to our survey, is that a significant part of the global journalism industry is facing up to that challenge and working hard to make it happen. They are enthusiastic about the new powers, but also accept the new responsibilities.

For our part, Polis looks forward to helping create a network for journalism and AI that can improve communications for all interested parties and help foster better training, stimulate research and the exchange of best practice and dialogue.

A handwritten signature in black ink, appearing to read 'C. Beckett'.

**Professor Charlie Beckett**

LSE, November 2019



# Glossary

## Glossary

### **Ad targeting:**

“An advertisement technique where advertisements are placed in specific areas of the screen to increase visibility and ‘clickability’ or to give tailor-made ads based on the user’s past behaviors and preferences. Targeted ads are meant to reach certain customers based on demographics, psychographics, behavior and other second-order activities that are learned usually through data exhaust produced by users themselves”. (<https://www.techopedia.com/definition/30295/ad-targeting>) Ad targeting is extremely relevant in the context of social media feeds and recommendation engines, with “micro targeted” ads built around each user’s specific preferences, embodied in their individual online data trail (likes, comments, shares, uploads, searches etc). For more on “micro targeting”, see: <https://blog.mozilla.org/internetcitizen/2018/10/04/microtargeting-dipayan-ghosh/>

### **Algorithm:**

“A procedure for solving a mathematical problem in a finite number of steps that frequently involves repetition of an operation”. More broadly, “a step-by-step procedure for solving a problem or accomplishing some end.” (<https://www.merriam-webster.com/dictionary/algorithm>)

### **Artificial intelligence (AI):**

“A collection of ideas, technologies, and techniques that relate to a computer system’s capacity to perform tasks normally requiring human intelligence.” (<https://reutersinstitute.politics.ox.ac.uk/our-research/industry-led-debate-how-uk-media-cover-artificial-intelligence>) As the Definition section in this report states, this is a nebulous term used by different people to mean different things.

### **Automation:**

“The technique, method, or system of operating or controlling a process by highly automatic means, as by electronic devices, reducing human intervention to a minimum.” (<https://www.dictionary.com/browse/automation>). “The creation of technology and its application in order to control and monitor the production and delivery of various goods and services. It performs tasks that were previously performed by humans. Automation is being used in a number of areas such as manufacturing, transport, utilities, defense, facilities, operations and lately, information technology.” (<https://www.techopedia.com/definition/32099/automation>)

**Bias:**

A systematic prejudice or error affecting the rationality and fairness of a decision. Rooted in decision theory, cognitive psychology and statistics, the notion of bias is extremely important as both journalism and artificial intelligence techniques ultimately rely on human decisions, and are as such subject to “cognitive” biases (confirmation bias, bandwagon effect, etc.). When mirrored in bad, incomplete or flawed data sets to train AI algorithms, this may result in equally flawed AI-powered decisions: “Algorithms can have built-in biases because they are created by individuals who have conscious or unconscious preferences that may go undiscovered until the algorithms are used, and potentially amplified, publically.” (<https://searchenterpriseai.techtarget.com/definition/machine-learning-bias-algorithm-bias-or-AI-bias>)

**Bot:**

‘Bot’ is short for ‘Robot’ and usually refers to ‘agent-like’ software – ie, software that exhibits autonomy or autonomous characteristics. A bot is “a piece of software that can execute commands, reply to messages, or perform routine tasks, as online searches, either automatically or with minimal human intervention” (<https://www.dictionary.com/browse/bot>). Bots perform either perfectly legitimate (eg. smart assistants, search engine spiders) and malicious activities (eg., covertly spread false information and political propaganda in coordination with other bots, within a so-called “botnet”). For more see: <https://www.techopedia.com/definition/24063/internet-bot>

**CMS:**

Acronym for “Content Management System”, it is “a software application or set of related programs used to create and manage digital content.” (<https://searchcontentmanagement.techtarget.com/definition/content-management-system-CMS>)

**CPM:**

Technically “cost per mille”, it is a common measure in advertising indicating the cost per thousand impressions of an ad.



### **Data analytics:**

Analytics is essentially just the counting digital actions and events, and drawing conclusions from those counts. “Data analytics is the pursuit of extracting meaning from raw data using specialized computer systems. These systems transform, organize, and model the data to draw conclusions and identify patterns.” (<https://www.informatica.com/services-and-training/glossary-of-terms/data-analytics-definition.html#fbid=Ne5BLlzmG0q>); Many of the techniques and processes of data analytics have been automated into mechanical processes and algorithms that work over raw data for human consumption. Data analytics techniques can reveal trends and metrics that would otherwise be lost in the mass of information.” (<https://www.investopedia.com/terms/d/data-analytics.asp>); Ever increasing computing power and automated analyzing capabilities are exponentially expanding the volume of data sets that can be processed for meaning and trends, leading experts in the field to coin a new term, “Big Data”.

