

# THE 7TH ANNUAL BITMOVIN VIDEO DEVELOPER REPORT

Shaping the future of video 2023/2024

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# Welcome

It's a huge honor and privilege to share the 7th edition of the Bitmovin Video Developer Report with you! We published our very first Video Developer Report back in 2017, and since then, it's grown to become a recognized and respected guide for streaming professionals who want to keep their finger on the pulse of the trends shaping the future of video. In recent years, we've also had to evolve the report, revamp some of the questions, and provide a deeper and more comparative analysis of the insights from developers to ensure the report still provides value in the context of global macroeconomic trends.

Our most recent editions of the Video Developer Report have been produced under seismic changes in the wider world, including the COVID-19 pandemic and the economic

turbulence that's followed it. It's not a secret that the last couple of years have been incredibly challenging for the video streaming industry and the tech industry overall due to huge market corrections not seen since the dot.com bubble. In the last 12 months, the majority of companies have been hyper-focused on their bottom line and implemented a number of cost-cutting measures that have stifled growth and innovation.

However, I am feeling more optimistic about 2024. I believe that we will see a much-needed return to monetization and growth in the coming 12 months, and this year's Video Developer Report gives me greater confidence in my optimism. One of our flagship questions for the Video Developer Report asks respondents to rank where they see the biggest opportunities for growth, and this year, advertising topped the list, up two places from last year's report. Many streaming companies, such as Netflix and Disney+ have already pivoted from traditional Subscription Video on Demand (SVOD) business models to hybrid monetization models which offer ad-supported tiers to their services. Additionally, Amazon offers everything from an ad-supported tier to a FAST service. What this year's Video Developer Report tells us is that monetization will be the big priority in 2024, which will help supercharge our industry's growth once more.

Another notable finding from this year's Video Developer Report is that respondents are becoming increasingly appreciative of the power and future potential of AI and ML. Only a tiny minority have no plans to use AI and ML in 2024, with the vast majority planning to use it for use cases that include audio transcription, speech-to-text, personalization, and tagging and categorizing video. AI has truly had a transformative year, and it's amazing and super exciting to see the uptake that will help make us a more innovative and efficient industry.

One new question we added to this year's Video Developer Report is how companies are prioritizing sustainability. We added this question because there has been a much bigger commitment from companies in the video streaming industry to make it more sustainable, but we wanted to understand how much of a priority it is, especially when the more sustainable solution is not always the most cost-effective. Our research found that most companies see sustainability as a priority. However, cost is the main driver of business decisions. It's clear that while progress has been made and there is a desire and commitment to become more sustainable, we as an industry need to take more meaningful action.

I can't summarize our Video Developer Report without talking about codecs! It has been a big

year in the world of codecs, specifically for AV1, following Apple's announcement of a dedicated AV1 hardware decoder for its iPhone 15 Pro and 15 Pro Max. Our results show that there's an uptick in developers planning to use AV1 for live and VOD, and AV1 is the codec that video developers plan to adopt most for VOD in 2024. Overall, H.264 and HEVC remain the most used codecs for VOD and live.

As I wrap up my summary, I would like to thank the video developer community for the time to complete our survey - your insights and feedback are invaluable and help make our industry better! A huge thank you to everyone on the Bitmovin team who helps make the report a reality every year and provides streaming professionals with a snapshot of the trends shaping the future of video. Thank you to you for reading this report and to everyone who's ever read the previous editions of the Video Developer Report. We appreciate the time you take to download, read, and share it with your network.

Here's to a great 2024 for all of us!

**STEFAN LEDERER**  
CEO, Bitmovin

## KEY FINDINGS

### Growth and challenges with ad workflows

- Ad Insertion was at the top of the list for biggest challenges, up from #3 last year. Advertising was also the area where respondents saw the most opportunity for innovation in their services.
- AVOD was the top monetization model utilized by 56% of respondents, while 39% said they were using FAST workflows. Both of these saw big jumps from last year, up from 40% and 26% respectively.
- SSAI was the top method of ad insertion, used by 67% of respondents, followed by CSAI workflows at 51%. These also both saw significant upticks from last year's responses of 55% and 44% respectively.

