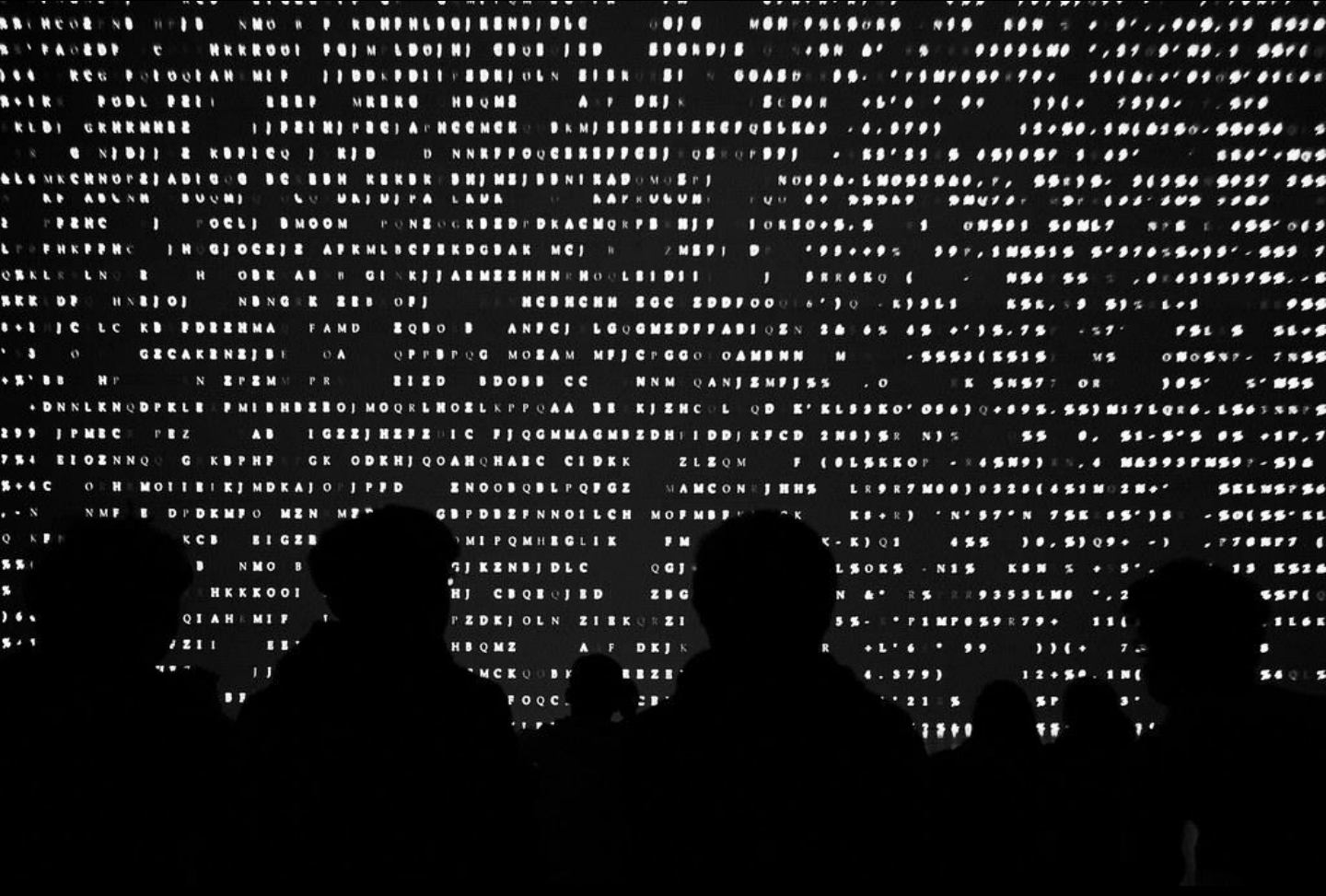

The next wave of disruption: Emerging market media use of artificial intelligence and machine learning

An overview of new technology implementation in emerging market media

THE FIX

IMS
paving the way for good journalism

CLIP
CENTRO LATINOAMERICANO DE INVESTIGACIÓN PERIODÍSTICA

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International Media Support is a non-profit organisation working to support local media in countries where conflict and political transition make it difficult for media to operate.

The report was prepared jointly with The Fix and The Clip.

The Fix is a media about media. Working for and with the media management and development communities, The Fix's mission is cracking the media management puzzle through insights, solutions and data. To learn more, reach out to research@thefix.media.

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The Clip is a non-profit association, based in Costa Rica, with a Latin American team, which conducts and coordinates collaborative cross-border journalistic investigations and puts its technological innovations at the service of journalism in the region. Learn more at info@elclip.org.

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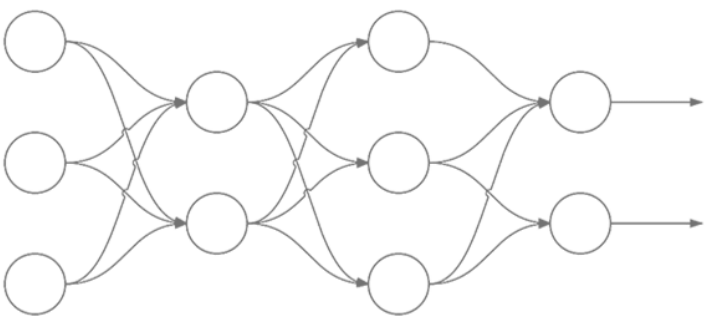


1 Foreword – "A collaborative path to supercharge journalism"

Journalism is traditionally highly competitive but when it comes to new technologies, collaboration might be a better strategy. This goes against the grain for many news organisations who pride themselves on their independence. But when it comes to the adoption of so-called Artificial Intelligence in the newsroom working with others can save time, resources and mistakes.

Machine learning, automation, personalisation, data analysis and natural language processing tools can supercharge the modern news media. They can help boost your audience retention and revenues. They can do a lot of the difficult or boring work, leaving the human journalists to concentrate on adding creativity and judgement. They can help with newsgathering, content creation or distribution.

But AI is a relatively new set of technologies for journalism and these algorithmically-driven systems need special skills and strategies. They can be complex technically. Their development and implementation can be complicated and needs working out to suit your organisation's special needs. There are risks as well as opportunities with AI. Collaboration can be a great short-cut to that goal.

By collaboration I mean working across the usual departmental barriers within the news organisation. AI should not be left to the technology team and in turn, the technologists need to be integrated into the news production process. AI is changing journalism and that means creating new positions or roles and a more collaborative work pattern. You will need some kind of AI strategy.

Collaboration might also mean working with other news organisations, especially on designing new tools. There is so much to learn from other people's knowledge and experience. It is tough to do it on your own. Other people will have made mistakes or found clever solutions. Learn from them. In the end everyone benefits.

It is also very efficient to collaborate with other organisations such as the technology companies, start-ups and AI labs within universities. Everyone has a mutual interest in collaborating to increase the effectiveness of AI in journalism. But news organisations need to build those relationships.

Our research on AI and journalism around the world showed that there are increasing inequalities for news organisations. The danger is that local news and media in emerging economies might fall behind. The big global brands have the R&D resources to buy in or develop their own systems. But the others will have to work together if they want to capture the benefits of AI for themselves.

The first step is to have people in your organisation who will educate themselves about AI for journalism. You will need to recruit or collaborate with experts. Start small but think strategically and bring as many colleagues into the process as possible. The world around us is going to be transformed by AI over the next few years. The news media is no exception. No, there won't be robots taking over from human journalists. But AI is the latest wave of technological change and it pays to work with others to see what it can do for you.

Professor Charlie Beckett,
Director of the POLIS/ LSE Journalism AI Project

2 Executive summary

In frontier and emerging media markets across the globe, there are many new opportunities in newsrooms to innovate through artificial intelligence, machine learning and data processing (later summarised as AI/ML). We have drawn the lens to fast-rising developmental changes capable of driving digital transformation in business and journalism by understanding how those newsrooms can use technology to develop a data and user-led approach to newsgathering, content, distribution, marketing and sales, and post-sale services.

However, there are several hurdles to expanding the set of use cases. Among them are severe knowledge gaps around the capabilities of these emerging technologies and a lack of funding for media innovation.

IMS (International Media Support) carried out this exploratory research during the first quarter of 2021, together with the Latin American Centre for Investigative Journalism (The CLIP) in Latin America (LatAm) and The Fix in the wider Central-Eastern Europe region (CEE).

The goal of the research was to surface best practices and illuminate barriers in the usage of artificial intelligence by independent media in frontier and emerging news media markets. The research covered small, medium and large news outlets – print, TV and radio – in these markets. IMS examined their ability to access AI/ML solutions, and how they used them as catalysts for change. Of particular focus was obtaining a better understanding of both how newsrooms can adopt these solutions in current market conditions and how news associations, research centers and public/ private investors can build new partnership ecosystems to promote them.

Our research collected data from a select sample of media from 20 countries in these two regions to deliver accessible, clear and structured experiences about practical ways that media in these markets are using, and can use, artificial intelligence. To ensure the richest perspectives, a range of smaller and bigger newsrooms using audio-visual and text were included exploring their success and challenges deploying varied degrees of automation to redefine their role in emerging market societies. This report does not reflect equally all viewpoints within the different parts of news organisations, but it does give insights into how these technologies are being used by newsrooms.

A larger and longer conversation around AI/ML and media in frontier and emerging markets is needed. We have taken a small step, focused on how media in these under-researched markets are using AI rather than the why (another key part of the puzzle, which is being investigated by dedicated groups such as Journalism AI and Luminate, as well as in the broader scholarly field).

The key goal was to better understand how the news sector in frontier and emerging news media markets uses AI/ML to collect, analyse and share data to grow their audiences and/ or revenues. Ultimately, this research aligns with a fast-rising developmental challenge – to find new ways to drive successful digital transformation in business and journalism – by understanding how newsrooms in these markets can use technology to develop a data and user-led approach to newsgathering, content creation, distribution, or generating revenues.

3 Key findings

Just as in the global context, new tools are being used by the media in LatAm and CEE. The use of AI/ML is not limited to large, corporate media. But the reality of different news organisations with a variety of budgets and markets can vary deeply.

In LatAm, only a handful of media organisations are embracing AI or machine learning in house, most notably in Argentina, Perú and México and none as part of a long term effort to embrace the technology. While most of the news organisations consulted are using some sort of AI implementation through vendors or third party solutions and there is strong appetite for more it is rarely part of a strategic vision.

In CEE, digital natives are embracing AI/ML solutions and the region has been produced a few AI/ML based third party solution providers with global reach or ambitions. Competition for talent is a major bottleneck, as media have to compete with the global outsourcing of IT jobs to the region. The other challenge is state pressure on media, especially in such markets as Russia or Belarus, which makes long-term planning and investment impractical.

Use cases for AI/ML

- In both LatAm and CEE the most widely used AI applications included the management of paywalls and subscriptions. Major legacy media are taking the lead with AI related either to subscription services, personalisation and automation to engage readers and drive them to become subscribers.
- In both LatAm and CEE media managers reported use for A/B headline testing and bots for user feedback. It was also used for churn prediction analysis.
- The most common AI/ML use in LatAm was for predictive patterns to generate new content and understanding visitor patterns.
- The most common AI/ML use in CEE was for the automated generation of texts.
- The data showed little use of AI for intelligent invoice management, customer or post-sale services or automatic content generation for social media.
- More than half of publishers use AI/ML powered solutions for editorial reasons (especially data analysis and automating content creation). But it is the mid to large sized media that make a full use of AI/ML solution spectrum, particularly when it comes to managing subscriptions or automating internal processes.

Talent is the major challenge

Media in these markets are struggling to attract talent but even more so to retain talent. The major issue – attracting specialist talent and skills is a barrier to further adoption and growth. The media industry, with low salary offers and lack of exciting projects, becomes a last resort for aspiring candidates.

Trans-national exchange of knowledge and best practices as well as training for small and medium-sized media houses are the key investment requests from media managers in these markets. Many working at newsroom level do not understand AI and the opportunities.

3 Key findings

Media that are better at attracting and using a diverse set of backgrounds and skills are at a significant advantage. There is a problem for both media development agencies as well as tech startups to find who to talk to in the media about AI, ML and data processing as new bridge roles are limited or non-existent.

AI is shifting modern media foundations by changing the way media work, the range of jobs in and around the newsroom and the environment in which publications operate.

Key influencers who understand, can translate and drive adoption of AI/ML applications in the newsroom have an impact in the speed of adoption in the rest of the organisation.

AI/ML applications require collaboration between departments across editorial, business and technology to be successfully implemented.

More internal and external collaboration is needed

Collaborative approaches between media, research institutions, or third party solution providers should be encouraged as many applications or ventures are beyond the scope of a single outlet, due to the resources needed, availability of data, or other barriers to entry.

Many academic institutions in CEE have changed little from the communist era when research was under strict state oversight creating a barrier to collaboration. Instead self-learning digital natives are carving out new paths.

Many media outlets rely on industry vendors to fill up gaps in the most demanded areas (subscriptions, content distribution, metrics) but little or no effort has been deployed into custom solutions as core technology

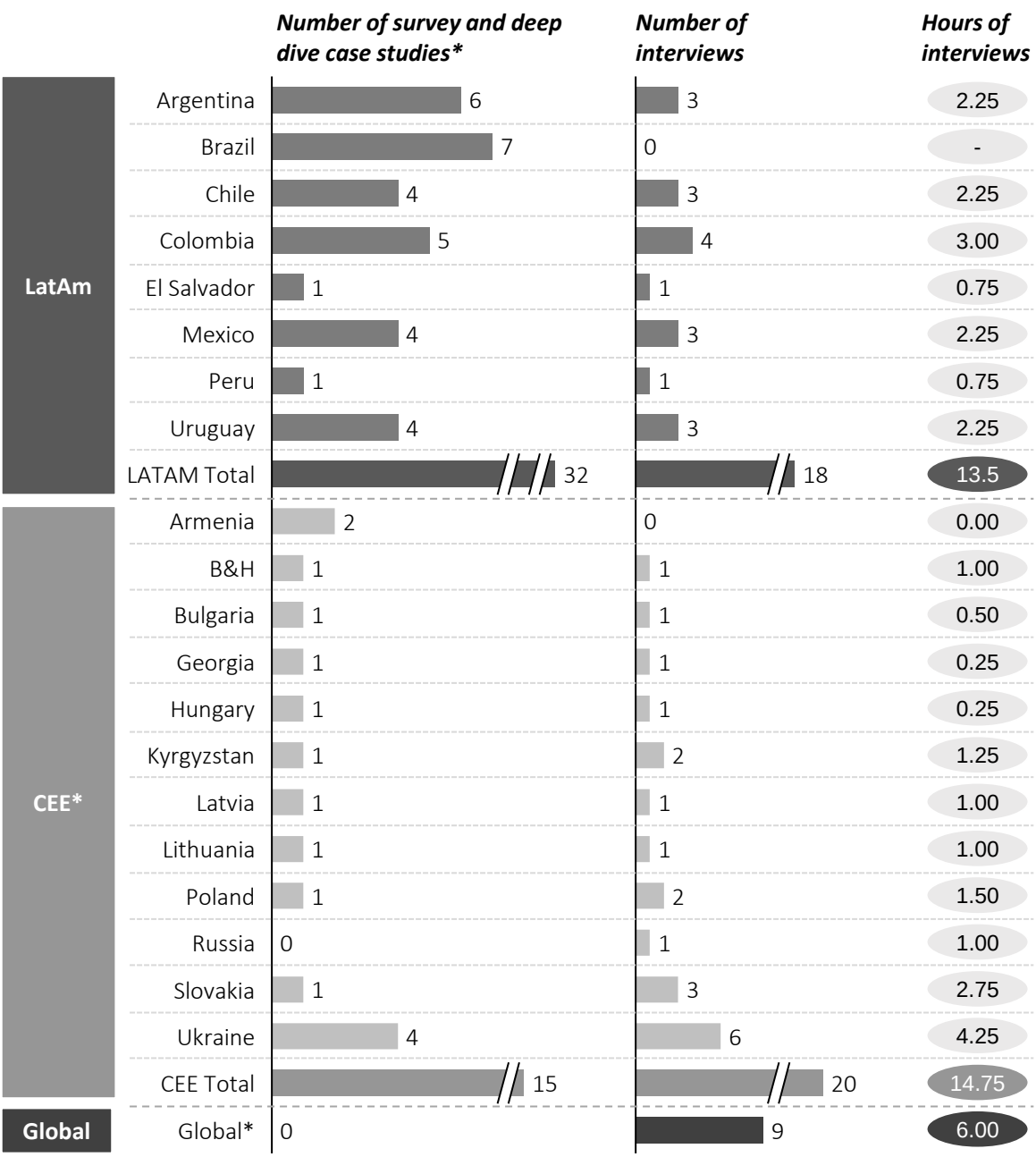
Engagement from multiple stakeholders is necessary to ensure a level playing field for independent, mission-driven media to ensure a digital divide does not thwart development. Although the knowledge is scarce, the willingness to learn is strong.