### **Deepfake:**

This is the negative form of a broader concept of ‘synthetic media’. Audio and video altered through machine learning and deep learning techniques for maximum, real-time realism in fakery. The term originally comes from a Reddit user that, in 2017, used such techniques to realistically and dynamically add faces of celebrities to pornographic content (<https://www.theverge.com/2018/5/22/17380306/deepfake-definition-ai-manipulation-fake-news>), and is now widely used for any kind of content, the politically charged included. (<https://www.theguardian.com/technology/ng-interactive/2019/jun/22/the-rise-of-the-deepfake-and-the-threat-to-democracy>)

### **Deep learning:**

“Deep learning is a subset of machine learning in artificial intelligence (AI) that has networks capable of learning unsupervised from data that is unstructured or unlabeled. Also known as deep neural learning or deep neural network” (<https://www.investopedia.com/terms/d/deep-learning.asp>), it is one of the most advanced contemporary applications of “AI”, powering a broad range of image, voice and text recognition tools. (<https://blogs.scientificamerican.com/observations/a-deep-dive-into-deep-learning/>)

### **Dynamic pricing:**

When the price of a product or service changes according to market demands: the most familiar examples are airline seats and hotel rates. One example is “surge pricing” policies for ride-sharing applications such as Uber or Lyft, in which the price of a ride increases with its demand. The better the market knows its users, possibly through advanced data analytics techniques, the better it can design the dynamics of its pricing according to their habits and needs. (<https://www.thestreet.com/technology/lyft-vs-uber-14791376>)



### **Fake news:**

An academically discredited and yet widely used term that encompasses the whole spectrum of meanings related to untruths, from misinformation (ie, non deliberate manipulation) to disinformation (ie, deliberate lying), from half-truths to plain lies. Its usage is mostly related to false information spread on social media, possibly by covert/anonymous agents of broader propaganda campaigns in a coordinated fashion. The expression has also been widely adopted by autocrats and demagogues alike in order to discredit adversarial journalism and political oppositions. (<https://www.poynter.org/fact-checking/2018/reporters-stop-calling-everything-fake-news/>; <https://www.nytimes.com/2017/12/12/world/europe/trump-fake-news-dictators.html>)

### **Filter bubble:**

Coined by activist Eli Pariser in a 2011 bestseller of the same name, the “Filter Bubble” hypothesis states that social media are increasingly indoctrinating us with our own propaganda, algorithmically exposing us only to content that is consistent with our current ideological preferences, while at the same time “hiding” whatever source could lead us to challenge our own beliefs, preferences and habits. This would respond to their business model’s utmost imperative: hook the user with more of whatever it is that hooked him since. Since its conception, the notion has been increasingly challenged academically. For a roundup of available literature, see: <https://cristianvaccari.com/2018/02/13/how-prevalent-are-filter-bubbles-and-echo-chambers-on-social-media-not-as-much-as-president-obama-thinks/>

### **Machine learning (ML):**

“Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed” (<https://www.expertsystem.com/machine-learning-definition/>). Definitions, however, abound. Here is how Turing Award winner and father of deep learning, Yoshua Bengio, puts it: “Machine learning research is part of research on artificial intelligence, seeking to provide knowledge to computers through data, observations and interacting with the world. That acquired knowledge allows computers to correctly generalize to new settings”. (<https://emerj.com/ai-glossary-terms/what-is-machine-learning/>)





### **Metadata:**

A set of data that describes and gives information about other data. “For example, an image may include metadata that describes how large the picture is, the color depth, the image resolution, when the image was created, and other data. A text document’s metadata may contain information about how long the document is, who the author is, when the document was written, and a short summary of the document. Web pages often include metadata in the form of meta tags. Description and keywords meta tags are commonly used to describe the Web page’s content. Most search engines use this data when adding pages to their search index.” (<https://techterms.com/definition/metadata>). The automation of this “meta-tagging” function is among the most common experimentations in journalism AI described in our report.

### **Minimum viable product:**

“A minimum viable product (MVP) is a development technique in which a new product or website is developed with sufficient features to satisfy early adopters. The final, complete set of features is only designed and developed after considering the feedback from the product’s initial users.

This concept has been popularized by Eric Ries, a consultant and writer on start-ups.” (<https://www.techopedia.com/definition/27809/minimum-viable-product-mvp>)

### **MOOC:**

A Massive Open Online Course (MOOC) is “a free Web-based distance learning program that is designed for the participation of large numbers of geographically dispersed students” (<https://whatis.techtarget.com/definition/massively-open-online-course-MOOC>). Coined in 2008 by Dave Cormier, the term implies, to some, an opportunity for restructuring education through personalisation and remote attendance; to others, this amounts to mere hype instead. (<https://www.theguardian.com/education/2014/jan/20/moocs-global-thirst-education>, <https://www.theguardian.com/higher-education-network/blog/2012/aug/08/mooc-coursera-higher-education-investment>)

### **Natural language processing:**

“Natural Language Processing, usually shortened as NLP, is a branch of artificial intelligence that deals with the interaction between computers and humans using the natural language. The ultimate objective of NLP is to read, decipher, understand, and make sense of the human languages in a manner that is valuable. Most NLP techniques rely on machine learning to derive meaning from human languages.” (<https://becominghuman.ai/a-simple-introduction-to-natural-language-processing-ea66a1747b32>) It is the technological foundation for many current experimentations with artificial intelligence in journalism, as highlighted in our report.

**Neural network:**

“A program or system which is modelled on the human brain and is designed to imitate the brain’s method of functioning, particularly the process of learning” (<https://www.collinsdictionary.com/dictionary/english/neural-network>); “a computer architecture in which a number of processors are interconnected in a manner suggestive of connections between neurons in a human brain and which is able to learn by a process of trial and error.” (<https://www.merriam-webster.com/dictionary/neural%20network>)