### More interest than action for sustainability

- For the first time, we asked questions around the prioritization of sustainability initiatives. For the majority of respondents, there was interest in more sustainable solutions, but cost was still the main driver of business decisions.
- 24% said that sustainability was a high priority that factored into their decision making and 6% said it was a top priority. We hope to see these numbers increase in the coming years and with our GAIA project, develop new methods that make the greenest solutions the most cost-effective.

### Commercial solutions rising, DIY declining

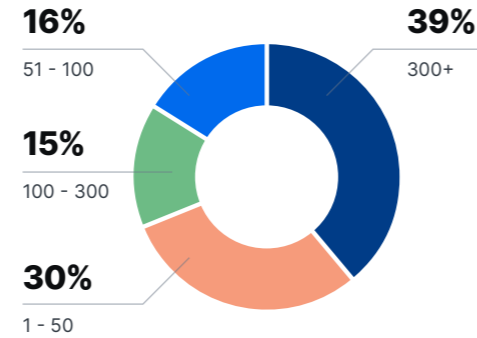
- When it comes to building vs buying solutions, several categories leaned toward buying this year. This is likely due to a combination of a maturing market and risk-reduction in a year when many companies lowered their headcounts and capacity for building their own solutions.
- For the player codebase question, Commercial solutions took back the top spot, used by 41% of respondents, followed by in-house solutions built on open source with 39%. In-house solutions NOT built on open source saw the biggest decrease, cut in half from last year down to 10%.
- Third-party CDN services were deployed most often, while in-house CDN usage declined substantially from 23% last year to 13% this year.
- Use of commercial DRM providers was most popular, growing to 54% of respondents, while use of in-house solutions dropped from 24% to 18% this year.

# Methodology

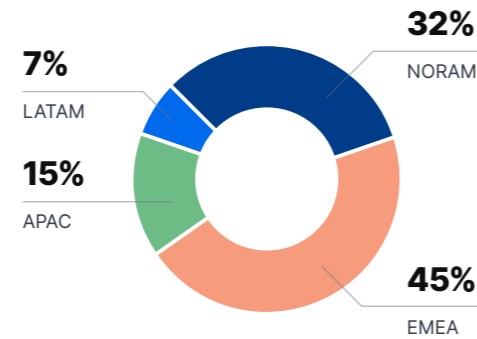
This is our 7th year of running our Bitmovin Video Developer Report. The survey was conducted between October and November 2023. The responses provided strong representation of the global market, coming from a diverse range of video developers and industry experts working at companies located in 42 different countries. Participation by region was led by EMEA with 45% of our participants, followed by North America at 32%, the Asia Pacific region at 15% and Latin America with 7% of total responses.

As a number of the questions are multiple-choice, you will notice that a number of these multiple-choice/answer questions have an aggregate that will not add up to 100%. In these cases, the number indicates the percentage of respondents that chose each option. Like last year, we have used a ranking option for a number of the questions and have adapted some of the questions to align with the recent advancements in technology development. Please keep in mind that the survey was open for everyone to participate, but the results may be somewhat skewed toward the Bitmovin customer base.