4 Our approach

This is an exploratory report that used a mixed-method research approach (both quantitative and qualitative elements), with a primary starting point targeting media houses using varying degrees of AI, ML and Data Processing as part of their core business operations.

We explored this in twenty countries in Latin America (Argentina, Brazil, Chile, Colombia, El Salvador, Mexico, Peru and Uruguay) and Central and Eastern Europe* (Armenia, Bosnia and Herzegovina, Bulgaria, Georgia, Hungary, Kyrgyzstan, Latvia, Lithuania, Poland, Russia, Slovakia and Ukraine).

Data collection was based on a mixed-method approach



**Definitions of CEE are inconsistent. This study takes the broadest possible view, including regions with strong historical, economic and social ties to core CEE states, including the Baltics, Balkans, Caucasus and Central Asia. For simplicity, the term CEE is further used to refer to this extended scope.*

4 Our approach

The research targeted media managers from tech-savvy independent, innovative, and entrepreneurial media that were more than five years old. This included digital editors, data specialists, editor in chiefs, directors, chief technical officers and the like.

To ensure the richest perspectives, a range of smaller and bigger newsrooms using audio-visual and text were included as were academics and local experts. It was a purposive sample as they were selected from contact networks of The Fix, The CLIP, International Media Support consultants and their researchers.

In total 57 online surveys were gathered, including 32 from LatAm (covering 29 media outlets) and 15 from CEE (covering 15 media outlets). Furthermore, deep dive video interviews were with experts and media managers from the region, as well as globally. A total of 18 interviews or 13.5 hours were carried out with LatAm based experts. In the CEE, 20 interviews or 14.75 hours were carried out. Global experts accounted for a further 9 interviews or 6 hours.

The online survey combined a mix of core data and AI/ML specific questions. The core data assessed the size and legal form of the organisation, primary outputs and financial resources including revenues and expenses. Section one was designed to review the knowledge of AI in the organisation including personal and organisational experiences.

The second section asked about solutions that were in place or how experiences were being developed. Then questions assessed talent management and access to hiring, followed by questions on competitors and the competitive environment. Sections five and six looked into the use of third party solutions and working with innovations.

The data were then verified. Internal teams for The Fix and The Clip checked the questions and research materials to ensure accuracy in the data collection process and translations were carried out where necessary.

A simple verification process was carried out between the researchers and regional case managers to ensure congruence between question formulation and use, interview targets and results and research literature. We systematically checked the data to ensure it was accurate and copyedited.

The analytical techniques used were part of a grouping method focused on an exploratory study and thematic analysis. Researchers also kept a journal with personal thoughts and insights derived from deep-dive interviews. We used this to review and judge the quality of data collection as well as the soundness of the researcher's interpretations during the analysis phase.

5 Glossary of terms

Note: There is a debate about distinctions between artificial intelligence, automated data processing, machine learning, deep learning and other terms. For the purposes of this report, we will use the umbrella term of Artificial Intelligence-Machine Learning (AI/ML) or simply Artificial Intelligence (AI) to cover all transformative and automated/algorithmic data-driven technologies, unless otherwise specified.

Algorithm: A process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer.

AI (Artificial Intelligence): A machine that can autonomously analyse its environment using a set of algorithms or pattern models to simulate human intelligence.

API (Application Programming Interface): APIs allow a developer to make a specific "call" or "request" to send or receive information from a server/ database.

Automated Content Production: Combining artificial intelligence with big data and natural language processing to automate content creation and curation.

Automated Journalism: News articles created by algorithms. Other names for automated journalism are algorithmic journalism, and robot journalism.

Content Recommendation is any system or engine that you use to suggest content that you think might be of interest to your readers.

Data Processing: Collection and manipulation of data points to produce meaningful information. This can range from classification to validation.

Digital Disruption: Change resulting from when innovative digital technologies and business models influence the value proposition of subsisting goods and services.

Digitisation: The adaptation of text, images, or sound into a digital form that can be computer processed.

Editorial Analytics: The practice of content editors using data about their audience, competitors and the performance of their previously published content to help make decisions in the editorial process.

Machine Learning: This is an AI subset that can access structured data and use it to learn for itself to provide improved results.

NLG: Natural language generation is a software process that automatically transforms structured data into a written narrative.

NLP: Natural language processing is what happens when computers read text and turn it into structured data.

NLU: Natural language understanding classifies input text into proper intents.

Personalisation: Personalised marketing uses data to deliver more relevant messages to your target audience. In other words, businesses collect data on their audience's interests, demographics, and behaviour to create more relevant and valuable content.

Product development: The innovative process of improving an existing product or creating a new one.

Reader Revenue model: Business model in which some or all revenue come directly from readers. These can be based on subscriptions, micropayments, donations, membership, action investments, crowdfunded investment and cooperative ownership. They range in intensity from passive to engaged relations and from transactional to invested revenues.

Ubiquitous: Anytime and everywhere computing.

UX design: User experience (UX) design is the process design teams use to create products that provide meaningful and relevant experiences to readers. This involves the design of the entire process of acquiring and integrating the product, including aspects of branding, design, usability and function

10 Tips for media to get into AI

1 Set a 5-year vision

A five-year plan will help you set the right goals and path to implement the vision.

Major change comes from top management – not some obscure lab or engineering team. Fully embracing AI adoption can get people on board and reduce friction.

But it's hard to break old habits. Training takes time. Introduce change gradually, but persistently. Make results visible. The company you want to see will slowly take shape.

2 Assign a single, responsible team leader

Tackling machine learning projects can start from any corner of the organisation. But without an identifiable point of contact – visible and accountable – it is easy to lose focus.

A single responsible person, outside the current organisation structure, should work across different areas (newsroom, sales, product etc.) and make them feel part of the process of building new digital skills. Moreover, the responsible person can propose, analyse and prioritise opportunities with the greatest impact for the entire organisation.

3 Form an interdisciplinary team with a single point of contact

AI is not just an engineering issue. The goal is to solve problems scattered all over – in engineering, design, sales and editorial. You cannot realise a 5-year vision working in silos.

An interdisciplinary team should build foundational blocks for future projects – start with simple ones like indexing archives, connecting systems through APIs. This will make starting new projects easier and set realistic expectations on time and resources needed.

4 Find low hanging fruit and aim for immediate results

Start with a project you know you can handle that will deliver an immediate impact.

It will help set the tone and make people realise integrating AI into the workflow is not rocket science. You will also start adding valuable know-how into the company that you can later use for more complex projects.

5 Set realistic timeframes (but finish the 1st project in 3 months)

You want to avoid excessive time dedicated to meetings and focus on actual planning and executing your vision. Your first project is all about getting people on board. A quick win will boost confidence and results will inspire people to tackle new problems.

10 Tips for media to get into AI

6 Use specific metrics (e.g., KPIs) to track progress

Key Performance Indicators (KPIs) help manage performance and evaluate the success of a particular project or the organisation overall.

Actual KPIs vary between organisations. It can be pageviews, new subscribers, or a million other metrics. What is consistent is that they can be used to drive towards specific goals. Measure everything and align your AI projects to those metrics.

7 Validate ideas early and often by using short project sprints

Many ideas don't survive real world testing. Avoid projects that require huge amounts of time or headcount. Break projects into short sprints or repeatable time-boxed activities that deliver real outcomes at regular intervals (and measure the impact!).

If you want to automate a process, start with the simplest piece and expand to more challenging parts. Change direction if it fails. "Trial and error" is your best friend.

8 Use projects to educate and train your staff in AI, ML and DP, with yearly goals that are clear to everyone involved

You can't deliver a 5-year vision unless the whole organisation is aligned. But people won't support things they don't understand (an issue for any new technology).

Fight fear of job losses with solutions that remove friction and free up time for people to focus on what they do best (and win you allies). It will also open eyes to new possibilities.

9 Collaborate with fellow media to push the boundaries

Many of the problems and limitations you face are not unique to your organisation. Work together with fellow media to overcome limitations and reach a higher standard sooner.

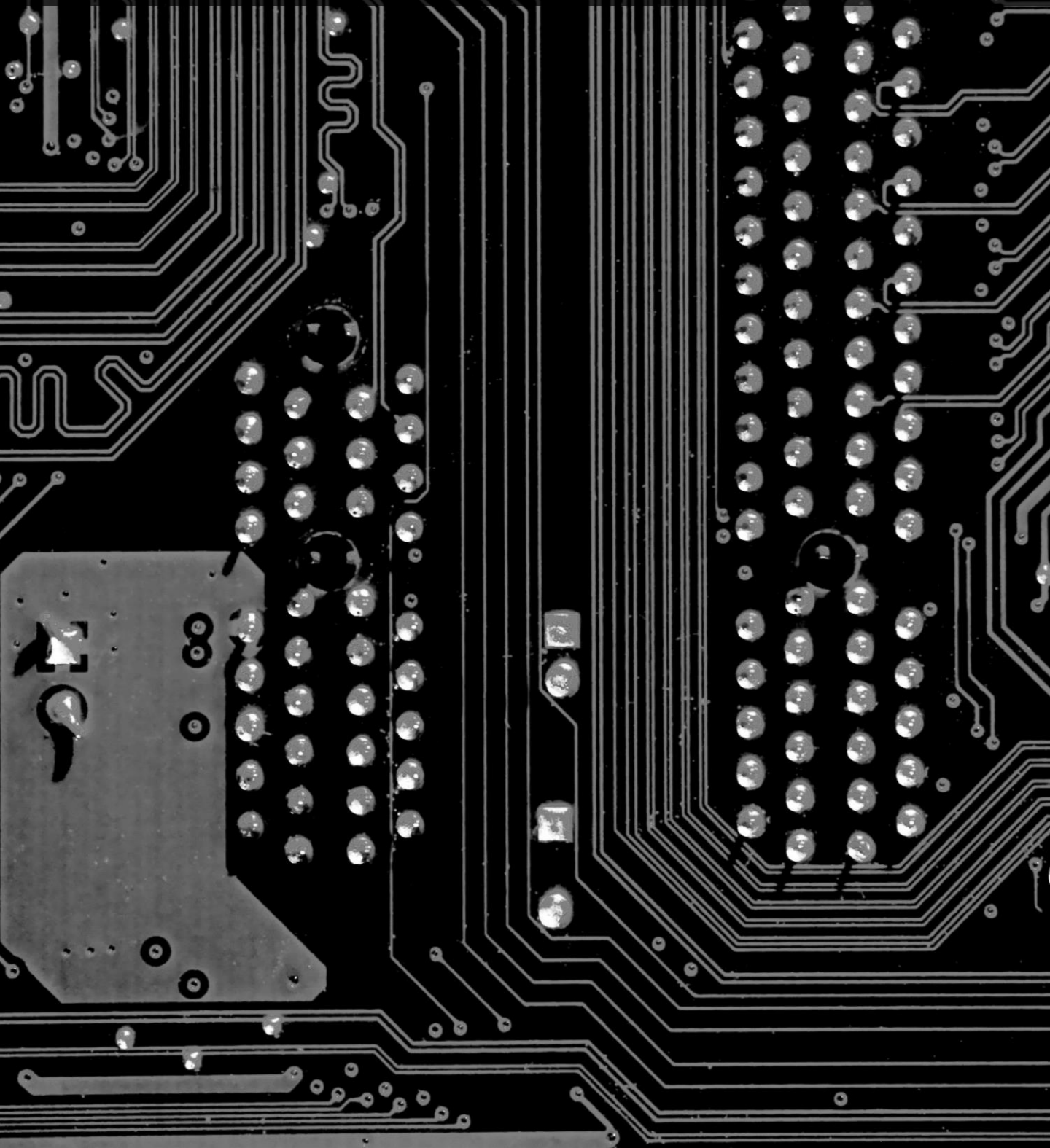
Use international workshops and resources and embrace organisations helping push new technologies into the newsroom. It will help implement your vision faster and better.

10 Use vendor, open-source solutions to implement AI faster

No need to reinvent the wheel. Many external players offer solutions to integrate AI into your organisation. Be wise to integrate solutions you can measure against your KPIs.

Make sure people see the benefits of AI in their daily work. Provide updates on results of vendor solutions. Highlight benefits for customers or competitive advantages gained. This will encourage the use of new technologies and set the right mindset for your team.

7. Key findings: A landscape ready to be seized – how AI/ML will change the world of media and journalism



A AI as a disruptive bridge to the future for media

Artificial Intelligence is the third wave of disruption transforming news media fabrics. Previously, moving online and the advent of social media have left most media companies poorer and more beholden to large companies who own the new channels of distribution and set the rules in their favor.

AI/ML offers an opportunity for the media to make significant steps around content production and data.

"There is a big future for AI in journalism, and AI will be a huge part of journalism," asserts Sasa Vucinic, managing partner of the US-based venture capital fund North Base, which has invested in several AI-powered media firms.

"These new technologies are the new printing press," argues María Florencia Coelho, New Media Research manager at La Nación in Argentina.

"The best way to get into AI is by starting with small, well-defined projects that solve a tangible problem," explains Francesco Marconi, author of Newsmakers: Artificial Intelligence and the Future of Journalism[1].

Cases reviewed for this research show that small experiments act as a catalyst, creating a virtuous cycle as knowledge and familiarity with AI/ML grow. The question often remains where to find that first spark.

Building bridges

So-called AI bridge roles play a huge role in media organisations. Like in other industries[2], the presence of translators or experts that others can reach out to for all artificial intelligence matters, appears to be crucial to the success of subsequent implementation of AI/ML use cases.

While most news organisations surveyed did not have formal translator or bridge positions, most had someone who *de facto* played this role.

Interestingly, this person could be in the newsroom, on the product or commercial side. It doesn't matter where they sit, what matters is that they can set a vision of AI integration into daily processes.

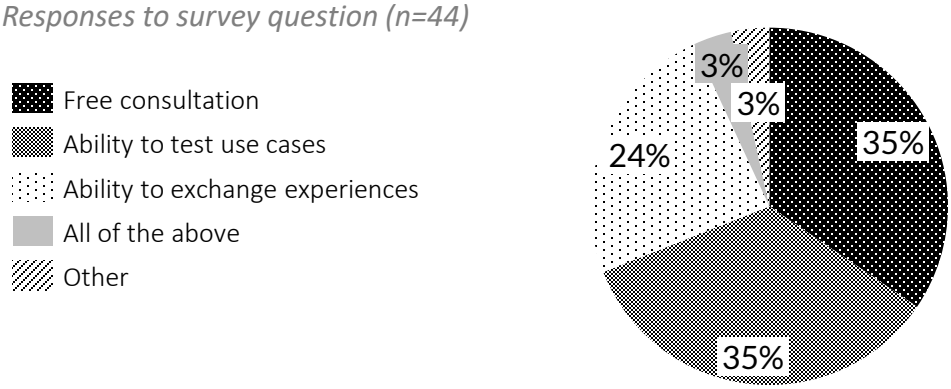
Media have an appetite to learn (see exhibit 1 for types of desired support).

Our findings suggest even modest help can set the wheels in motion, readying media to seize opportunities and face the challenges of an AI-powered future.

Exhibit 1

"What kind of support would you be interested in?"

Responses to survey question (n=44)



B Opportunities: from automated content to subscription management

Many discussions around AI/ML in the media have focused on the idea of "robots writing articles", leading to some misunderstandings[3,4]. While the latest language generators like GPT-3 can write articles when prompted[5], their main use is to augment the capacity of human writers, not replace them.