**Profiling:**

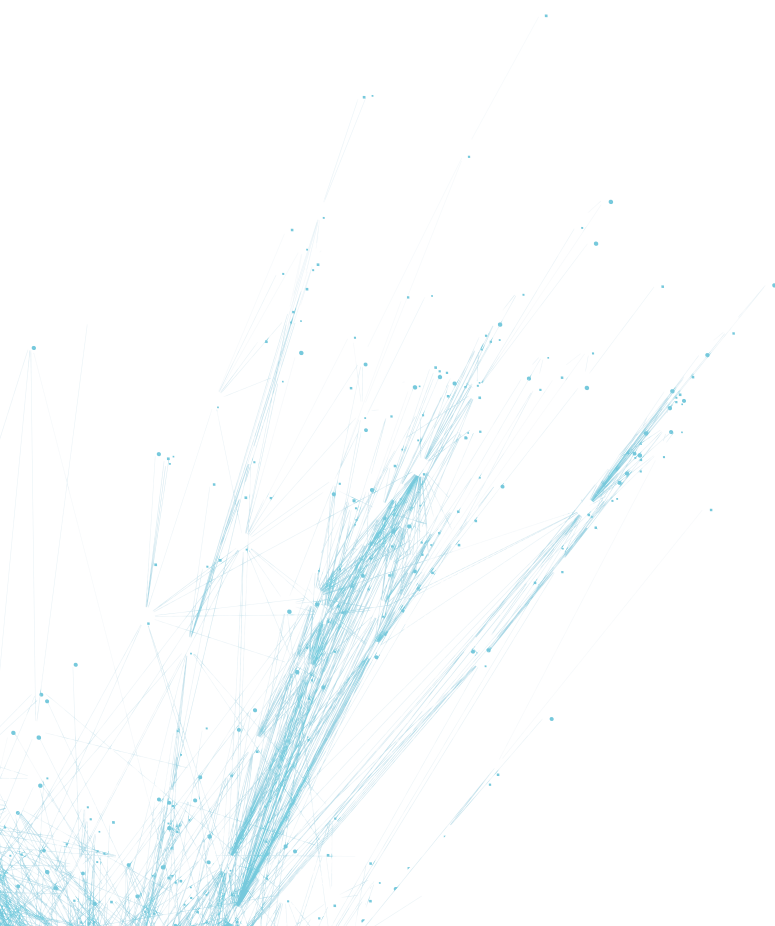
In the context of journalism and AI, profiling is the collection of information about users in order to be able to individually and collectively describe them, categorize them and serve them personalised content and advertisements. The meaning of the term “profiling”, however, is tied to criminal investigations. (<https://dictionary.cambridge.org/dictionary/english/profiling>)

**Tagging:**

See “Metadata”

**UGC content:**

User Generated Content.





# Endnotes

## Endnotes

### Preface

- 1 Bathke, B., (2017). "Journalists will have superpowers" Futurist Amy Webb talks opportunities – and pitfalls – of journalism tech. *Medium*, [online] 12 January 2017. Available from: <https://medium.com/global-editors-network/journalists-will-have-superpowers-futurist-amy-webb-talks-opportunities-and-pitfalls-of-97409133ea50> [19 October 2019].

### Introduction

- 2 Google News Initiative.,(n.d). [online]. Available from: <https://newsinitiative.withgoogle.com/> [19 October 2019].
- 3 Polis (n.d.), [online]. Available from: <https://blogs.lse.ac.uk/polis/> [10 October 2019]
- 4 Wiggers, K., (2018). Geoffrey Hinton and Demis Hassabis: AGI is nowhere close to being a reality. *Venture Beat*, [online] 17 December 2018. Available from: <https://venturebeat.com/2018/12/17/geoffrey-hinton-and-demis-hassabis-agi-is-nowhere-close-to-being-a-reality/> [Last accessed 19 October 2019].
- 5 Jajal, T.D., (2018). Distinguishing between Narrow AI, General AI and Super AI. *Medium*, [online] 21 May 2018. Available from: <https://medium.com/@tjajal/distinguishing-between-narrow-ai-general-ai-and-super-ai-a4bc44172e22> [Last accessed 19 October 2019]
- 6 Brennen, J.S., Howard, P.N. and Nielsen, R.K., (2018). An Industry-Led Debate: How UK Media Cover Artificial Intelligence. *Reuters Institute for the Study of Journalism Fact Sheet,(December)*, pp1-10.
- 7 Corea, F., (2018). AI Knowledge Map: how to classify AI technologies. *Medium*, [online] 29 August 2019. Available from: [https://medium.com/@Francesco\\_AI/ai-knowledge-map-how-to-classify-ai-technologies-6c073b969020](https://medium.com/@Francesco_AI/ai-knowledge-map-how-to-classify-ai-technologies-6c073b969020) [Last accessed 19 October 2019].
- 8 Diakopoulos, N., (2019). *Automating the News: How Algorithms Are Rewriting the Media*. Harvard University Press. pp16.
- 9 Elements of AI., (n.d). How should we define AI? [online]. Available from: <https://course.elementsofai.com/1/1> [19 October 2019].



- 10 Diakopoulos, N., (2019). *Automating the News: How Algorithms Are Rewriting the Media*. Harvard University Press. pp17.
- 11 Diakopoulos, N., (2019). *Automating the News: How Algorithms Are Rewriting the Media*. Harvard University Press. pp13-40.