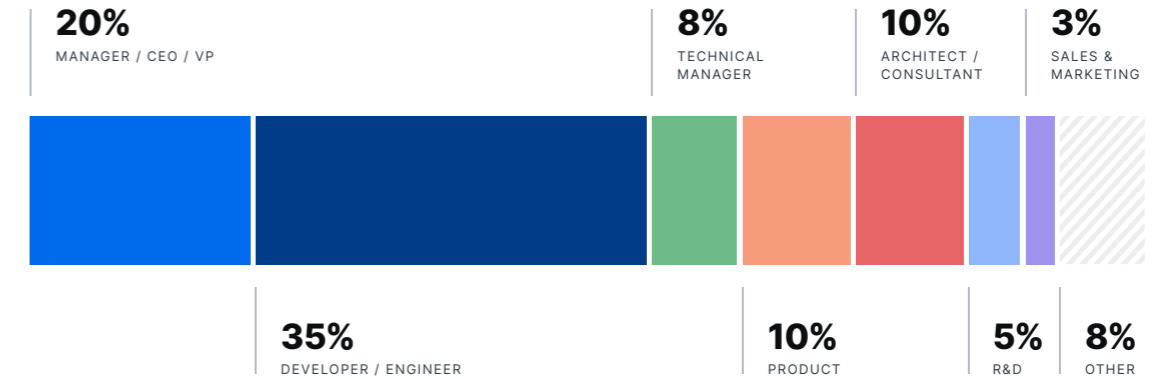
## COMPANY SIZE



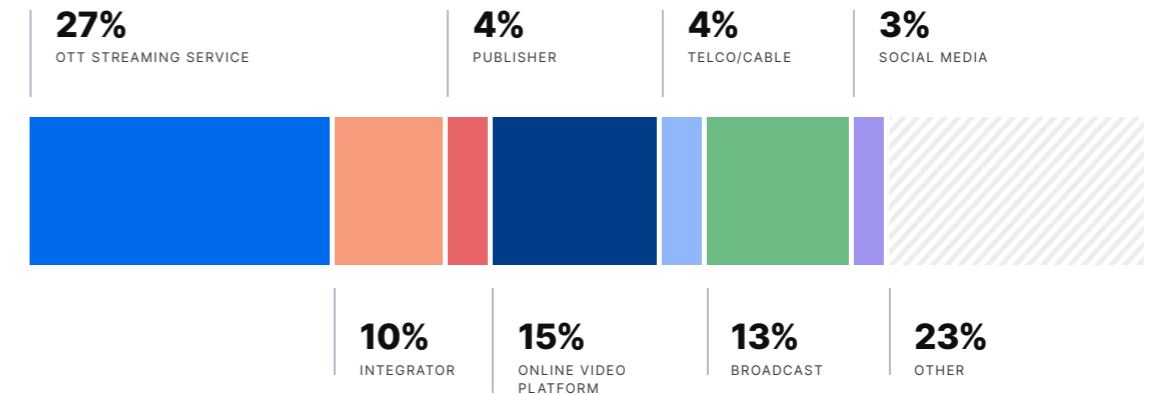
## REGION



## JOB TITLE



## INDUSTRY



# The State of the Streaming Industry

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This report is aimed at providing you with a snapshot of where the industry is today and giving a broad overview of growing trends and opportunities. 2023 was a challenging year for streaming services and the wider tech industry that brought financial concerns to the forefront. Even with all the buzz around AI and machine learning, innovation and technological advancements were often delayed in favor of addressing higher priority economic needs and goals, something we see reflected in this year's responses.