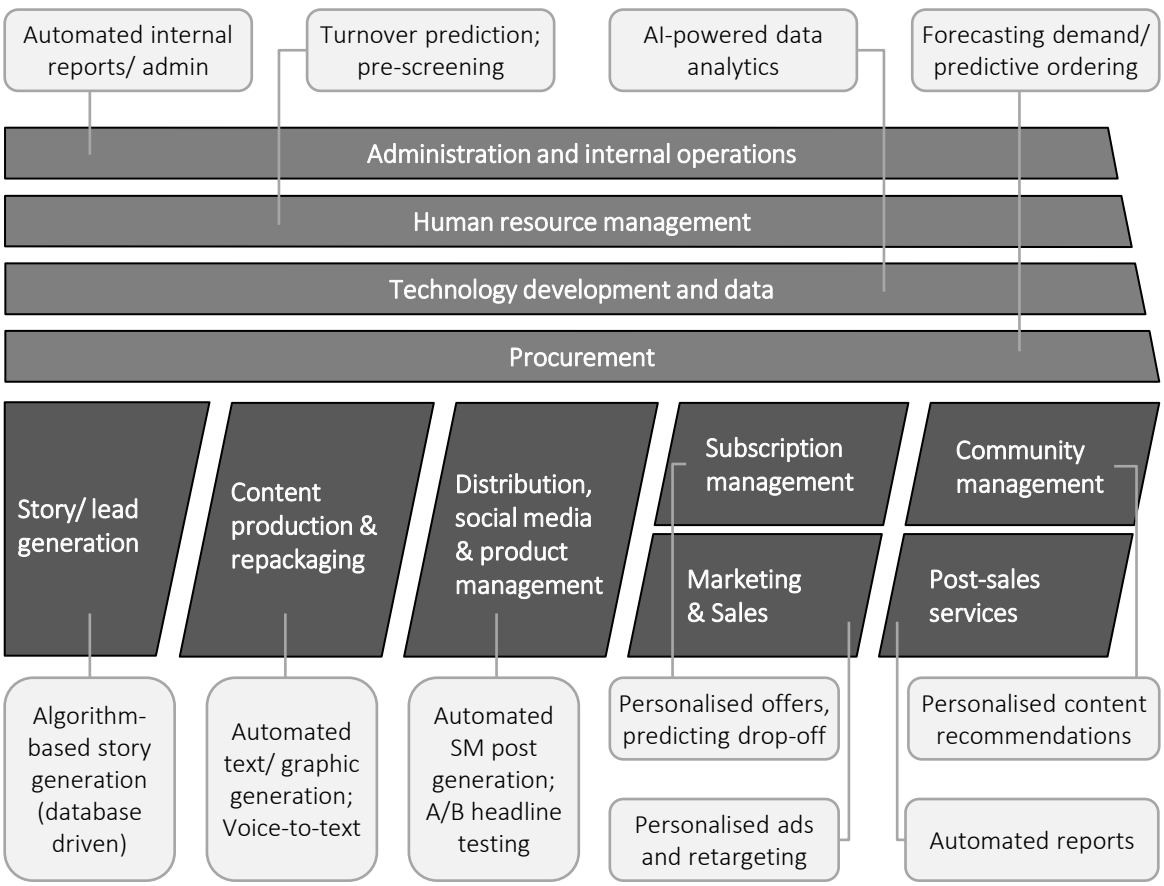
Our findings show where there are repetitive, process-heavy tasks, there may be an opportunity to leverage automation to make internal processes more efficient. In fact, there are a broad range of applications, from internal operations and product development to commercial functions, that go beyond editorial uses.

"Roughly 40% of AI/ML use cases are in editorial, 40% goes to commercial, and 20% covers internal functions," explains Michal Cyrek, Big Data Architect and leader of the data team at Onet.pl, one of Poland's biggest digital media. In fact, AI/ML applications can extend across the value chain.

Automating content production and managing subscriptions are the most important use cases (see exhibit 3, page 16). But wherever there are repetitive, process-heavy tasks, there may be an opportunity to leverage automation[6]. Expert interviews suggested a common error is to start the process of finding use

Exhibit 2

Examples of observed applications of AI/ ML extend across the full media value chain*



** The media value chain is adapted from the classical value chain model developed by Michael Porter[7] by the authors and tested for applicability and pertinence with over 20 publishers*

cases from reviewing AI/ML capabilities. Instead, news media should review their internal processes and find opportunities to automate them.

AI/ML is also not just for well-resourced newsrooms in developed markets. AI is adopted at different rates by media of all sizes. Larger media may deploy a broader range of solutions, but small outlets can build and use a range of tools and lead the way with experimentation. "You don't necessarily need a lot of money or skills to make AI/ML work in journalism – at least for basic applications – but you need either money or skills," explains Carl-Gustav Linden, a professor at the University of Bergen in Norway.

Automating data points as story source

Creating content is core to what media do – and how they spend their money. Hence it is no surprise that is often the focus of AI/ML discussions. But automation can start before writing the story itself – at the process of idea generation.

Graph databases that emphasise relationships between data points can be used to generate stories or to boost journalists' search capabilities (see sidebar, opposite). By connecting the dots, machines expedite the painfully laborious process that leads to generating stories.

Automated fact-gathering lets journalists focus on more valuable elements – talking to sources or developing the narrative.

But NLG uses go further, writing the content itself – particularly for topics that use both public and private structured data sets. This is used on topics like sports, real estate or company news.

The potential impact is vast – not least for short-staffed local media. This is especially valuable post-pandemic. "Publishers are starting to see the more-with-less value of our automated content service," notes Cecilia Campbell, Chief Marketing Officer of United Robots, a Swedish content automation service expanding to LatAm.

Machine-augmented investigations

Machine learning offers journalists an opportunity to develop processes for investigative journalism. By scouring public databases, algorithms can quickly detect suspicious links or rules' violations that would have taken a reporter hours, days or even weeks to uncover.

Using graph databases that allow you to create complex links between data points, Kyrgyzstan's Kloop, a leading investigative journalism outfit, scours public databases to uncover rule-breaking – like companies tied to public servants bidding for tenders.

Machine learning is also boosting investigative journalists' research capabilities.

The Organized Crime and Corruption Reporting Project's Aleph Project is a super-database that combines information from public registries, journalist research, leaks, tips and other data into a massive (and costly[8]) hub for civic-minded actors.

"The platform uses neural networks to improve searches, super-powering what any individual researcher could do by themselves," explains OCCRP CTO Emma Prest.

B Opportunities: from automated content to subscription management

Subscription management

Publishers are turning to AI/ML-powered solutions around reader revenues. The pandemic-driven subscriptions boom[9] increased the shift to direct pay models. To make the most of this model, El Tiempo in Colombia is using algorithms to boost readership and reduce attrition, or churn, among paying users.

"We are convinced this is the way to increase our subscription business," notes El Tiempo's Data Strategy Manager David Rodriguez. "Thanks to our algorithm, we improved print [subscriptions] by 80% and digital by 2x."

Dennik N in Bratislava built its own, open-source platform (REMP2020, the first REMP product, now being replaced with REMP2030), used by several of the region's publishers[10]. It is currently being upgraded with machine learning solutions from the e-commerce industry.

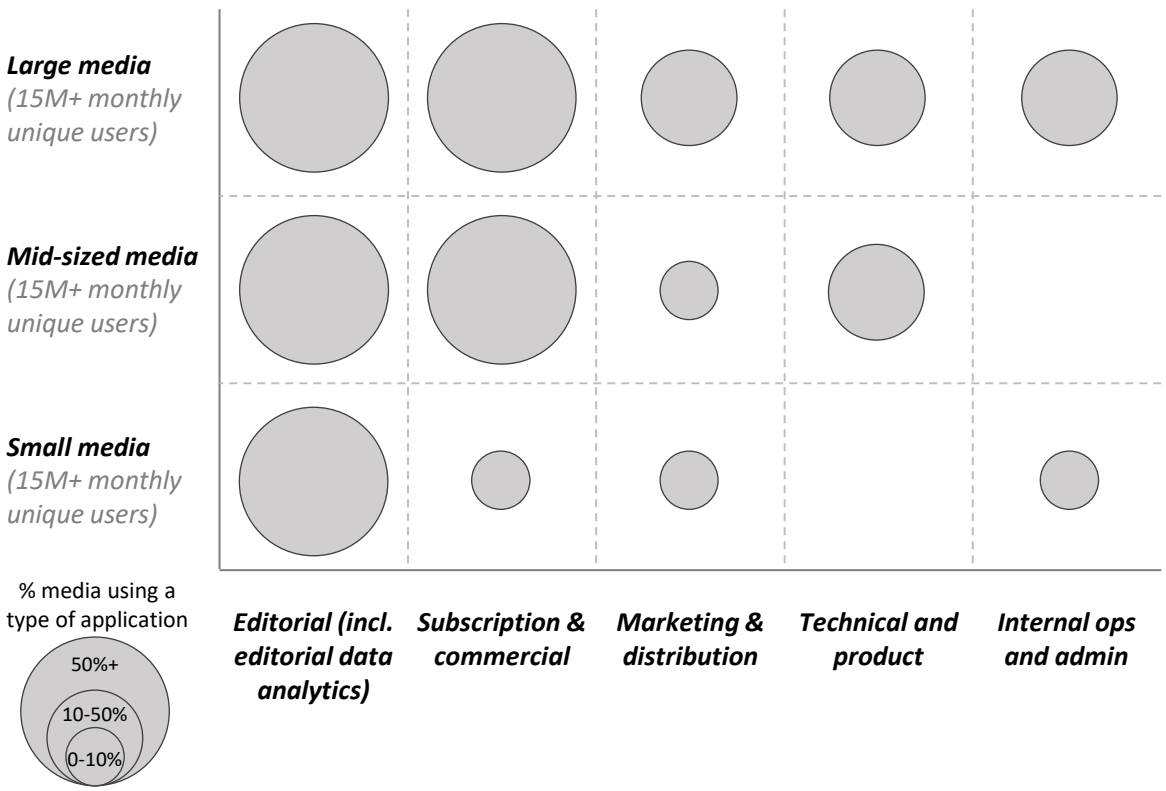
"Innovation in media is always coming from the money side," notes Konstantins Kuzikovs, CEO of Delfi Latvia, which uses the Piano paywall solution with AI-powered churn prediction features.

In turn, many large Polish publishers (for example Rzeczpospolita, Gremi Media or Wprost) use the services of Deep BI, a Warsaw and New York-based firm.

Deep BI offers a bundle of product, including a dynamic paywall, user behaviour prediction, content evaluation and other features – all powered by AI/ML.

Exhibit 3

With scale come possibilities: Breakdown of AI/ML applications type of media



B Opportunities: from automated content to subscription management

Case study: An investigative start-up flourishes

Kyrgyzstan-based Kloop is known for its journalism investigations into corruption of Kyrgyz political elites and cases of electoral fraud on behalf of Kyrgyz state officials.

Despite the modest team size of 30 full time equivalent staff, Kloop uses several AI/ML technologies – including graph databases, embedding and image recognition. The main reason for their data savvy strategy is based on the previous experience using it by its team members.

These technologies enable the newsroom to find content insights. “Usually you need a cue from someone to start an investigation, but here you literally find stories inside the data,” says Kloop co-founder Rinat Tuhvatshin. Using this approach, the media discovered that the second-largest company was owned by a member of the parliamentary fuel committee.

There are four directions in which Kloop applies its AI/ML efforts.

Investigations – the team use internally built algorithms to analyse and cross-reference large amounts of open-source data (legal entities, public procurement, tax declarations) to locate abnormal patterns with corruption risks.

TV monitoring – Kloop records important TV channels’ broadcasts to process the recordings with image recognition tools and calculate coverage rates for pro-government and opposition politicians.

Election monitoring in real-time – Kloop developed a platform for its election monitors to enter violation reports. They were automatically wired to partner journalists and lawyers for examination. The platform processed the inputs and turned them into official appeals that a monitor could file in the polling station.

Reader feedback - The Kyrgyz Political Compass tests readers views, helping them determine which political party is the closest to their views.

Kloop’s approach has included an effective use of internships, using external resources for their own data collection needs. Internships can be a time-consuming task. “If you had 200 students to give each one a practical task, you would need 40 editors doing almost a full-time job”, explains Tuhvatshin.

Instead, Kloop assigned the interns to collect data for a set of interviews with local district governors and wire it back to the data management system. “In this way we were able to get interesting journalism material and provide tasks for 200 students and it took only one programmer to run it”.

B Past the first knowledge barrier, AI becomes surprisingly accessible

Early AI advocates

Across our interviews, media outlets reported that the use of AI/ML solutions was often driven by one advocate or early adopter in the newsroom, who was able to drive through the rationale and understanding of the importance.

OCCRP's chief technologist in the mid-2010s was Smári McCarthy, known for his involvement in pioneering tech and civic initiatives[11]. Kyrgyz investigative media Kloop's future CTO Rinat Tuhvatshin was inspired by a conference talk.

They championed new solutions when their organisation's vision or strategy was discussed and acted as translators between the technical and editorial areas. This set the foundation upon which a lot of media AI/ML is built.

"It's key that there's always someone on the receiver end that understands how to use our products."

- Cecilia Campbell, CMO of United Robots

Management buy-in

The single biggest challenge for media to adopt AI-powered solution explains Deep BI CEO Jaroslaw Gora, is finding people within newsroom leadership who understand the basic principles of their solution and can integrate it into their workflows.

This is the case for using third party solutions as well as in house development.

The strategy can't just be "we need to use AI," emphasises United Robots' Cecilia Campbell. Senior managers need to understand what problem they are trying to solve and the basics of how it will be solved.

"We work in very close collaboration with the publisher. Our company's roots are in media, and we understand our clients' business – one of our key USPs is this partnership we have with the publisher. In order to really leverage news automation, you need to have a clear strategy for how you use it. Buy-in from top management is key for successful deployment," explains Campbell.

C Product and agile thinking

Media that succeed in using AI/ML are often those where product is central to the way of thinking across the firm, continuously built and delivered via short, incremental sprints to avoid long resource commitments and providing chances to course correct quickly.

This means embracing agile principles[12] putting the user of a solution first, working in cross-functional teams, and using bridge roles to connect different parts of the organisation.

"We always start from the user," says Onet.pl's Cyrek. "Whatever raises time on site, frequency of return – anything for a sweet and smooth UX."

In a digital era, a user-centric approach means becoming more data-driven, which can be a challenge for legacy players.

The importance of product-thinking and use of data is being increasingly recognised by media[13].

Peru's El Comercio newspaper, founded in 1829, moved to a digital-first model last year, explains Horacio J. Puga Nogués, the group´s CTO.

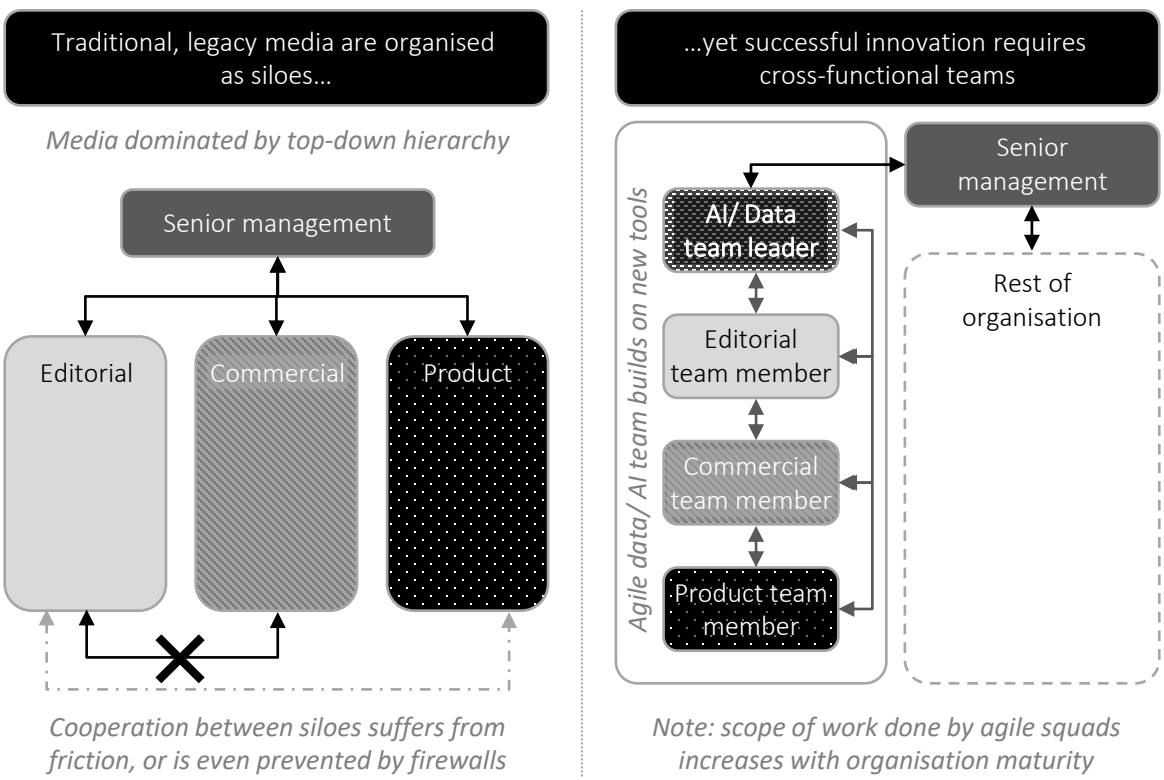
"We see newsrooms need to start using data as an input on a day-to-day basis. It's all about generating a data culture in the newsroom," Puga notes.