## Chapter 1

- 12 Russell, A., (2011). *Networked: A contemporary history of news in transition*. Polity.
- 13 Chadwick, A., (2017). *The hybrid media system: Politics and power*. Oxford University Press.
- 14 Roman, E., (2019). Journalism and AI team up to measure missing stories. *Google News Initiative*, [online] 12 June 2019. Available from: <https://www.blog.google/outreach-initiatives/google-news-initiative/journalism-and-ai-team-measure-missing-stories/> [19 October 2019].
- 15 Funke, D., (2018). In Argentina, fact-checkers latest hire is a bot. *Poynter*, [online] 11th January 2018. Available from: <https://www.poynter.org/fact-checking/2018/in-argentina-fact-checkers%C2%92-latest-hire-is-a-bot/> [Last accessed 19 October 2019].
- 16 Full Fact., (n.d.). *Automated Factchecking* [online]. Available from: <https://fullfact.org/automated> [Last accessed 10 October 2019].
- 17 Marconi, F., (2020). [Forthcoming]. *Newsmakers: Artificial Intelligence and the Future of Journalism*. Columbia University Press.
- 18 Koponen, J., (2018). First in the world: Yle's smart news assistant Voitto ensures that you don't miss the news you want to read. *YLE by Newslab*, [online] 10 October 2018. Available from: <https://newslab.yle.fi/blog/16T3d1e7YcuwguOk8gsq8s> [Last accessed 19 October 2019].
- 19 Sky News., (2018). Who's Who. *Sky News*, [online] 19 May 2018. Available from: <https://news.sky.com/whoswho> [Last accessed 19 October 2019].
- 20 Le Monde., (2015). Robots at Le Monde during the departmental elections? Yes... and no. *Le Monde*, [online] 23 March 2015. Available from: [https://www.lemonde.fr/le-monde/article/2015/03/23/des-robots-au-monde-pendant-les-elections-departementales-oui-et-non\\_5995670\\_4586753.html](https://www.lemonde.fr/le-monde/article/2015/03/23/des-robots-au-monde-pendant-les-elections-departementales-oui-et-non_5995670_4586753.html) [Last accessed 19 October 2019].
- 21 Waddell, K., (2019). AI learns to write headlines (but not this one). *Axios*, [online] 17 May 2019. Available from: <https://www.axios.com/ai-learns-write-headlines-e578a9ba-1e29-4b15-a809-22437e9691ea.html> [Last accessed 19 October 2019].
- 22 Beckett, S., (2015). Robo-journalism: How a computer describes a sports match. *BBC News*, [online] 12 September 2015. Available from: <https://www.bbc.co.uk/news/technology-34204052> [Last accessed 19 October 2019].



- 23 Tobitt, C., (2019). PA's 'robot-written' story service gets first paying subscribers after trial ends. *Press Gazette*, [online] 9 April 2019. Available from: <https://www.pressgazette.co.uk/press-association-robot-written-story-service-radar-signs-up-first-regional-press-subscribers/> [Last accessed 19 October 2019].
- 24 Evershed, N., (2019). Why I created a robot to write news stories. *The Guardian*, [online] 1 February 2019. Available from: <https://www.theguardian.com/commentisfree/2019/feb/01/why-i-created-a-robot-to-write-news-stories> [Last accessed 19 October 2019].
- 25 Stray, J., 2019. Making Artificial Intelligence Work for Investigative Journalism. *Digital Journalism*, pp.1-22.
- 26 Texty., (n.d.) Leprosy of the land [online]. Available from: [http://texty.org.ua/d/2018/amber\\_eng/](http://texty.org.ua/d/2018/amber_eng/) [Last accessed 19 October 2019].
- 27 Bondarenko, A., Kelm, N., Kulchynsky, R., Romanenko, N., & Tymoshchuk, Y. We've got bad news! *Texty.org*, [online] 28 November 2018. Available from: <http://texty.org.ua/d/2018/mnews/eng/> [Last accessed 19 October 2019].
- 28 Texty.org (n.d.). Barge of memes [online]. Available from: <http://texty.org.ua/d/barzha/> [Last accessed 19 October 2019].
- 29 Reuters., (2019). Tidal investigated by Norwegian police over inflated streaming allegations. *The Guardian*, [online] 14 January 2019. Available from: <https://www.theguardian.com/music/2019/jan/14/jay-z-tidal-investigated-by-norwegian-police-streaming> [Last accessed 19 October 2019].
- 30 Carvajal, R., (2018). How machine learning is revolutionizing journalism. *International Consortium of Investigative Journalists*, [online] 22 August 2018. Available from: <https://www.icij.org/blog/2018/08/how-machine-learning-is-revolutionizing-journalism/> [Last accessed 19 October 2019]
- 31 Quartz AI Studio (n.d.) Available from: <https://qz.ai/> [19 October 2019].
- 32 Southern, L., (2019). How The Times of London increased digital subscribers 19% in a year. *Digiday*, [online] 15 August 2019. Available from: <https://digiday.com/media/how-the-times-of-londons-year-long-content-review-fuelled-its-drive-to-300000-subscribers/> [Last accessed 19 October 2019].
- 33 Zaffarano, F., (2019). How Neue Zürcher Zeitung increased its conversion rate up to five times with dynamic 'paygates'. *Journalism.co.uk*, [online] 7 March 2019. Available from: <https://www.journalism.co.uk/news/how-nzz-increased-its-conversion-rate-up-to-five-times-with-dynamic-paygates-/s2/a735623/> [19 October 2019]
- 34 Wang, S., (2018). After years of testing, The Wall Street Journal has built a paywall that bends to the individual reader. *NiemanLab*, [online] 22 February 2018. Available from: <https://www.niemanlab.org/2018/02/after-years-of-testing-the-wall-street-journal-has-built-a-paywall-that-bends-to-the-individual-reader/> [19 October 2019].