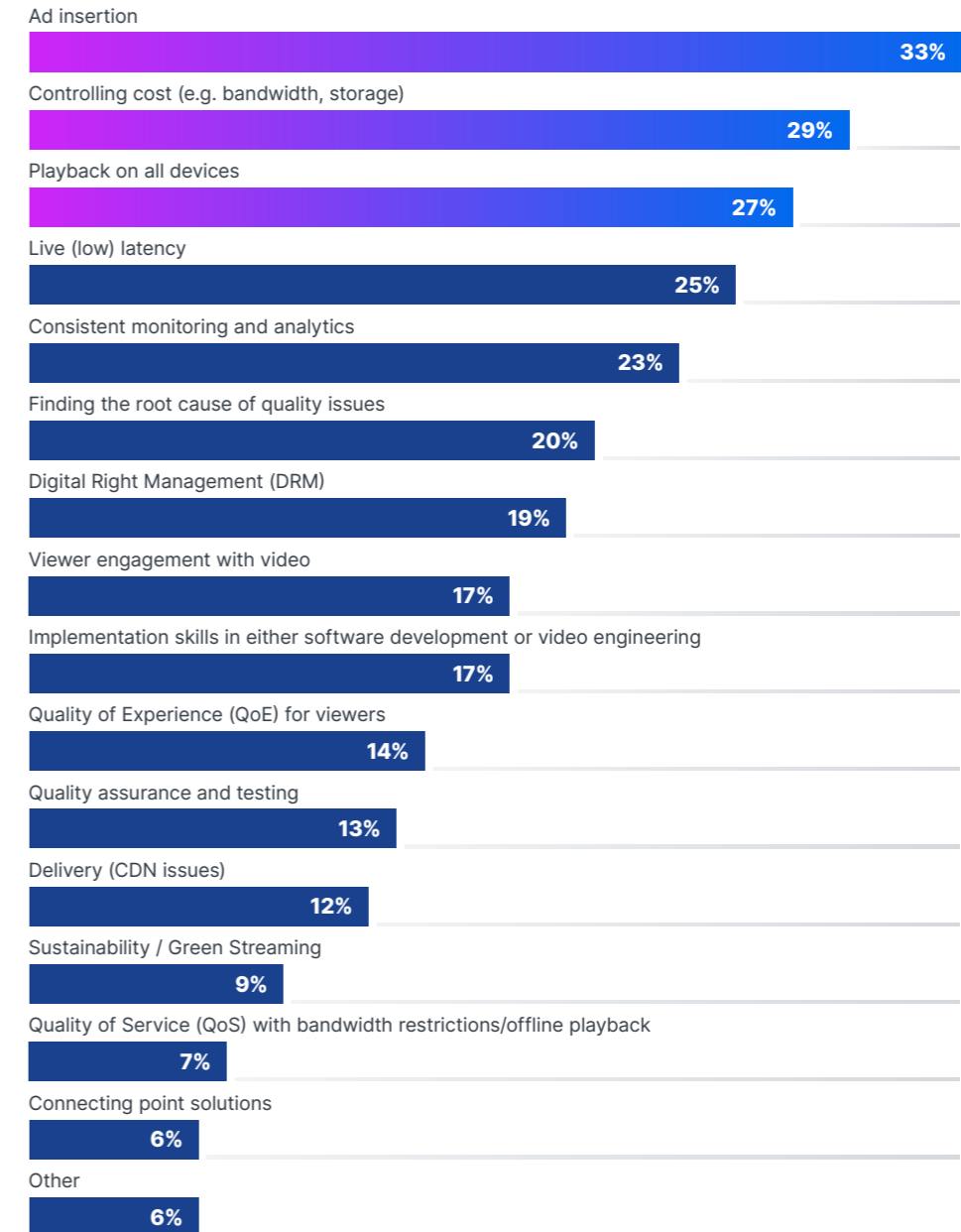
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The report is broken into the following three sections. Part 1: an overview of the big challenges, areas of opportunity, how innovation is being prioritized and a picture on how Artificial Intelligence and Machine Learning can and will affect the industry. In Part 2: this report will dive deeper into the detail of Video Workflows. We cover topics from Codecs through to Low Latency needs and advertising functionality. To come to a close, Part 3 outlines additional data into business insights and video analytics.

## What are the top three biggest challenges you are experiencing with video technology today?

This is our traditional warm-up question and helps us get a good understanding of what's top of mind from all of our survey participants. This time around, the topic of Ad Insertion continued its climb to the top of the chart, passing Controlling Cost, which came in second. This is not too surprising as the past year saw more and more services adding ad-supported subscription tiers along with the rise in popularity of FAST channels.