Cross functional roles

User experience in product design requires cross-functional ways of working. Products need to be designed by cross-functional teams so that they meet all requirements and use all the insights.

Exhibit 4

Cross-functional organisations are best placed to implement innovative technologies[13]



C Product and agile thinking

"Technical aspects are not the hard things, it's always the culture. Everybody needs to be involved," notes Erik Van Heeswijk, CEO of AI-driven editorial analytics firm Smartocto.

But the situation is changing, Van Heeswijk explains. The balance of power is shifting and corporate, product and data have a greater voice when it comes to decisions – both what to work on, and how to work.

"The most successful media I know of in using technology are those with a very strong technology department that is not troubleshooting problems but runs the whole process – defining when content is created, when it's published, how it's improved," notes David Llorente, CEO of Narrativa, an NLG solution provider headquartered in Los Angeles in the US.

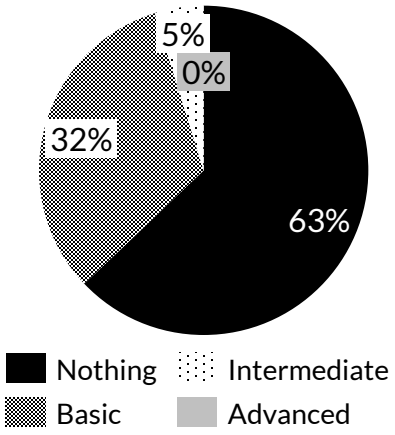
A key role in digital transformations are those which facilitate understanding across departments. Given the generally low level of editorial teams' knowledge of data and AI journalists need help to actually make use of data.

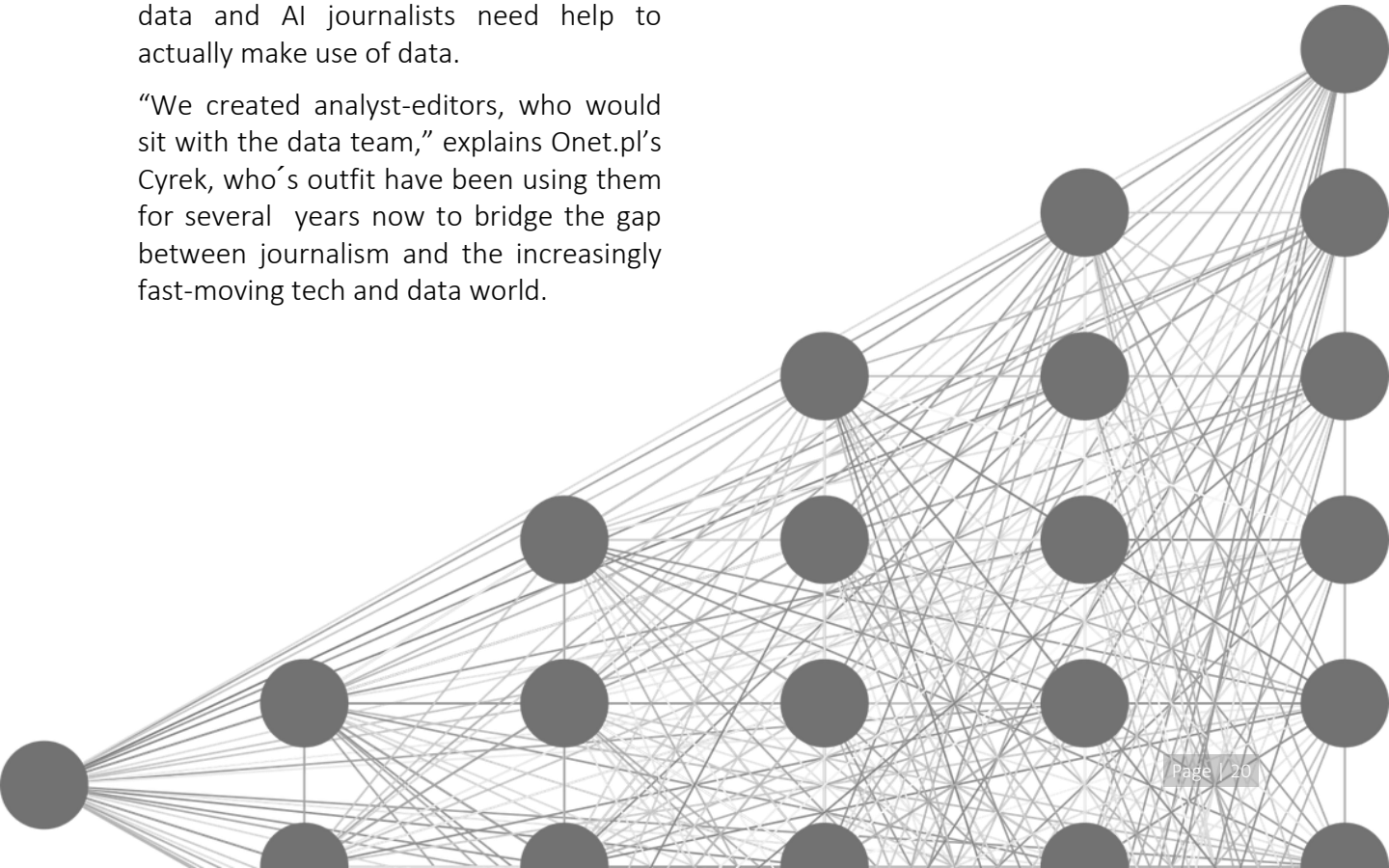
"We created analyst-editors, who would sit with the data team," explains Onet.pl's Cyrek, who´s outfit have been using them for several years now to bridge the gap between journalism and the increasingly fast-moving tech and data world.

Exhibit 5

"How would you rate your editorial team's knowledge of AI"?

Responses to survey question (n=42)





D Finding talent

Our data found 59% of LatAm managers and 62% in CEE said finding qualified candidates was their biggest challenge.

The economy-wide digital transformation has put a premium on already in-demand roles like data scientists or product managers with AI/ML experience[14].

Media need to ensure these data and product people can effectively collaborate with editorial or commercial teams with limited technical literacy. Moreover, they need to keep them engaged and ready to turn down prospective head-hunters looking to lure them away.

"The biggest issue is what can a media organisation afford. The industry is under stress," notes Mohamed Nanabhay, Deputy CEO of the Media Development Investment Fund (MDIF), which invests in media across many emerging markets.

Because media have been unable to grow their own talent – research and development budgets are virtually unheard of, argues Nanabhay – they have to poach them from other industries.

There is high demand for this talent, especially post-pandemic when most businesses see digital presence and product quality as make or break.

The rising cost of specialists is prohibitive. Asked if they are hiring digital specialists, Russian media managers often "prefer to hire three journalists and do the same work manually," explains Olga Dobyvsh, a lecturer at the University of Helsinki specializing on the Russian market.

The result is that media need to appeal to people's sense of mission (i.e., working to support democratic values), or their desire to work for a known brand and have people see the result of their work – one of the few remaining competitive advantages available to media companies.

"There are people who look for tech jobs, but are mission driven too. People who work with open data, while they could work for Google," according to Nanabhay.

Advanced AI/ML talent is already rare in many smaller emerging markets[15]. Meanwhile, big tech is actively poaching anyone with related skills[16], raising prices.

"These data profiles are very expensive, especially in a time when we are fighting for survival," says Sebastian Rivas, Audiences General Editor at La Tercera newspaper in Chile.

Mexico's Verificado team has been successful in attracting young tech-savvy journalists to their ranks, but still finds it hard to pay for full-time data scientists.

D Finding talent

Retaining talent

"The challenge is not to find it but to retain the technological talent.", says Gastón Roitberg, Digital Assistant Managing Editor at La Nación newspaper in Argentina. "A news organisation is not something that ends up being entirely cool to work with," he explains.

It's not just the "cool factor", though this also plays a role. Young talented specialists will not stay in places they are not taken seriously.

"It's important to build the right culture," says Linden from the University of Bergen. "There is an issue of lack of respect for non-journalists."

However, this is changing – "earlier people might ignore the pink-haired digital person in the corner, but the rise of social media and understanding of tech has changed the situation," explains Charlie Beckett of the LSE's Polis Journalism AI project.

In Mexico, investigative media Verificado has been successful in attracting young tech-savvy journalists to their ranks, but still finds it hard to pay for full-time data scientists.

Diego Vallejo, Chief Digital Officer from El Tiempo newspaper in Colombia explains they had to adapt to an average turnover of 40% and a maximum duration of two years for tech specialists by creating "new structures with high and fast pay raises."

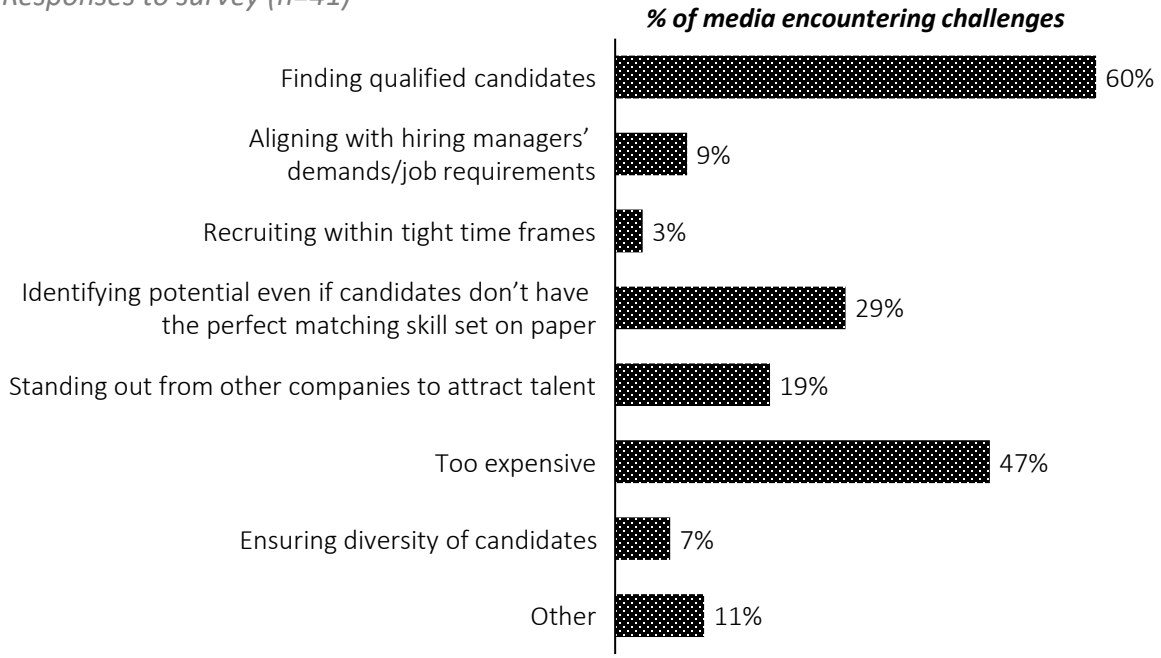
Even if pay and stature can be mostly replicated by media, many technology companies offer a wide complexity of tasks and opportunities to learn the most advanced skills: opportunities which are rarer among news publishers.

"An unexpected problem to attract and retain top data and digital talent is that the challenges are too small," Linden explains. "The [digital specialists] get bored".

Exhibit 6

Talent is a top priority for media managers seeking to use AI

Responses to survey (n=41)



E Collaboration in multiple formats

To leverage the potential of AI/ML, media will need to embrace many forms of collaboration: between human and robot, collaboration between teams or departments within a media house, working with third party solution providers and collaboration with external stakeholders like business or academia.

“The intersection of tech and humans is very important. Elysium, an automated content generator, now has three Indian languages and each of them has 5 editors to say which story is interesting and which not,” says North Base’s Vucinic.

The challenge for managers is not so much making sure they “retain control” over the robots but rather making sure that the robots are integrated into work processes in an effective manner.

“You need to make AI work for you,” says Christopher Brennan, editor in chief of Deepnews AI, which scores content quality. Every media has their own goals and definitions, he notes, adding that “AI needs to be adjusted to these.”

Promise of third party solution providers

Individual media often lack people, data, and funding to develop in-house AI/ML tools. But a growing range of third party solution providers is stepping in.

“It doesn’t make sense to try to develop something by ourselves,” says Kuzikovs of Delfi.lv. “Especially when there are so many simple solutions out there.

The Riga-based publication uses externally developed AI/ML solutions to manage subscriptions (via Piano), to automate social media posts (via Echobox) and to turn texts into speech indistinguishable from human one (albeit it only in Russian; Latvian is too small to build solutions of similar quality).

Semana magazine in Colombia is making the switch to external providers a core part of its strategy, explains Chief Digital Officer Victor Estrugo Rottenstein.

“I want to change from internal to external development, consolidating suppliers in a single ecosystem,” he notes. “If there is already someone who did it well, let's use it.”

“It doesn’t make sense to try to develop something by ourselves. Especially when there are so many simple solutions out there.”

- Konstantins Kuzikovs, CEO of Delfi Latvia

Based in Sweden, United Robots offers “content as a service” to small and medium-sized media. Using NLG and AI, the firm allows even small teams to generate large amounts of automated content using public data.

“With the economic downturn, newsroom resources have been further stretched driving managers to test out innovative ways to both generate new revenue and lower costs,” says Cecilia Campbell, CMO at United Robots.

“They need to look at new opportunities, things they wouldn't have even considered before. Because either these automated solutions simply didn’t exist, or because the culture in the newsroom has been slow to innovate,” Campbell adds.

E Collaboration in multiple formats

Publishers using automated content have been able to fill the gaps in verticals like sports or real estate coverage[17]. This allows stretched local media to deliver real value to audiences and prevents the formation of news deserts.

Argentinean news website Infobae boosted automated content production tenfold since 2019, expanding to 15 verticals without increasing headcount.

But the impact goes beyond traffic or reach – editors and reporters are freed up to focus all their efforts on producing high value content or creatively enriching automated copy in a hybrid model.

Opportunities on the commercial side are arguably even more promising – at least in terms of bottom-line impact. Drawing inspiration from e-commerce, open-source subscription management platform REMP2030 helps publishers dynamically segment audiences, creating tailored offers and campaigns.

"E-shops study the behavior of customers on their websites and take further actions, so if the customer browsed shoes, you send them more information on shoes," explains Matej Borko, a Fatchilli developer working on REMP2030.

The Bratislava-based subscription-service offers similar capabilities to media. They can segment users based on which content they picked, how long they read it… The team is currently working on taking this solution to the next level, Borko explained, by creating personalised ads that increase the value of media for marketing agencies.

Users consume a package – the product, the way it is delivered, and the content itself – meaning that the work to create it should also be aligned.

Media City Bergen

Clustered around Bergen in Western Norway, the Media City Bergen project brings together academic, tech companies, publishers and investors in the goal of driving innovation – especially that centred on AI/ML – in the media sector.

It gathers over 100 media-related organisations, ranging from public broadcaster NRK or media holding Schibsted, to graphic design solution provider Vizrt.

Because the Norwegian market is small, media companies need to compete globally, explains Kristoffer Hammer, an advisor and organizer at the project.

"People are ready to share insights, learn from each other at almost 150 open events a year, lots of consulting and mentoring," Hammer explains.

The goal is to share insights, launch joint projects and generate new sources of funding. Every other day someone is explaining how to solve a problem or build something new.