- 35 Moses, L., (2017). The Washington Post's robot reporter has published 850 articles in the past year. *Digiday*, [online] 14 September 2017. Available from: <https://digiday.com/media/washington-posts-robot-reporter-published-500-articles-last-year/> [19 October 2019].
- 36 Granger, J., (2018) Press Association's news service RADAR has written 50,000 individual local news stories in three months with AI technology. *Newsrewired*, [online] 7 November 2018. Available from: <https://www.newsrewired.com/2018/11/07/press-associations-news-service-radar-has-written-50000-individual-local-news-stories-in-three-months-with-ai-technology/> [19 October 2019].
- 37 Kunova, M., (2019). The Times employs an AI-powered 'digital butler' JAMES to serve personalised news. *Journalism.co.uk*, [online] 24 May 2019. Available from: <https://www.journalism.co.uk/news/the-times-employs-an-ai-powered-digital-butler-james-to-serve-personalised-news/s2/a739273/> [19 October 2019].
- 38 Mullin, B., (2016). Bloomberg EIC: Automation is 'crucial to the future of journalism'. *Poynter*, [online] 27 April 2016. Available from: <https://www.poynter.org/tech-tools/2016/bloomberg-eic-automation-is-crucial-to-the-future-of-journalism/> [19 October 2019].
- 39 Broussard, M., and Lewis, S., (2019). Will AI Save Journalism – or Kill It? *Knowledge@Wharton*, [online] 9 April 2019. Available from: <https://knowledge.wharton.upenn.edu/article/ai-in-journalism/> [19 October 2019].
- 40 Chun Chew, W., (2018). A Look at Toutiao: China's Artificial Intelligence Powered News Platform. *Medium*, 1 December 2018. Available from: <https://medium.com/@chewweichun/a-look-at-toutiao-chinas-artificial-intelligence-powered-news-platform-4eef3c23b79a> [19 October 2019].
- 41 DeepL Pro., (n.d). Available from: <https://www.deepl.com/pro-faq.html> [19 October 2019].
- 42 Spangher, A., (2018). How Does This Article Make You Feel? *Medium*, [online] 31 October 2018. Available from: <https://open.nytimes.com/how-does-this-article-make-you-feel-4684e5e9c47> [19 October 2019].
- 43 Texty., (n.d.) Leprosy of the land [online]. Available from: [http://texty.org.ua/d/2018/amber\\_eng/](http://texty.org.ua/d/2018/amber_eng/) [19 October 2019].
- 44 Koponen, J., (2018). First in the world: Yle's smart news assistant Voitto ensures that you don't miss the news you want to read. *YLE by NewsLab*, [online] 10 October 2018. Available from: <https://newslab.yle.fi/blog/16T3d1e7YcuwguOk8gsq8s> [19 October 2019].



## Chapter 2

- 45 Rogati, M., (2017). The AI Hierachy of Needs. *Hacker Noon*, [online] 12 June 2017. Available from: <https://hackernoon.com/the-ai-hierarchy-of-needs-18f111fcc007> [19 October 2019].
- 46 Shipman, A., (2019). Good Strategy Bad Strategy. *Anna Shipman*, [online] 17 May 2019. Available from: <https://www.annashipman.co.uk/jfdi/good-strategy-bad-strategy.html> [19 October 2019].
- 47 Marconi, F., (2020). [Forthcoming]. *Newsmakers: Artificial Intelligence and the Future of Journalism*. Columbia University Press.
- 48 Nieman Lab., (2019). How The Wall Street Journal is building an incubator into its newsroom, with new departments and plenty of hires. *Nieman Lab*, [online] 12 August 2019. Available from: <https://www.niemanlab.org/2019/08/how-the-wall-street-journal-is-building-an-incubator-into-its-newsroom-with-new-departments-and-plenty-of-hires/> [19 October 2019].

## Chapter 3

- 49 Bell, V., (2010). Don't Touch That Dial! *Slate*, [online] 15 February 2010. Available from: <https://slate.com/technology/2010/02/a-history-of-media-technology-scares-from-the-printing-press-to-facebook.html> [19 October 2019].
- 50 Beckett, C., (2018). The Evolution of 'Quality' Journalism. *Medium*, [online] 5 June 2018. Available from: <https://medium.com/s/story/what-is-quality-journalism-here-it-is-and-here-s-how-we-do-it-5a2c0634ee51> [19 October 2019].
- 51 Fletcher, R., Newman, N., Nielsen, R.K., and Kalogeropoulos, A., (2019). Reuters Institute Digital News Report 2019. *Reuters Institute for the Study of Journalism* [online]. Available from: [https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2019-06/DNR\\_2019\\_FINAL\\_0.pdf](https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2019-06/DNR_2019_FINAL_0.pdf) [19 October 2019]
- 52 Illing, S., (2019). How search engines are making us more racist. *Vox*, [online] 6 April 2018. Available from: <https://www.vox.com/2018/4/3/17168256/google-racism-algorithms-technology> [19 October 2019].
- 53 alphaHoo., (2019). Will AI cause mass unemployment? *Medium*, [online] 29 May 2019. Available from: <https://chatbotslife.com/will-ai-cause-mass-unemployment-f26537e5f25a> [19 October 2019].
- 54 McCourtie, S. D., (2018). With AI, jobs are changing but no mass unemployment expected – UN labour experts. *UN News* [online] 4 September 2018. Available from: <https://news.un.org/en/story/2018/09/1018292> [19 October 2019].
- 55 Diakopoulos, N., and Friedler, S., (2016). How to Hold Algorithms Accountable. *MIT Technology Review*, [online] 17 November 2016. Available from: <https://www.technologyreview.com/s/602933/how-to-hold-algorithms-accountable/> [19 October 2019].