Media City Bergen is also actively sharing learnings and approaches more broadly – most recently with the Cardiff-based Clwstwr[18].

Importantly, media firms themselves play a major role in supporting and driving the project (which has also received government funding.

"There is a wide recognition that collaboration here works," Hammer sums it up.

E Collaboration in multiple formats

Role of technology hubs

There has been a rise of technology clusters and parks over the past decade, such projects as Media City Bergen or Technopuc in Brazil.

"How do you connect tech startups to the media? When a university that has a dynamic journalism and technical department and local traditional/ digital media are working together, this can be extremely effective," says James Breiner, a lecturer at the University of Navarra.

"Publishers in Latin American are starting to recognize the power of collaboration over competition," he explains.

A density of talent working across sectors has transformed more than one industry for the better from financial services to energy – its time to apply the same logic to media.

The Brazilian "sandbox experiment"

Nestled in Porto Alegre, the birthplace of great writers in southern Brazil, in 2003 the Catholic University of Rio Grande do Sul planted a golden tech tree called Technopuc. It has flourished into a leading global science and technology parks, bringing together a unique mix of giants like HP and Microsoft together with Brazilian start-ups.

In 2011, they brought news media into the fold given their unique role in filtering data, and soon after Brazil's largest media company, Globo, joined them.

How do you convince small media to get into this? What do you do with legacy media? How do you transform them or connect them with startups? These are the thorny questions that Techopur's research laboratory UBILAB has begun looking at, analysing how mobile internet, sensors and new hardware impact the way we get informed and socialize.

"The broader concept of AI and media is to have information flows and to filter this information. AI can be used to process this information. The main goal of the lab is to put journalism in this front seat," says Eduardo Campos Pellanda, Director of UBILAB.

Using cross-disciplinary research on AI with specialists from various fields, including fintech and media, Pellanda explains how they have worked hard to build "a bridge between curators as a sandbox for experiments".

As an advisory board member of WAN-IFRA's Global Alliance for Media Innovation, Pellanda is adamant that media of all shapes and sizes can benefit from the catalytic effect of AI.

"There are lots of tech parks, accelerators, incubators in the world and both big and small media companies should be attached to them. The same solution can be applied to a small media company and a fintech. The creative environment can be catalytic for all media".

8. LatAm: The New Frontier – Artificial Intelligence, Audience and Data

Covid 19 hits hard: Turnaround time for media in Latin America

The Latin American region is readying itself for the catalytic powers of AI, but the media sector lacks basic knowledge of the capabilities needed and the promises of creating an AI-savvy newsroom.

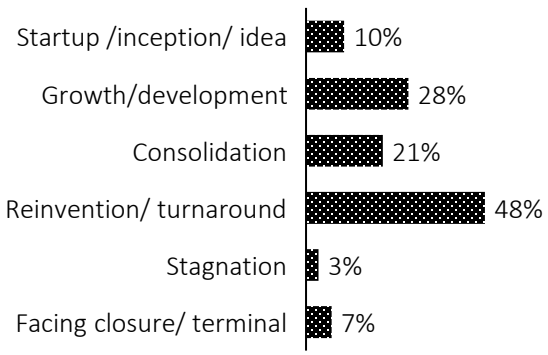
Across the region, 48% of surveyed media believed they were in the "reinvention" phase of the life cycle. Newsrooms were eager to incorporate technology that can be transformational for their businesses. Many legacy news media are moving to digital-first, especially after the COVID pandemic affected sales for print[19]. Digital start-ups are looking to join forces with them to find new solutions.

At the center of these efforts, we discovered a clear common denominator – a strategic push to find more effective ways to engage with readers and new ways to collect and analyse data, both on reader insights as well as public and private datasets[20]. The business model of print advertising is gradually shifting to diversified user-based reader revenue and digital advertising models .

Exhibit 7

"What lifecycle phase best describes your organisation?"

Responses to survey question (n=29) multiple options accepted



Peru: How to catch up in the product race?

El Comercio newspaper has used AI in advertising and reader revenue monetisation strategies.

It has focused on using leadership to set a vision of becoming a digital first company.

The results make a solid case, as they saw a 10% increase in ad revenue after the implementation of an AI algorithm to boost their returns per thousand views.

Their key question is whether to build in house or use third party solutions.

Chief Technology Officer Horacio J. Pugo Nogués explained how the biggest struggle for the media sector was to "buy or build".

"The reality is that as media we do not have the capacity to both generate and develop solutions. We chose to outsource solutions that aren't our core because we cannot sustain this product evolution."

The focus for them is on business models and reader revenue.

"It is important for the publisher to know their audience and seek the data to attract more readers to our publications."

The New Frontier – Artificial Intelligence, Audience and Data

Exhibit 8

Key solutions used by Latin American news media

Subscriptions

Subscriptions are the priority for LatAm media. But most prioritise direct results over potentially complex and pricy in-house solutions. Hence, they opt to use third party solutions like Piano to manage subscriptions or content recommendation.

El Tiempo newspaper is a clear example of exploration into how algorithms can drive subscriptions. A recent initiative using machine learning improved conversions for the print paper by 80% and 2x for the digital edition. They are not the norm across the region.

Content recommendation

Content recommendation is also a top solution being used with mixed results. Out-of-the-box solutions don't rank highly, largely due to limitations around the Spanish and Portuguese languages (notably including the frequent use of local jargon).

La Nación newspaper implemented a solution that allows topic selection for new subscribers. They use that information to recommend stories in automated areas in the homepage and at the footer of their news articles. These personalisation areas are fast becoming a trend across Latin America with many publishers exploring it.

Automated content production

Human-made templates are used to produce automated stories based on structured data. Local communities receive sport results, weather stories, COVID-19 updates and other stories (they can also be SEO optimised).

Automated content use by La Nación in Argentina, Globo TV in Brazil and others is promising.

InfoBae from Argentina has used it to scale across markets from Argentina to Colombia and Mexico.

Automated data processing

Advancements in automated data processing are starting to impact news reporting. From image recognition software to processing large datasets, newsrooms are using machine learning to explore the possibilities of big data.

"We have used small, medium and large-scale data processing under a project called 'Synapse'. We can link databases to detect matches in an automated way for names, companies, telephones, etc", says Tania L. Montalvo, Executive Editor at Animal Político in México

Big data and data for user needs

Media managers from newsrooms in emerging markets are starting to see the need to reorganise their organisational strategies around user needs and to do this efficiently they need to improve their data analytics.

So the headline here is using data for user needs. From markets in Argentina, Colombia and Mexico, the core technologies being implemented are targeting, subscription services, personalisation and content automation.

While publishers are starting to invest more in subscription tools, less is being budgeted for data analytics and distribution.

Other AI uses we found in our research include content consumption analysis throughout the subscription funnel and homepage widget personalisation.

Once subscribed, the focus is on retention. The process is tightened together using automation techniques, such as email automation for onboarding and retention of current subscribers, analysis of content consumption throughout the subscription period, widget personalisation on the homepage and related stories to increase the perceived value of the content and other marketing techniques such as retargeting.

Ana Laura Perez, Digital Product Manager, El País, Uruguay said: "There is still a huge gulf between the possibilities that exist in the use of technologies (AI / ML) and what is being done in the newsrooms.

If writers, editors and managers knew how to start incorporating them, it facilitates the quality of the work, it would completely change the final product and the need to invest in these types of tools would become more evident".

Exhibit 9

What is the breakdown of your budget? *Number of media within bracket (n=17)*

	% of budget allocated				
Department	**0-5%**	**5-25%**	**25-50%**	**50-75%**	**+75%**
Editorial	0	5	6	5	1
General management	8	7	2	0	0
Human Resources	11	4	0	0	0
Data and analytics	10	4	0	1	0
Tech & equipment	6	3	5	0	0
Distribution	6	4	1	0	0
Marketing & promo	10	5	0	0	0
Commercial and sales	4	7	3	0	0
Subscription	6	6	1	0	0
Other	6	0	1	0	0

Creating the Culture

While AI knowledge and usage remains limited in the region, media managers and journalists expressed willingness to learn. Asked about the possibility of receiving help on the subject, 70% opted for free consulting or trainings on use cases. However little progress had been made at the organisational level to implement AI systems across departments in media houses. Training and support on AI knowledge for the editorial side of the newsroom was limited.

Creating a culture may also be influenced at a macro level through public sector investment. Our research indicated that the leading media organisations embracing AI or machine learning come from countries with new and/or revised public AI strategies. Over the last five years, in South America and the Andes, both Argentina and Colombia developed AI strategies to build and integrate public data as part of wider efforts to boost technology penetration[21].

Governments in both countries have been working to build public open data resources in key sectors that are the backbone of their AI strategy and link up with efforts to increase technology penetration in both countries.

Innovative research spaces that connect academia, technology sectors and media, such as Brazil's Techopuc park in Porto Alegre, can play a part. New alliances inside newsrooms and with academia and technology are being forged.

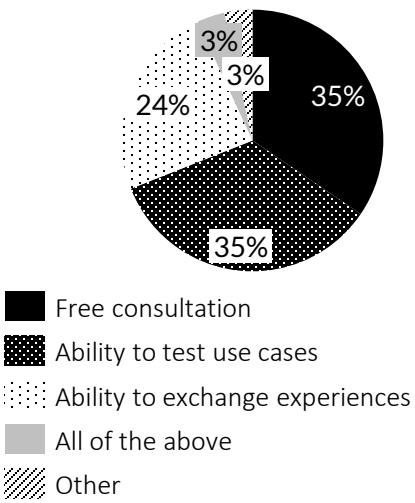
Investments for R&D and AI leadership

Both legacy and digital-first media interviewed often did not identify what they were doing as being part of transformational technologies, even though they use AI technologies. Almost every editor we talked to wanted to get a project started in the field, but they lacked the budgets and human resources to do so. On average, less than 5% of budgets were used in data and product lines (often close to 1%) and the

Exhibit 10

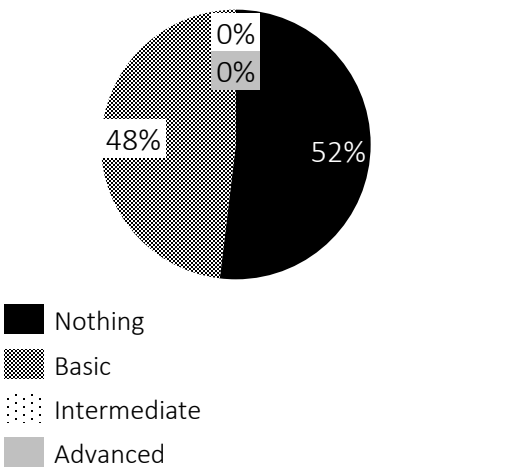
"What kind of support would you be interested in?"

Responses to survey question (n=29)



"How would you rate your editorial team's knowledge of AI"?

Responses to survey question (n=27)



Use of AI was perceived as cost intensive.

This lack of financial muscle was a real problem for media houses in Latin America. In fact, close to 70% of respondents did not have a full-time dedicated leader responsible for setting an AI strategy for their media.

Close to 70% of respondents (n=29) did not have a full-time dedicated leader responsible for setting an AI strategy for their media

New talent: A "wage war" with big tech

A lack of hirable resources and an ability to keep them for more than 12 months was a key challenge. Our research showed that Latin American e-commerce firms like Mercado Libre, global tech giants like Google, Amazon and Microsoft, and consulting firms like JP Morgan and Globant are hiring engineers right out of school.

Media can't compete. In Colombia, there is talent in the market, but the supply is low because of the high industry demand. "We're in a 'wage war' where large tech companies and financial conglomerates are winning," says David Rodríguez, Data Strategy Manager at El Tiempo newspaper.

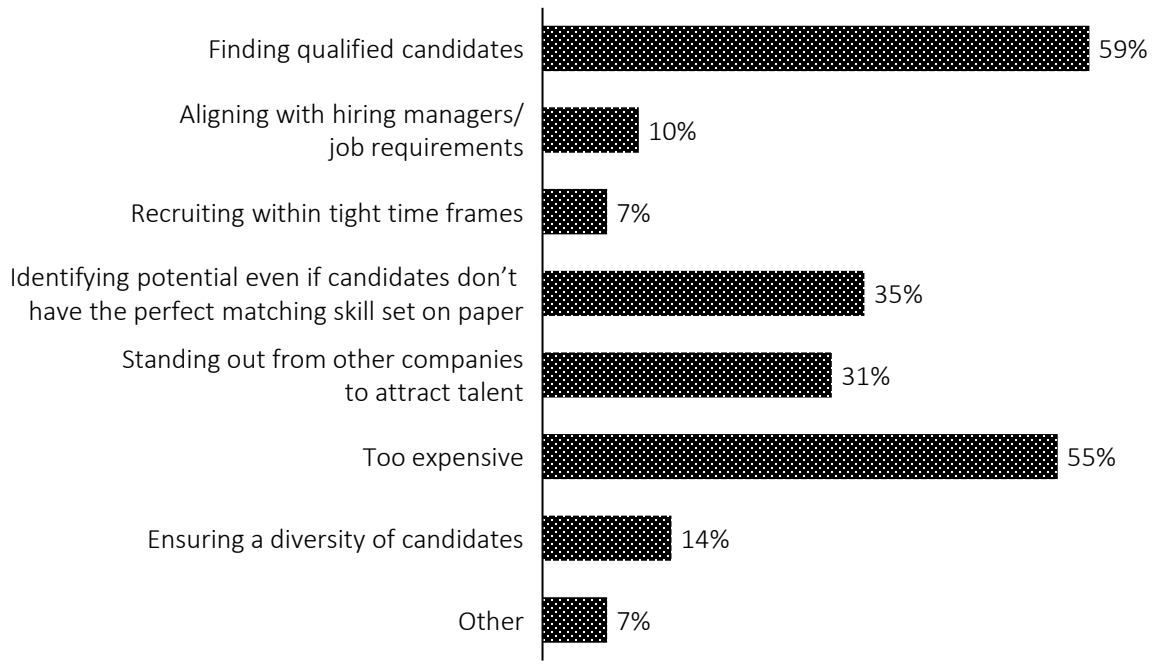
"In Peru, banks are increasingly pulling all the talent. Today it is difficult to find good people at affordable prices," says El Comercio's Puga.

"Either we bring junior people who we have to train or pay higher costs for more qualified staff to return because they like the work in a better environment. We simply are not in a position to create the right talent base to match the product needs."

Exhibit 11

What's the biggest challenge you face when hiring tech and data professionals?

"Select all that apply." Responses to survey question (n=29)



The demand for software engineers is so high that salaries skyrocketed years ago. Low salary offers and lack of exciting projects, makes news media a last resource for aspiring candidates. Of our respondents 59% said finding qualified candidates was an issue and 55% that they were too expensive.

How to keep young talent?

“A developer is going to want to dedicate himself to a 100% technology company, especially young people,” notes Erick Lopez Torres, EL Universal’s (Mexico) Head of Business Technology Strategy.

“It helps us a lot that everyone knows the brand, but we have found the case that young people arrived, and, in a year, they are moving to other types of companies.”

But research also shows that purpose-driven media like Verificado in Mexico and Cuestión Pública in Colombia, find it easier to recruit dedicated data specialists that support their cause.

"People love working with us, sometimes it is cheaper because what we are doing is seen as incredible and it contributes to society," details Claudia Baéz, co-founder and editor at Cuestión Pública.

“A developer is going to want to dedicate himself to a 100% technology company, especially young people.”

- Erick Lopez Torres, EL Universal Head of Business Technology Strategy

Exhibit 12

“If you had $50,000 to spend on AI/ML, what would you spend it on?”

Word cloud based on survey question responses (n=27)

“A developer is going to want to dedicate himself to a 100% technological company, especially young people,” notes Erick Lopez Torres, EL Universal’s (Mexico) Head of Business Technology Strategy. “It helps us a lot that everyone knows the brand, but we have found the case that young people arrived, and, in a year, they are moving to other types of companies.”

However, our research also shows that purpose-driven media, like Verificado, a fact-checking outfit in Mexico and Cuestion Publica, an investigative media outlet in Colombia, find it easier to recruit dedicated volunteers that support their cause.

"People love working with us, sometimes it is cheaper because what we are doing is seen as incredible and it contributes to society," details Claudia Baez, co-founder and editor at Cuestión Pública.

The lack of hirable resources and an ability to keep them for more than 12 months forces news organisations to rely on vendors and third-party solutions.

“It is cheaper to develop it outside than inside and these tools the more volume the more precise they are,” says Damien Osta Mattos from Uruguay’s La Diaria, “I think there is a way, but if you develop in-house, it will put you on a steep learning curve that never ends. If there is a service that is already tried and tests by others, we can jump on that (train).“

This is also the case for Semana magazine in Colombia, who embarked on a project to modernize the newsroom to become a data-driven organisation.”

"We are migrating to use external providers because everything was done in house", says Victor Estrugo Rottenstein, Chief Digital Officer at Semana.

"For it to be scalable and have an impact on the audience, automated content has to add actionable value beyond NLP and tables. I haven’t found a good provider that does this.

It must be something that generates good content. The tools that create content from tables look like they were made by a drunken monkey. And Google realises this.

> **““People love working with us, sometimes it is cheaper because what we are doing is seen as incredible and it contributes to society.”**
>
> ***- Claudia Baez, co-founder and editor, Cuestión Pública***

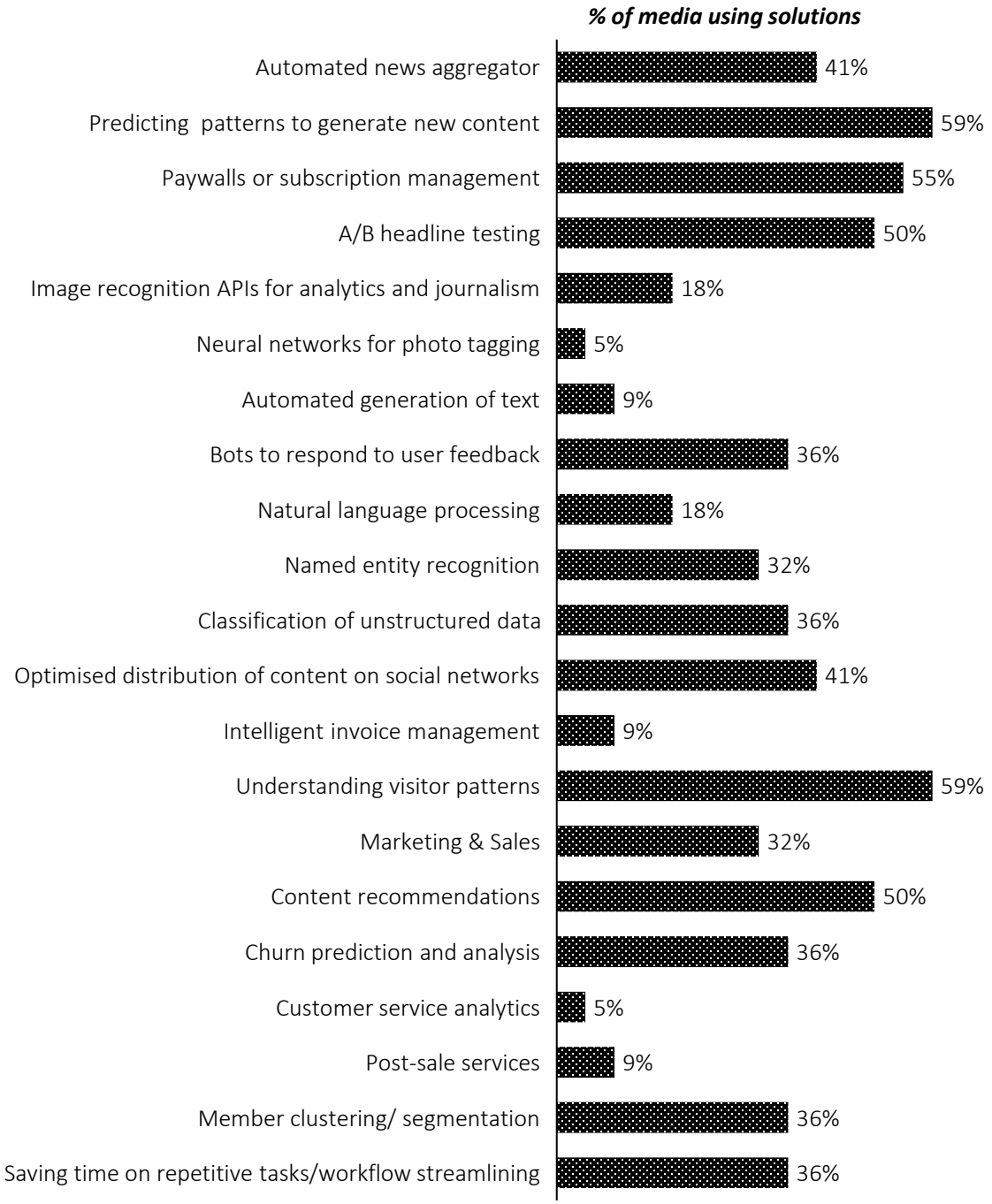
In English it works better, but in Spanish not yet as each country speaks differently in Latin America.“

Despite the drawbacks, the interest in automation is palpable and willingness to learn and implement solutions is there. With proper help, training and resources, the impact in the region could be transformative over the coming 3-5 years.

Exhibit 13

"What AI solutions has your media implemented (both internal and third party)?"

Responses to survey question, selecting all that apply (n=29)



8. Central and Eastern Europe: A new generation of digital champions emerging from illiberal foundations

From illiberal foundations, an emerging generation of digital champions

The former Eastern Bloc has strong academic traditions[22], particularly in engineering and mathematics (and a notable, unique gender balance[23]). This has created a solid foundation to grow computer science and AI-related fields[24].

However, the region fails to take full advantage of this comparative advantage due to a relatively low level of cooperation between media, business and academia[25].

The rise, or in some cases, persistence, of authoritarian and illiberal states is a second hurdle for media to overcome. An uncertain future means that media owners and managers are hesitant to invest in projects with longer time horizons or uncertain pay-offs.

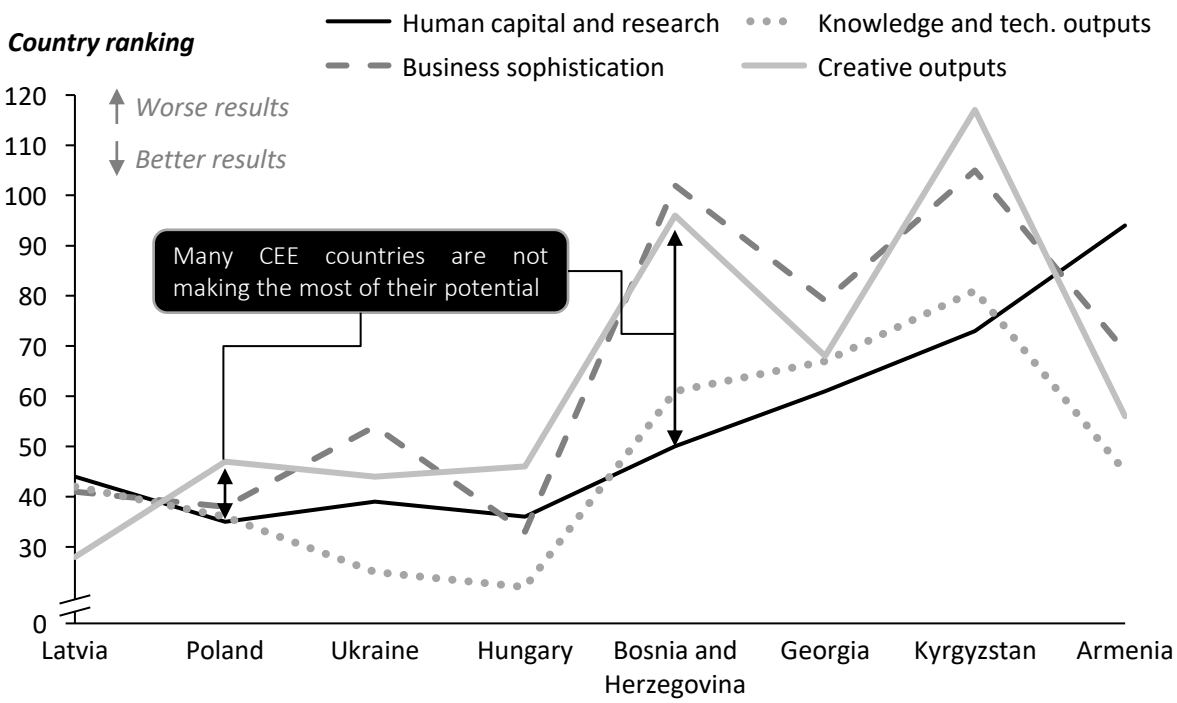
Nonetheless, the broader region has nurtured a set of media whose use of AI/ML is comparable with many better-resourced Western peers.

This is particularly true of the digital natives who are the most vibrant part of the sector. There are also a growing group of third-party solution providers producing world-class AI/ML tools for media.

Exhibit 14

Insufficient collaboration of business and academia is preventing CEE states from using strong human capital foundations to build vibrant creative and IP-driven industries

Country ranking in Global Innovation Index[26], selected dimensions



Human capital levels (e.g., education spend, number of graduates) are relatively strong across the region, which results in strong knowledge and technology outputs (e.g., patents, scientific papers). But the absence of innovation clusters (business-academia-finance), joint ventures and strategic alliances (i.e., business sophistication) is holding the region back, hampering the growth of creative industries, including media and intellectual property driven industries

From illiberal foundations, an emerging generation of digital champions

Exhibit 15

Key solutions used by Central and East European news media

Subscriptions

Subscriptions are increasingly important for CEE media as the region pivots toward reader revenue. Managing large numbers of paying subscribers can be very complex and time-consuming – making AI-powered solutions highly desirable.

Both Deep BI (based in Warsaw and New York) and REMP (based in Bratislava) 2030 provide there users – including many of the region's media with advanced subscription management solutions (e.g., churn prediction and personalised targeting)

Story generation

Multiple media based in CEE use graph databases to connect disparate data sets (mostly from public sources, but also enriched), to find suspicious activity or uncover cases of corruption that can be easily turned into new stories.

Kyrgyzstan's Kloop connects many of the country's public databases via an integrated graph database, allowing editors to uncover links (e.g., between officials ownership in companies and procurement contracts) that would have taken a human editor hundreds of hours.

Data processing

Data journalism is an increasingly popular format for analytical/ investigative stories, while audiences are keen on visualisations/ infographics. As a result, CEE publishers are looking to AI/ML to increasing data processing efficiency.

Texty in Ukraine has run several large AI-enhanced data stories. It's "Hot Disinfo from Russia" project provides a real-time dashboard of Russia-based disinformation. Meanwhile it's "Leprosy of the Land" used AI to analyse satellite images showing illegal amber extraction.

Social media recommendations

Social media is key source of traffic for most CEE publishers, but is both unstable due to frequent algorithm changes and time-consuming (need for relatively large teams covering multiple platforms during most of the day).

Delfi in Lativa uses Echobox, an AI-powered tool to support social media recommendations. The types of activities/ features covered includes optimizing reshares, suggesting hashtags and mentions, optimizing timing of posts and automating the overall workflow.

Media face uphill talent battle

As in other regions, CEE media face significant talent shortages, both on the editorial and especially the product and digital side. The situation is amplified by an academic sector in need of reform[27].

On the one hand, the region has large supplies of high-quality digital talent. Poland, Russia, and Ukraine regularly lead lists for developer performance along with many smaller CEE countries[28]. But on the other hand the booming business process and IT outsourcing sectors are making it hard for the media to attract staff (similarly as in LatAm).

"Media cannot compete with IT companies for talent on the market. On the other hand, the professional skills needed to work on data journalism projects are very specific. "Texty prefers the strategy of hiring young talent and investing resources in training them," explains Roman Kulchynsky of Texty in Ukraine, which uses AI/ML in their data journalism project.

The natural route, for many media, is reaching out directly to graduates. But universities and research institutions are not proving to be helpful partners.

"As employers, we can reach out to academic institutions to set up programs to collaborate. But there is not much interest on the other side," notes Michal Cyrek of Onet.pl in Poland (owned by Ringier-Axel Springer), which works with data teams in Switzerland and Germany to drive innovation.

University-industry research collaboration is the second worst indicator on Poland's global innovation index ranking[29]. Opening a business is first. But the problem is consistent across the region.

Many institutions have changed little from the communist era when research was under strict state oversight. This results in lost opportunities.

Meanwhile, projects like the joint "Product School" between Kyiv-based global media/ IT firm Genesis and the Kyiv School of Economics[30] are rare and still relatively small scale.

Hence, media digital know-how typically comes from self-learning or from having digital specialists among the founders. This ensures they have the necessary setup to be competitive from the start. Kyrgyzstan's Kloop and Bulgaria's Bird.bg are good examples.

Exhibit 16

"What lifecycle phase best describes your organisation?"

Responses to survey question, selecting all that apply (n=15)

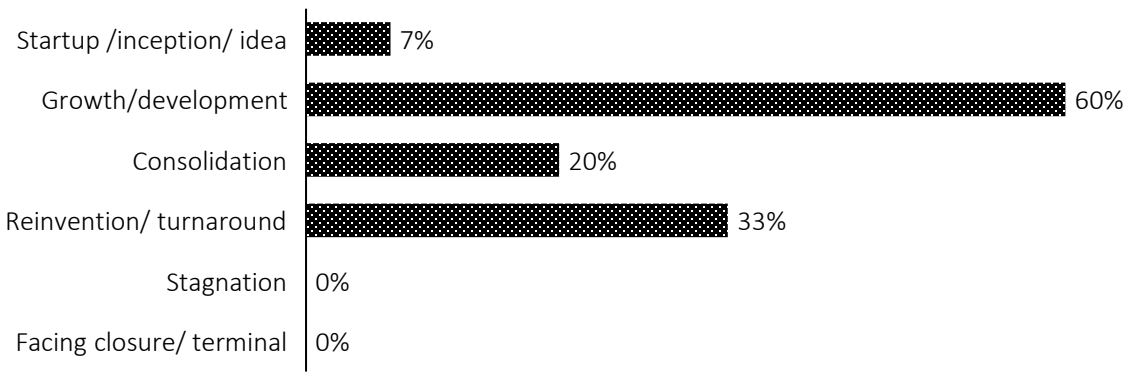


Exhibit 17

"What challenges do you encounter when hiring tech and data specialists?"

Responses to survey question, selecting all that apply (n=15)

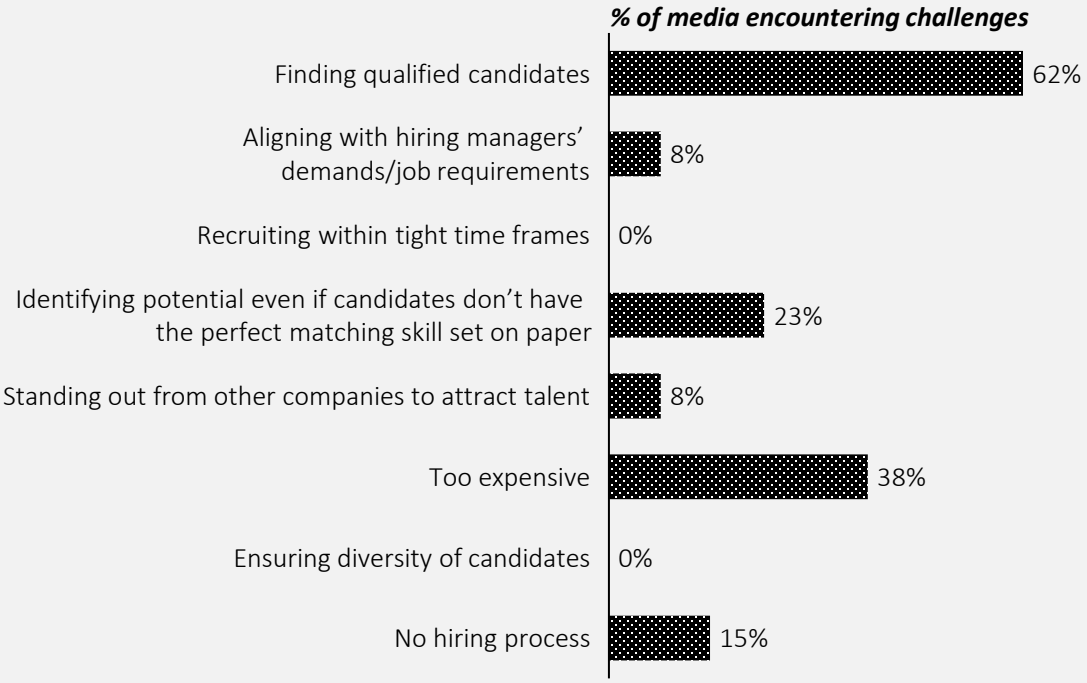


Exhibit 18

Compared to competitors, how would you rate your media in terms of tech skills and capabilities?