- 56 Bernstein, C., and Rouse, M., (2018). machine learning bias (algorithm bias or AI bias). *Search Enterprise AI*, [online] October 2018]. Available from: <https://searchenterpriseai.techtarget.com/definition/machine-learning-bias-algorithm-bias-or-AI-bias> [19 October 2019].
- 57 Jiaconda., (2019). Understanding and Reducing Bias in Machine Learning. Medium, [online] 5 April 2019. Available from: <https://towardsdatascience.com/understanding-and-reducing-bias-in-machine-learning-6565e23900ac> [19 October 2019].
- 58 Diakopoulos, N., (n.d.) Algorithmic Accountability & Transparency. Available from: <http://www.nickdiakopoulos.com/projects/algorithmic-accountability-reporting/> [19 October 2019].
- 59 Vaccari, C., (2018). How Prevalent are Filter Bubbles and Echo Chambers on Social Media? Not as Much as Conventional Wisdom Has It. *Cristian Vaccari*, [online] 13th February 2019. Available form: <https://cristianvaccari.com/2018/02/13/how-prevalent-are-filter-bubbles-and-echo-chambers-on-social-media-not-as-much-as-president-obama-thinks/> [19 October 2019].
- 60 Jarvis, J., (2019). Evidence, Please. *Medium*, [online] 11th October 2019. Available from: <https://medium.com/whither-news/evidence-please-d794b5d21ee4> [19 October 2019].
- 61 LSE Truth, Trust, and Technology Commission. (n.d.) Available from: <http://www.lse.ac.uk/media-and-communications/truth-trust-and-technology-commission> [19 October 2019]
- 62 First Draft News., (n.d.) Available from: <https://firstdraftnews.org/> [19 October 2019]
- 63 The Trust Project., (n.d.) Available from: <https://thetrustproject.org/> [19 October 2019].
- 64 Online News Association, (n.d.) ONA Social Newsgathering Ethics Code. *Journalists.org*, [online]. Available from: <https://journalists.org/tools/social-newsgathering/#m3edu> [11th October 2019].
- 65 Bradshaw, P., (2019). If we are using AI in journalism we need better guidelines on reporting uncertainty. *Online Journalism Blog*, [11th October 2019]. Available from: <https://onlinejournalismblog.com/2019/05/23/ai-in-journalism-guidelines-on-reporting-uncertainty/> [19 October 2019].
- 66 Liberty, J., (2019). Studying the behaviour of AI. *MIT Media Lab*, [online] 11th October 2019. Available from: <https://www.media.mit.edu/posts/studying-the-behavior-of-ai/> [19 October 2019].
- 67 Myles, S., (2018). How Can We Make Algorithmic News More Transparent? *Slideshare*, [online] 22 May 2018. Available from: <https://www.slideshare.net/smyles/how-can-we-make-algorithmic-news-more-transparent-98053867> [19 October 2019].





- 68 Isaac, M., (2019). In New Facebook Effort, Humans Will Help Curate Your News Stories. *NY Times*, [online] 20 August 2019. Available from: <https://www.nytimes.com/2019/08/20/technology/facebook-news-humans.html> [19 October 2019].
- 69 Nilsson, P., (2019). Google adjusts search algorithm to boost original journalism. *Financial Times*, [online] 12 September 2019. Available from: <https://www.ft.com/content/e27ca6c6-d57c-11e9-a0bd-ab8ec6435630> [19 October 2019].
- 70 Adams, C. J., New York Times: Using AI to host better conversations. *Google Technology*, [online] 23 May 2018. Available from: <https://www.blog.google/technology/ai/new-york-times-using-ai-host-better-conversations/> [19 October 2019]
- 71 Lewis, S.C., Guzman, A.L. and Schmidt, T.R., 2019. Automation, Journalism, and Human–Machine Communication: Rethinking Roles and Relationships of Humans and Machines in News. *Digital Journalism*, pp.1-19.
- 72 Carlson, M., 2017. *Journalistic authority: Legitimizing news in the digital era*. Columbia University Press.
- 73 Hern, A., (2019). New AI fake text generator may be too dangerous to release, say creators. *The Guardian*, [online] 14 February 2019. Available from: <https://www.theguardian.com/technology/2019/feb/14/elon-musk-backed-ai-writes-convincing-news-fiction> [19 October 2019].
- 74 Schuster, E., (2018). We need to talk! About artificial intelligence and ethics in journalism. *LinkedIn*, [online] 1 November 2019. Available from: <https://www.linkedin.com/pulse/we-need-talk-artificial-intelligence-ethics-ellen-schuster/> [19 October 2019].
- 75 AI Ethics Initiative., (2018). Meet the 66 finalists in the AI and the News Open Challenge. *AI News Initiative*, [online] 4 December 2018. Available from: <https://aiethicsinitiative.org/news/2018/12/3/meet-the-66-finalists-in-the-ai-and-the-news-open-challenge> [19 October 2019].

#### Chapter 4

- 76 Waters, R., (2019). The billion-dollar bet to reach human-level AI. *Financial Times*, [online] 3 August 2019. Available from: <https://www.ft.com/content/c96e43be-b4df-11e9-8cb2-799a3a8cf37b> [19 October 2019].
- 77 MIT Technology Review., (2019). The Man Who Helped Invent Virtual Assistants Thinks They're Doomed Without a New A.I. Approach. *Medium*, [online] 14 March 2019. Available from: <https://medium.com/mit-technology-review/the-man-who-helped-invent-virtual-assistants-thinks-theyre-doomed-without-a-new-a-i-approach-34654ad1054d> [19 October 2019].
- 78 Bryant, H., (2018). A look at nine of the best collaborative journalism projects of 2018. *Medium*, [online] 17 December 2018. Available from: <https://medium.com/centerforcooperativemedia/a-look-at-nine-of-the-best-collaborative-journalism-projects-of-2018-cfd49b3c4865> [19 October 2019].



- 79 The Panama Papers., (n.d.) *International Consortium of Investigative Journalists*. Available from: <https://www.icij.org/investigations/panama-papers/> [19 October 2019].
- 80 Wash Post PR Blog., (2019). The Washington Post establishes a computational political journalism R&D lab to augment its campaign 2020 coverage. *The Washington Post*, [online] 24 July 2019. Available from: <https://www.washingtonpost.com/pr/2019/07/24/washington-post-establishes-computational-political-journalism-rd-lab-augment-its-campaign-coverage/> [19 October 2019].
- 81 Lehigh University., (2019). Rise of the robots: Coming to a first-year Intro to Journalism class near you. *Phys.org* [online] 1 July 2019. Available from: <https://phys.org/news/201907-robots-first-year-intro-journalism-class.html> [19 October 2019].
- 82 Jones, R. and Jones, B., 2019. Atomising the News: The (In) Flexibility of Structured Journalism. *Digital Journalism*, pp.1-23.
- 83 Köppen, U., (2019). Working across disciplines: A manifesto for happy newsrooms. *Niemen Lab*, [online] 9 July 2019. Available from: <https://www.niemanlab.org/2019/07/working-across-disciplines-a-manifesto-for-happy-newsrooms/> [19 October 2019].
- 84 Marconi, F., (2020). [Forthcoming]. *Newsmakers: Artificial Intelligence and the Future of Journalism*. Columbia University Press.
- 85 Vicari, J., (2019). Venturing into a New World of Journalism. *Medium*, [online] 10 January 2019. Available from: <https://medium.com/journalism-of-things/journalism-of-things-65aa481b2dda> [19 October 2019].
- 86 Marconi, F., (2016). Making the internet of things work for journalism. AP Insights, [online] 14 July 2016. Available from: <https://insights.ap.org/industry-trends/making-the-internet-of-things-work-for-journalism> [19 October 2019].
- 87 Ward, P., (2017). Four Ways Augmented Reality Could Save Journalism. *Medium*, [online] 19 November 2017. Available from: <https://medium.com/@peterward85/four-ways-augmented-reality-could-save-journalism-19537272fab0> [19 October 2019].
- 88 Beckett, C., (2010). The value of networked journalism. *POLIS*, [online] 11th June 2010. Available from: <http://www.lse.ac.uk/media@lse/POLIS/documents/Polis%20papers/ValueofNetworkedJournalism.pdf> [19 October 2019].
- 89 Bradshaw, P., (2007). A model for the 21st century newsroom pt2: Distributed Journalism. *Online Journalism Blog*, [online] 2 October 2007. Available from: <https://onlinejournalismblog.com/2007/10/02/a-model-for-the-21st-century-newsroom-pt2-distributed-journalism/> [19 October 2019].



- 90 Beckett, C., (2019). Emotion as an organising principle for networked journalism. LSE Blogs, [online] 17 April 2019. Available from: <https://blogs.lse.ac.uk/polis/2019/04/17/emotion-as-an-organising-principle-for-networked-journalism/> [19 October 2019].
- 91 The Uber Game., (n.d.) Available from: <https://ig.ft.com/uber-game/> [12 October 2019].
- 92 Kaliouby, R. E., (2019). How do we build trust between humans and AI? *World Economic Forum*, [online] 1 August 2019. Available from: <https://www.weforum.org/agenda/2019/08/can-ai-develop-an-empathetic-bond-with-humanity> [19 October 2019].

## Conclusion

- 93 Newman, J., (2019). How human curation came back to clean up AI's messes. *Fast Company*, [online] 18 September 2019. Available from: <https://www.fastcompany.com/90402486/how-human-curation-came-back-to-clean-up-ais-messes> [19 October 2019].
- 94 Juskalian, R., (2008). Interview with Clay Shirky, Part I. *Columbia Journalism Review*, [online] 19 December 2008. Available from: [https://archives.cjr.org/overload/interview\\_with\\_clay\\_shirky\\_par.php?page=all](https://archives.cjr.org/overload/interview_with_clay_shirky_par.php?page=all) [19 October 2019].
- 95 Feldman, M., (2019). There isn't enough empirical data on the impact of AI. *HIIG Digital Society Blog*, 17 September 2019. Available from: [https://www.hiig.de/en/there-isnt-enough-empirical-data-on-the-impact-of-ai/amp/?\\_\\_twitter\\_impression=true](https://www.hiig.de/en/there-isnt-enough-empirical-data-on-the-impact-of-ai/amp/?__twitter_impression=true) [19 October 2019].
- 96 Mehra, A., (2019). An Open Letter to Nonmillennials. *Medium*, [online] 19 September 2019. Available from: <https://onezero.medium.com/an-open-letter-to-nonmillennials-5d971516e2d7> [19 October 2019].





# Readings and Resources

## Readings and Resources

### BOOKS

[Automating the News: how Algorithms are Rewriting the Media](#)

Diakopoulos, N. (June 2019), Harvard University Press

[Newsmakers: Artificial Intelligence and the Future of Journalism](#)

Marconi, F. (forthcoming, February 2020), Columbia University Press

### REPORTS

[The Next Newsroom: Unlocking the Power of AI for Public Service Journalism](#)

European Broadcasting Union, November 2019

[News Automation: The rewards, risks and realities of 'machine journalism'](#)

WAN-IFRA, March 2019

[An Industry-Led Debate: How UK media cover artificial intelligence](#)

Reuters Institute for the Study of Journalism, December 2018

[Artificial Intelligence: Practice and Implications for Journalism](#)

Tow Center for Digital Journalism, Columbia University, September 2017

[The Future of Augmented Journalism: A guide for newsrooms in the age of smart machines](#)

Associated Press, April 2017

[Guide to Automated Journalism](#)

Tow Center for Digital Journalism, Columbia University, January 2016

### MOOCs

[Hands-on Machine Learning Solutions for Journalists](#)

JournalismCourses.org, forthcoming, November/December 2019

[News Algorithms: The Impact of Automation and AI on Journalism](#)

JournalismCourses.org, February/March 2019

For a wider selection of articles about the applications and implications of AI in journalism, with case studies and practical insights, go to [blogs.lse.ac.uk/polis](https://blogs.lse.ac.uk/polis). This will be updated regularly. Please send us suggestions for further readings and resources.