Responses to survey question (n=15)

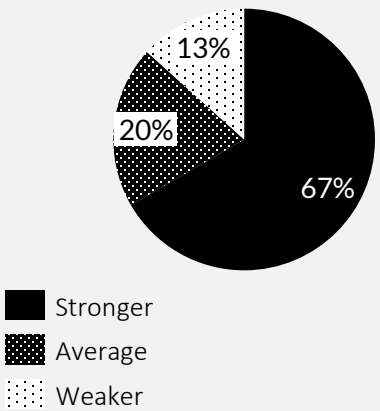
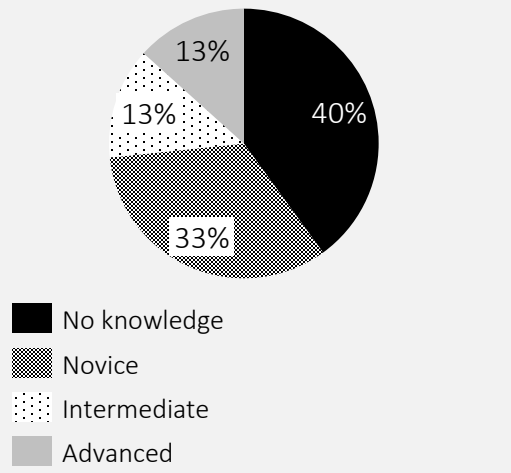


Exhibit 19

"How would you rate the knowledge of AI solutions of the newsroom?

Responses to survey question (n=15)



From illiberal foundations, an emerging generation of digital champions

Bulgaria's Bird.bg – building a media around AI/ML use cases

Investigative media Bird.bg was launched in 2019, mainly with the goal of using public data to identify cases of corruption – a major issue in the country.

Co-founded by Atanas Tchobanov, who holds a PhD in computational linguistics, the idea is based around the AI/ML use case of leveraging data to create stories – rather than the other way around.

Bird.bg is currently developing algorithms that will enable tracking new public procurements/ subsidies according to corruption risk factors.

New entries will be scraped from open sourced and fed into the algorithm for processing.

The algorithm will be based on a supervised learning neural network and be implemented with available solutions and libraries (TensorFlow, Keras).

Still, availability of data is an issue, especially for verticals like real estate (highlighting how important reliable and accessible datasets are for automated content production).

Security is also an issue for the young media organisation (Bulgaria ranks last in the European Union in terms of press freedom[31], mainly due to violence against journalists). Bird.bg is run via a France-based NGO DRJI (Data for Reporters, Journalists and Investigations).

Deep regional contrasts in terms of press freedom, digital environment

CEE is one of the world's most internally varied regions. This diversity has an impact on AI technology development.

There is no consensus on who to include and leave out[32], but common definitions include digital pioneer Estonia, wealthy and liberal Czechia, autocratic Belarus and impoverished Moldova. The former "Eastern Bloc" can go as far as Central Asia, which has strong social, historical and economic ties to "core CEE" states.

The broader region's media operate in very different environments (see exhibit 15, next page), in terms of general press freedom, the availability and quality of digital and e-governance infrastructure and the availability of public datasets.

There are large differences between states that support the rise of new technologies and their subsequent use by media, and those looking to restrict, control or manipulate such technologies.

The Baltic countries, as well as several Central European countries like Slovakia or Czechia, have vibrant ecosystems to promote AI as a government strategy[33], institutionalizing cooperation between the state, industry and academia to promote AI solutions in private and public sectors. Latvia, for example, advocates for integration of AI themes in the general education system of all levels[34]. These countries also have relatively high levels of press freedom – creating a conducive environment for media to develop AI/ML.

Other countries have relatively high levels of human capital and conducive policies (e.g., on availability of public data), but are weak on implementation and have lower levels of press freedom.

From illiberal foundations, an emerging generation of digital champions

Ukraine's new Development Strategy aims to embed AI technologies in every aspect of the country's development, notably education (to supply Ukrainian tech firms with necessary AI talent)[35]. But results are still underwhelming[36], as for many similar countries. Together with lower levels of press freedom, this creates a more challenging environment to develop and effectively use AI/ML solutions.

The CEE region also includes many deeply unfree or autocratic states. These include both countries with essentially no independent press to speak of (e.g., Turkmenistan, Azerbaijan) and countries where independent press exists but is heavily repressed and as a result struggles to develop new technologies. The latter includes Belarus and Russia, where media that where leaders in terms of AI/ML potential – notably Tut.by in Belarus and Russian market-focused Meduza – faced existential threats from authorities.

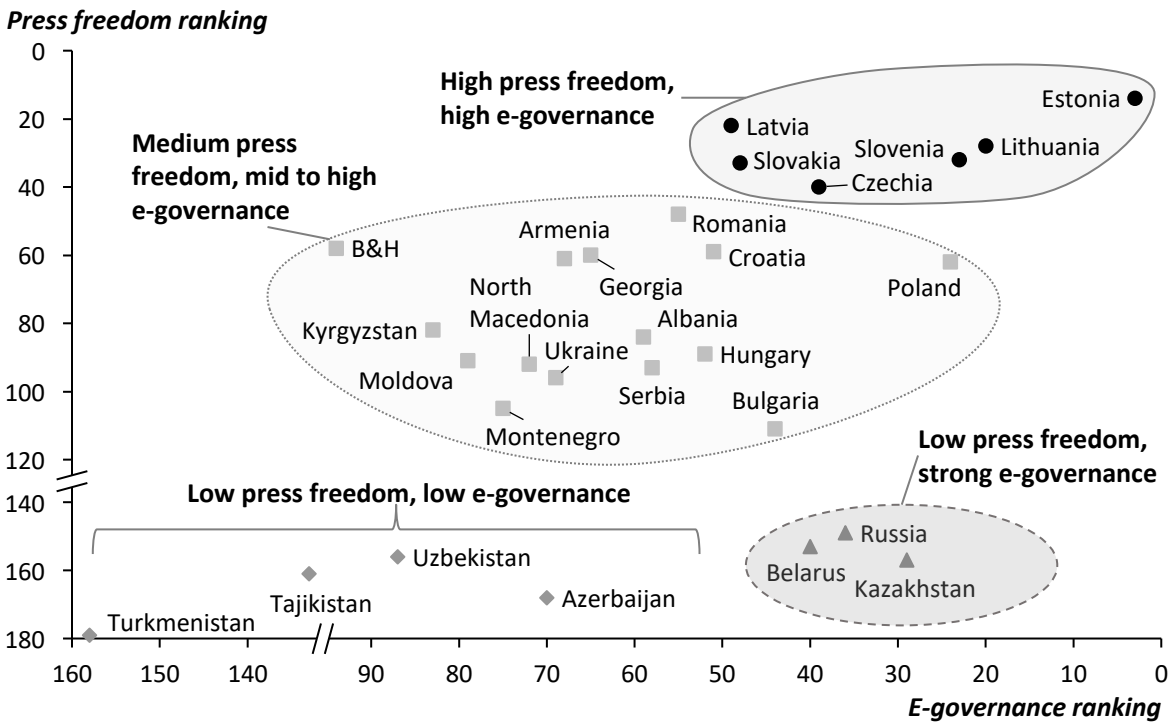
Launched in 2000 with the goal of creating the "Belarusian Yahoo", Tut.by is the biggest digital player in the country, reaching up to 65% of internet users[37]. In May 2021, however, the government arrested its leadership and blocked the site, putting their survival in question[38].

That same month Meduza (based in Riga but serving mainly Russian users), one of the region's biggest digital natives and a leading player in terms of AI/ML experimentation, was labelled a foreign agent – a potentially crippling blow to its business and operating model[39]. The law

Exhibit 20

Developing new technologies in very different environments

CEE and Central Asian countries ranked according to e-governance scores, press freedom[40]



CEE countries operate in varying environments. These can be grouped by levels of press freedom and e-governance – both categories impacting their ability to develop and use AI/ML solutions.

requires both editorial and advertising to be marked with large block letters saying the content came from a foreign agent (VTimes, an independent business publication was labelled a foreign agent shortly after Meduza and announced it would close in June 2021[41]).

In such environments, it is extremely difficult for media managers to maintain focus on developing new technologies and transforming their organisations – especially when the time horizons of such projects extend over multiple years.

Government-backed media like Russia Today are best positioned to develop and/ or use AI/ML tools, while independent media are harassed or face legal hurdles

- Olga Dovbysh, a lecturer at the University of Helsinki

Russia also stands out due to the scale of local tech players, the most important of which is Yandex – a Google, Uber and Amazon rolled into one. With over $3 billion in revenue in 2020 and more than 12,000 employees[42], it could easily play a role similar to Facebook or Google in the West (i.e., funding innovative media products, training staff who later bring know-how to the media sector), especially given that it already has an AI-powered, personalised newsfeed product.

Instead, Yandex has opted to work with the government, and there are tensions with the media community, explains Olga Dovbysh, a lecturer at the University of Helsinki. As a result, government-backed

Poland's web-giant Onet: "Our goal is the optimal user experience"

Launched in 1996, Onet.pl is one of Poland's biggest web portals, bought by Ringier Axel Springer in 2012.

It was one of the earliest media to start investing in digital solutions, a trend that has been further supported by the purchase. Indeed, cooperation with German, Swiss and US-based teams is a key competitive advantage for the media.

Onet has one of the broadest set of use cases of AI/ML among CEE media – only about 40% is editorial, the rest goes from internal workflow optimisation to removing ads people don't like – powered by some 20 people, a quarter of whom are data scientists.

Cyrek explains that Onet has an entrepreneurial but pragmatic approach to AI/ML – if a project is able to quickly generate value, they invest, if not, they close it down. The main consideration, aside from finances, is whether the it delivers an added benefit for audiences. "Algorithms are our unique selling point," he says.

"User experience has to be like 'honey'," explains Cyrek, who runs data projects at the player. "We do everything so that they spend more time, get more out of it," he adds.

"We started earlier than everyone else, and our system solves real problems," Cyrek notes.

Key findings: The power of hybrid collaboration

Playing globally: CEE AI/ML solution providers on the rise

Central and Eastern Europe boasts a growing number of international AI/ML players that are expanding their services in such areas as subscription and paywall management, automated data processing, editorial analytics and others.

The region has large supplies of digital talent and markets insulated from global players (complex languages, low willingness to pay that makes investment cases unattractive). These conditions have fostered the rise of local solution providers.

Warsaw and New York-based Deep BI, uses AI-powered analytics to optimize subscriptions – predicting churn, increasing life-time value of subscribers and developing personalised recommendations. While the solution provider still serves several local publishing houses, much of its growth has been abroad.

“Many CEE publishers are too small for advanced AI-powered services to make sense,” notes the CEO Jaroslaw Gora, explaining why the company has chosen to expand internationally, as well as to other industries (Deep BI also works with e-commerce and insurance, for example).

One of the Semantic Force dashboards

Ukraine-based Semantic Force works in 19 countries (including the US, Kazakhstan and Russia), aggregating data with the help of AI from social media, networks and other sources. They track fraud, fake news, or bot use, carry out audience analysis and fact-checking, providing these services on a subscription basis.

Vsevolod Gavrilyuk, the CEO, explains that social data monitoring will be increasingly important – not just for media but other companies, too. “Social customer care is important: if Dyson customers experience problems, they do not call Dyson. They ask questions on social platforms. SF detects support tickets, and identify the ones that brands need to respond to,” Gavrilyuk notes.

In turn, the REMP project based out of Bratislava, Slovakia, works as an open-source solution. Funded with the help of Google News Initiative grants, the platform offers best in class subscription management and reader engagement solutions (initially designed by the same people who created Piano, the biggest paywall management company). The latest version – REMP2030 – includes AI/ML powered elements inspired by the e-commerce industry.

media like Russia Today are best positioned to develop and/ or use AI/ML tools, while independent media are harassed or face legal hurdles.

Media operating in countries with higher press freedom and e-governance in particular have had an easier path both in terms of developing AI/ML tools and knowing how to effectively leverage third-party solutions.

Better availability of public datasets, stronger cooperation within technology clusters and greater access to human capital – combined with less oppressive states – supported innovation in media.

However, even within these groups, there was an apparent break between so-called digital natives and legacy media with print or broadcast platforms. A common feature of the digital natives was the presence of IT experts among founders, as well as an organisational structure and work culture that values digital and product departments.

This usually translated into a person in the newsroom to drive data projects from the start – like Texty's Deputy Chief Editor Anatoliy Bondarenko or Kloop's CTO Rinat Tuhvatshin – albeit primarily on the content side.

Such media were more likely to develop their own in-house solutions, particularly in such areas as data processing and analysis or content-related use cases (and are most likely to invest additional funds in these areas – see exhibit below)

Meanwhile, third-party solutions were used for subscription-related solutions, social media, or programmatic ads. Internal processes, operations or marketing/ sales were the least likely to be automated.

Exhibit 21

"If you had $50,000 to spend on AI/ML, what would you spend it on?"

Word cloud based on survey question responses

From illiberal foundations, an emerging generation of digital champions

Growing CEE third party solution providers

A feature of the CEE region in terms of innovation in media is the growing significance of local third-party solution providers with global potential and ambitions.

The list includes Deep BI from Poland, REMP from Slovakia, and Semantic Force from Ukraine, as well as several smaller players aiming to grow abroad.

The tradition goes back further, however. Piano – one of the biggest paywall solution providers was originally founded in Bratislava.

The combination of relatively abundant tech talent, a strong position of digital native media, and modestly sized markets on which to grow pushes local players to try their luck globally.

Importantly, complex and mostly small local languages limit possibilities to build content-based applications[43].

As a result, providers focus on AI/ML opportunities with global potential, such as subscription management or data processing.

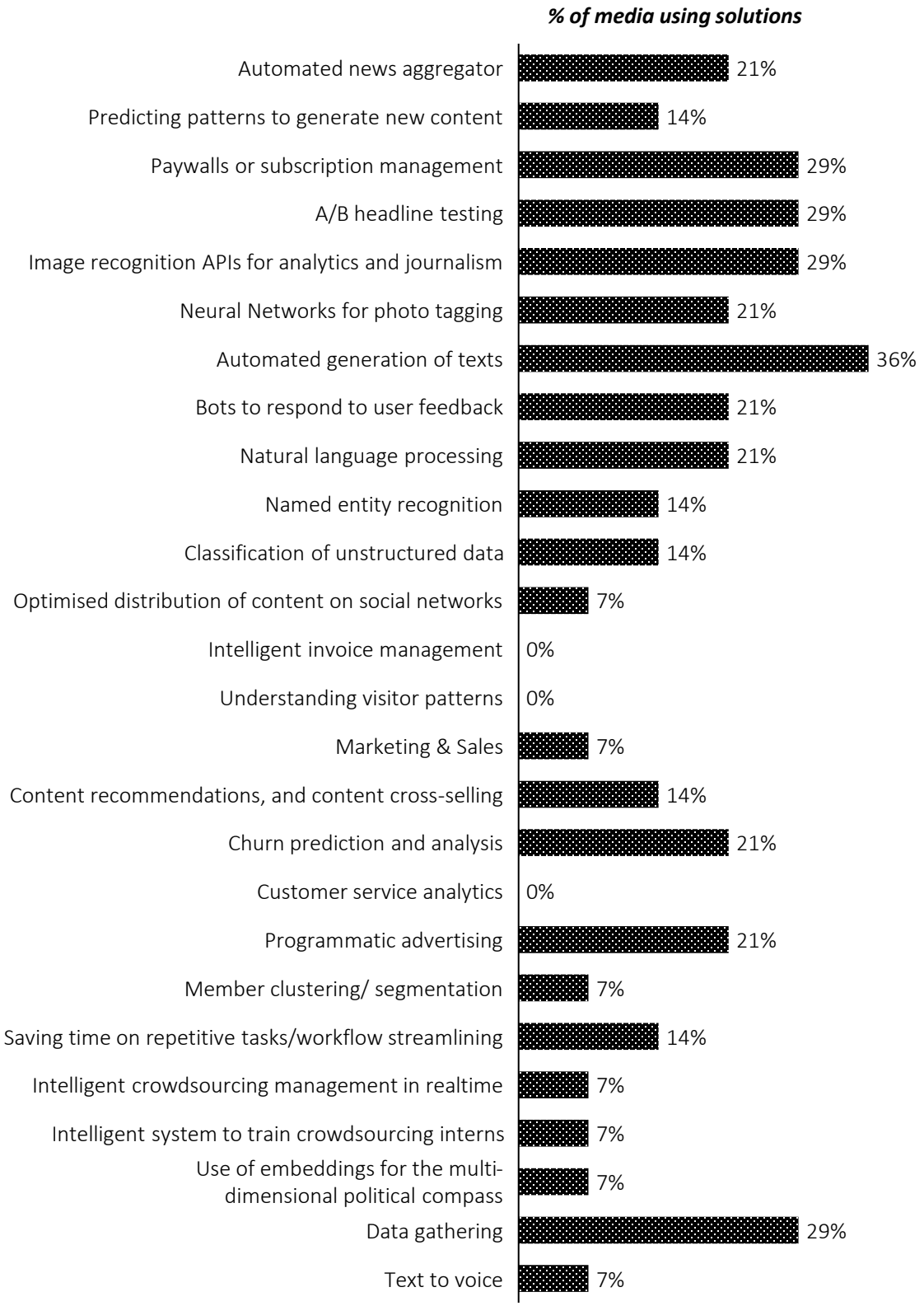
These players can fill an important gap when it comes to emerging markets globally, as many of the Western solutions have too high price points and are less well suited to the needs of developing country media.