# Acknowledgments

## Acknowledgments

The editorial responsibility for the content of this report lies with the author, Professor Charlie Beckett.

Thanks to Anita Zielina, Nic Newman, Ville Kinnunen, and Ana Jakimovska, for improving the early drafts of the report with their feedback.

Thanks to lead researcher Fabio Chiusi, and for additional research and editing support by Selina Swift.

During two high-level meetings at the start of the survey phase, experts working at the intersection of journalism and AI in newsrooms and academia generously shared their expertise and recommendations. Their contribution was instrumental in allowing this research to start on the right track and in the spirit of collaboration.

Along with them, we want to thank Cong Yu and Moustapha Cisse of Google AI, whose technical expertise was of great added value in designing this research.

*Journalism AI* would not have been possible without the support of the Google News Initiative. Special thanks to David Dieudonné for his vital work to make this happen.

Last but not least, we want to thank again the media organisations who made this report possible by taking the *Journalism AI* survey. The complete list follows on the next page:



## NEWS ORGANISATIONS THAT COMPLETED THE JOURNALISM AI SURVEY

**Agence France-Presse** – France  
**Agora SA** – Poland  
**Aller Media** – Nordics  
**ARTE** – France/Germany  
**Associated Press** – US  
**Australia Broadcasting Corporation**  
**Austria Presse Agentur** – Austria  
**Axel Springer SE** – Germany  
**Bayerischer Rundfunk** – Germany  
**BBC** – UK  
**Bloomberg** – US  
**Caerphilly Observer** – UK  
**Central Médiacsoport** – Hungary  
**Chequeado** – Argentina  
**CNN** – US  
**Condé Nast International**  
**Corriere della Sera** – Italy  
**Český rozhlas** – Czech Republic  
**Dagens Næringsliv** – Norway  
**De Standaard / Mediahuis** – Belgium  
**Der Standard** – Austria  
**Deutsche Welle** – Germany  
**El Universal** – Mexico  
**Esquire Singapore** – Singapore  
**FD Mediagroep** – Netherlands  
**Financial Times** – UK  
**Folha de S.Paulo** – Brazil  
**France Télévisions** – France  
**Full Fact** – UK  
**Helsingin Sanomat** – Finland  
**ICIJ**  
**Il Sole 24 Ore** – Italy  
**Inaaj** – India  
**INK Centre for Investigative Journalism** – Botswana  
**Jysk Fynske Medier** – Denmark  
**Kinzen** – Ireland  
**La Stampa** – Italy  
**Le Monde** – France  
**LETA** – Latvia  
**Los Angeles Times** – US  
**Malaysiakini** – Malaysia  
**Mediafin** – Belgium  
**MittMedia** – Sweden  
**Neue Zürcher Zeitung** – Switzerland  
**News UK** – UK  
**NPR** – US  
**NRC Media** – Netherlands  
**Observador** – Portugal  
**openDemocracy** – UK  
**Poligrafici Editoriale** – Italy  
**POLITICO**  
**PRISA Noticias** – Spain  
**Quartz** – US  
**Reuters**  
**RTL Deutschland** – Germany  
**Schibsted Media Group** – Nordics  
**Sky News** – UK  
**South China Morning Post** – Hong Kong  
**Spiegel Online** – Germany  
**Süddeutsche Zeitung** – Germany  
**Sveriges Television** – Sweden  
**Tamedia AG** – Switzerland  
**Tempo** – Indonesia  
**Texty** – Ukraine  
**The Economist** – UK  
**The Guardian** – UK  
**The Washington Post** – US  
**TRT** – Turkey  
**VPRO** – Netherlands  
**VRT NWS** – Belgium  
**Yle** – Finland

# Get Involved

## Get Involved

The author welcomes feedback on this report at [C.H.Beckett@lse.ac.uk](mailto:C.H.Beckett@lse.ac.uk)

If you have any questions about the project, or if you want to be involved in future Journalism AI initiatives, do not hesitate to get in touch with Mattia Peretti at [M.Peretti@lse.ac.uk](mailto:M.Peretti@lse.ac.uk)

[blogs.lse.ac.uk/polis/2019/11/18/new-powers-new-responsibilities](https://blogs.lse.ac.uk/polis/2019/11/18/new-powers-new-responsibilities)



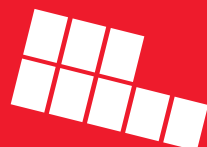
[@PolisLSE](https://twitter.com/PolisLSE)

[#JournalismAI](https://twitter.com/PolisLSE)

Journalism AI, Polis  
Department of Media and Communications  
The London School of Economics  
and Political Science  
Houghton Street  
London WC2A 2AE



THE LONDON SCHOOL  
OF ECONOMICS AND  
POLITICAL SCIENCE ■



POLIS  
Journalism and Society

Think-tank at LSE ■

Google  
News Initiative