Kyrgyzstan's Kloop is constantly looking to attract new talent, often working with and training students

From illiberal foundations, an emerging generation of digital champions

Exhibit 22

"What AI solutions has your media implemented (both internal and third party)?"
Responses to survey question, selecting all that apply (n=15)



10. Recommendations

Recommendations

New public-private partnerships as well as collaborations with AI research hubs can adopt a problem-solving approach to identify where AI, machine learning and data processing strategies (not tools) can best provide a catalytic push towards business development.

Partnerships can be a way to pool complementary resources, capabilities and knowledge that can foster new business models which align commercial and social interests aligned with relevant sustainable development goals.

Strategic implementation is key and collaborative partnerships are needed to move this forward, both within the media sector – from small to large and legacy to start-ups – and between the media sector and other industries.

International Media Support is exploring an opportunity to start this with LSE's Journalism AI research hub, including designing training for small and medium-sized newsrooms.

Deepen the understanding of global reach and growth for digital media in CEE to further nurture their potential.

More research is needed to identify and map how AI solutions can match the needs of small, media and large media in emerging markets.

Support and interventions should be targeted to identify what processes and challenges AI can address

Invest in creating public-private scalable data-sets that can be used by newsrooms in emerging markets based on quality, timeliness and accessibility (structure and legality).

Support long-term training and education programmes with media and research institutes from emerging markets to share best practices and test use cases with a focus on reaching and engaging new local audiences through data and editorial analytics and automated content.

Target support to narrow the growing skills gap, with a focus on developing competencies particularly around product development.

Link third-party solutions and start-ups across the media value chain with small-medium sized media from emerging markets by funding product development, trial pilot programmes and beta versions of AI/ML applications.

Develop and promote the creation of media technology parks that foster research and innovation by means of concerted actions that involve academia, legacy and digital first media, private companies and public entities.

11. Appendix I: Country Profiles

Country profile[a]: Poland

General country data	Population[b]	37.97 mln
	GDP/ Capita	$15,656
	Democracy Index[c]	50 (flawed democracy)
	Global Innovation Index	38/131
	Human Capital & Research	35
	Business Sophistication	38
	Knowledge & Tech Outputs	36
Media environ-ment	Press freedom ranking[d]	64/180
	Internet penetration[e]	81%
	Market overview[f]	Freedom of expression of independent media outlets is seriously undermined by the judicial system under government pressure. Poland's media are pluralistic and mostly privately owned. However, the public media and their governing bodies have been purged of independent voices since PiS came to power in 2015. State propaganda is mainly channelled through state-owned media, which does not tolerate opposition or neutrality.
Public sector	Govt online services	17
	AI/ML government strategy/ regulation	The Polish Government has a national AI strategy and roadmap (https://www.gov.pl/web/cyfryzacja/ai)
Research & academia	R&D Spending	1.32% of GDP
	Graduates (science & eng.)	22.90%
	Country description	Poland outperforms on PISA scores in reading, math and science and has a high level of publication of scientific and technical articles in peer-reviewed journals.
Market sophis-tication	Entrepreneurship/ start-up scene	In recent years Poland has grown its tech and startup reputation, and is now recognised as one of the most startup-friendly ecosystems across Europe and beyond
	AI/ML Innovation	Polish entrepreneurs have developed software that can search for and detect fake news, hate speech and violence across online platforms.
	Business sophistication	Despite a strong knowledge-intensive sector, Poland scores low in formal employer training and innovation linkages (especially industry-academia collaboration).

a Unless otherwise specified, all data is from the Global Innovation Index 2020 report; b World Bank c Economist Intelligence Unit; d Reporters Without Borders; e Data Portal; f Freedom House

Country profile: Ukraine

General country data	Population[b]	44.385 mln
	GDP/ Capita[b]	$3,726
	Democracy Index[c]	79
	Global Innovation Index	45/131
	Human Capital & Research	39
	Business Sophistication	54
	Knowledge & Tech Outputs	25
Media environ-ment	Press freedom ranking[d]	97/180
	Internet penetration[e]	67.6%
	Market overview[f]	Ukraine has a diversified media landscape and its authorities have adopted a number of reforms since the 2014 revolution, including a law on media ownership transparency. However, these gains are fragile, as the new independent public broadcaster's under-financing has shown. More is needed to loosen the oligarchs' tight grip on the media, encourage editorial independence and combat impunity for crimes against journalists.
Public sector	Govt online services	93
	AI/ML government strategy/ regulation	Ukraine's new Development Strategy aims to embed AI in all areas of development, incl. education to provide the Ukrainian tech companies with the AI talent.
Research & academia	R&D Spending	0.471 of GDP (2018)
	Graduates (science & eng.)	22.90%
	Country description	Industry-university collaboration is weak and prevents firms from acquiring the latest industrial advances. Universities perform weak R&D and innovation activities.
Market sophis-tication	Entrepreneurship/ start-up scene	Kyiv is ranked 32/100 startup cities. The country has experienced economic difficulties for several years but still manages to create scalable and global technology.
	AI/ML Innovation	Smart City Hub in Kyiv aims to start a discourse on digital rights of the people, to develop practical cases of use of AI, as well as automated decision-making
	Business sophistication	Ukraine scores above average for the lower middle-income group. But such areas as Business environment and Rule of Law are considered as weakness in GII report

a Unless otherwise specified, all data is from the Global Innovation Index 2020 report; b World Bank c Economist Intelligence Unit; d Reporters Without Borders; e Data Portal; f Freedom House

Country profile: Hungary

General country data	Population[b]	9,770 mln
	GDP/ Capita[b]	$15,899
	Democracy Index[c]	55
	Global Innovation Index	35/131
	Human Capital & Research	36
	Business Sophistication	33
	Knowledge & Tech Outputs	22
Media environ-ment	Press freedom ranking[d]	92/180
	Internet penetration[e]	83%
	Market overview[f]	The media "are increasingly dominated by pro-government outlets, which are frequently used to smear political opponents", it says.Fidesz-friendly business figures have supplanted foreign companies as investors in key media, says Reporters Without Borders. Online outlets are carrying investigative reporting of alleged corruption involving officials.
Public sector	Govt online services	58
	AI/ML government strategy/ regulation	Hungary developed Artificial Intelligence Strategy 2020-2030. The Hungarian AI Coalition was established in 2018 to create a community for all stakeholders
Research & academia	R&D Spending	1.555 of GDP (2018)
	Graduates (science & eng.)	50
	Country description	Industry-university collaboration is weak and prevents firms from acquiring the latest industrial advances. Universities perform weak R&D and innovation activities.
Market sophis-tication	Entrepreneurship/ start-up scene	An Artificial Intelligence Innovation Center will be established to encourage widespread use of related applications, and the National MI Lab will be involved in the research aimed at achieving this.
	AI/ML Innovation	National AI Laboratory created to serve as a coordinator for pursuing global research projects between research institutes, the market, the AI research scene
	Business sophistication	Hungary scores below average for its income group for Business Sophistication pillar, but the country displays strengths in High-tech imports and Research talent

a Unless otherwise specified, all data is from the Global Innovation Index 2020 report; b World Bank c Economist Intelligence Unit; d Reporters Without Borders; e Data Portal; f Freedom House

Country profile: Bosnia and Herzegovina

General country data	Population[b]	3.301 mln (2019)
	GDP/ Capita[b]	$6,031
	Democracy Index[c]	39/100
	Global Innovation Index	74/131
	Human Capital & Research	50
	Business Sophistication	102
	Knowledge & Tech Outputs	61
Media environ-ment	Press freedom ranking[d]	58/180
	Internet penetration[e]	83%
	Market overview[f]	In 2020, journalists in BiH continued to face interference to their work, including defamation lawsuits, verbal threats, and physical attacks. From January until August 2020 the BiH journalists' association, BH Novinari, documented 51 violations of media freedom. Defamation suits are regularly used to obstruct journalists' work and silence critics.
Public sector	Govt online services	114
	AI/ML government strategy/ regulation	
Research & academia	R&D Spending	0.199 of GDP (2018)
	Graduates (science & eng.)	61
	Country description	BiH demonstrates weakness in the indicator University/industry research collaboration (124)
Market sophis-tication	Entrepreneurship/ start-up scene	Accelerators, incubators etc. are appearing on the map; international initiative like the Swiss Entrepreneurship Program support the development of Bosnian startups
	AI/ML Innovation	na
	Business sophistication	na

a Unless otherwise specified, all data is from the Global Innovation Index 2020 report; b World Bank c Economist Intelligence Unit; d Reporters Without Borders; e Data Portal; f Freedom House

Country profile: Georgia

General country data	Population[b]	3.72 mln
	GDP/ Capita[b]	$4,278
	Democracy Index[c]	91/100
	Global Innovation Index	63/131
	Human Capital & Research	61
	Business Sophistication	79
	Knowledge & Tech Outputs	67
Media environ-ment	Press freedom ranking[d]	60/180
	Internet penetration[e]	68.9%
	Market overview[f]	"Georgia's media are pluralist but still very polarised. The reforms of recent years have brought improvements in media ownership transparency and satellite TV pluralism, but owners still often call the shots on editorial content.
Public sector	Govt online services	71
	AI/ML government strategy/ regulation	Georgia's Innovation and Technology Agency (GITA), part of the Ministry of Economy & Sustainable Development executes tech policies in the country
Research & academia	R&D Spending	0.305: Georgia is weak in Global R&D companies (42)
	Graduates (science & eng.)	40
	Country description	104: Georgia displays weakness in University/Industry collaboration
Market sophis-tication	Entrepreneurship/ start-up scene	Global Startup Foundation is the Premier Startup Launchpad in the region involving Israel's Silicon Wadi and Silicon Valley Tbilisi
	AI/ML Innovation	
	Business sophistication	Georgia scores below average in this pillar in Upper Middle Income economies. However, in the World Bank Doing Business 2020, Georgia ranks 7th

a Unless otherwise specified, all data is from the Global Innovation Index 2020 report; b World Bank c Economist Intelligence Unit; d Reporters Without Borders; e Data Portal; f Freedom House

Country profile: Latvia

General country data	Population[b]	1.88 mln
	GDP/ Capita[b]	$17,620
	Democracy Index[c]	38/100
	Global Innovation Index	36/131
	Human Capital & Research	44
	Business Sophistication	41
	Knowledge & Tech Outputs	42
Media environ-ment	Press freedom ranking[d]	22/180
	Internet penetration[e]	86%
	Market overview[f]	The news media landscape in Latvia is diverse, however, the diversity is decreasing. In 2019, the new owners shut down the newsroom of the oldest commercial TV channel LNT. Latvian Association of Journalists called it the worst media-related decision of the decade. Latvian authorities continued to pressure the Kremlin-controlled media by any available means that sometimes lacked explanation
Public sector	Govt online services	76
	AI/ML government strategy/ regulation	In 2020, Latvia released its national AI strategy on Developing Artificial Intelligence Solutions. Its goal is to promote the growth of AI in the whole economy.
Research & academia	R&D Spending	0.631 (2018)
	Graduates (science & eng.)	66
	Country description	Founded in 1992, the Artificial Intelligence Laboratory at IMCS, University of Latvia conducts research on natural language processing (NLP) and machine learning (ML)
Market sophis-tication	Entrepreneurship/ start-up scene	Latvia's current startup scene is abounds with numerous startup accelerators and incubators, and a pool of institutional support, business angels and other investors
	AI/ML Innovation	
	Business sophistication	

a Unless otherwise specified, all data is from the Global Innovation Index 2020 report; b World Bank c Economist Intelligence Unit; d Reporters Without Borders; e Data Portal; f Freedom House

Country profile: Kyrgyzstan

General country data	Population[b]	6.45 mln
	GDP/ Capita[b]	$1,173
	Democracy Index[c]	107 (Hybrid regime)
	Global Innovation Index	94/131
	Human Capital & Research	73
	Business Sophistication	105
	Knowledge & Tech Outputs	81
Media environ-ment	Press freedom ranking[d]	82/180
	Internet penetration[e]	50.4% in January 2021.
	Market overview[f]	Polarisation of Kyrgyz society is reflected both within the media themselves and in the environment for journalists. Although the crackdown on the media that preceded the 2017 presidential elections is long over, investigative journalism is still hesitant – hampered by difficulties in accessing information and subjected to a great deal of harassment
Public sector	Govt online services	84
	AI/ML government strategy/ regulation	IIn 2019, the Kyrgyz government adopted the "Digital Kyrgyzstan 2019-2023" strategy aimed at the following targets: Improving digital infrastructure and internet connectivity.
Research & academia	R&D Spending	0.107 (2017)
	Graduates (science & eng.)	67
	Country description	Kyrgyzstan's investment in RD is low, the number of graduates in science/engineering is not high. However, the tech industry remains a popular option for youth
Market sophis-tication	Entrepreneurship/ start-up scene	The Kyrgyz Republic's emerging ICT sector is poised to be a major economic driver to power modernisation. IT is one of the fastest growing industries
	AI/ML Innovation	
	Business sophistication	Even though business sophistication indicators ranks low (105) it is relatively easy to start a business in Kyrgyzstan.

a Unless otherwise specified, all data is from the Global Innovation Index 2020 report; b World Bank c Economist Intelligence Unit; d Reporters Without Borders; e Data Portal; f Freedom House

Country profile: Armenia

General country data	Population[b]	2.97 mln
	GDP/ Capita[b]	$4,267
	Democracy Index[c]	89 (Hybrid regime)
	Global Innovation Index	61 (/131
	Human Capital & Research	94
	Business Sophistication	69
	Knowledge & Tech Outputs	45
Media environ-ment	Press freedom ranking[d]	63/180
	Internet penetration[e]	68%
	Market overview[f]	Armenia's media is highly polarised. Journalistic independence and transparent media ownership are far from being achieved. There is concern about the volume of judicial proceedings against journalists excesses in the fight against fake news. The involvement of the security services in combating disinformation are alarming. However, investigative journalism is flourishing online.
Public sector	Govt online services	96
	AI/ML government strategy/ regulation	
Research & academia	R&D Spending	0.189 (2018)
	Graduates (science & eng.)	96
	Country description	Despite few science and engineering graduates, spending on RD, University/Industry collaboration and such indicators as Knowledge Creation are relatively high
Market sophis-tication	Entrepreneurship/ start-up scene	Armenia ranks 57 globally among 202 countries, based on the strength of its startup ecosystem. Considering the level of its economic development, this rank is quite high
	AI/ML Innovation	BAR CAMP Yerevan - annual media+tech event, for bloggers, new media professionals, IT specialists, companies involved in digital technologies, journalists.
	Business sophistication	Armenia’s score nudged up from 73.2 in Doing Business 2019 to 74.5 in Doing Business 2020.

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