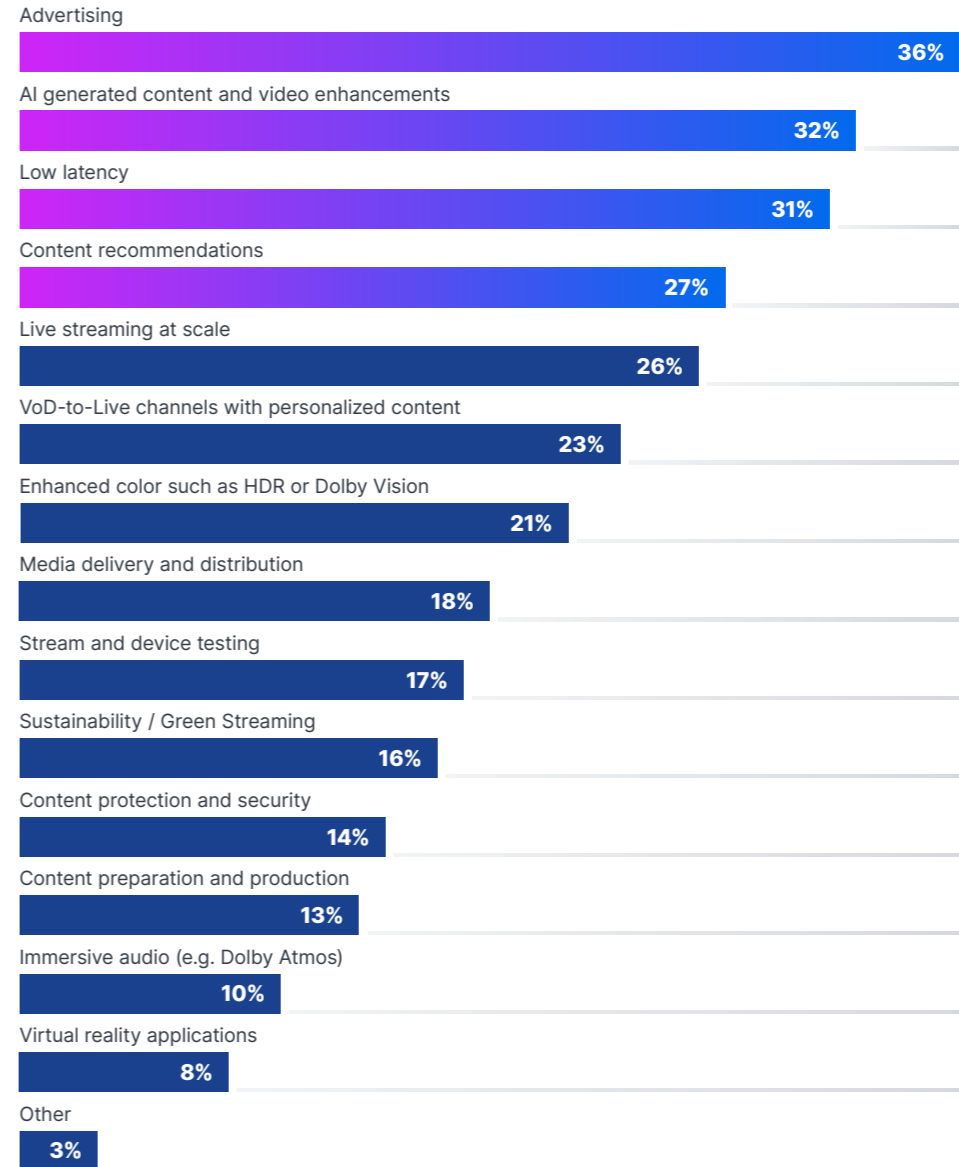
It's also somewhat expected that Controlling Cost remained near the top of the list given the economic conditions the industry has faced in recent times. Playback on All Devices is back up to number 3 on the list after a slight drop last year, so it seems that challenge is still ongoing.



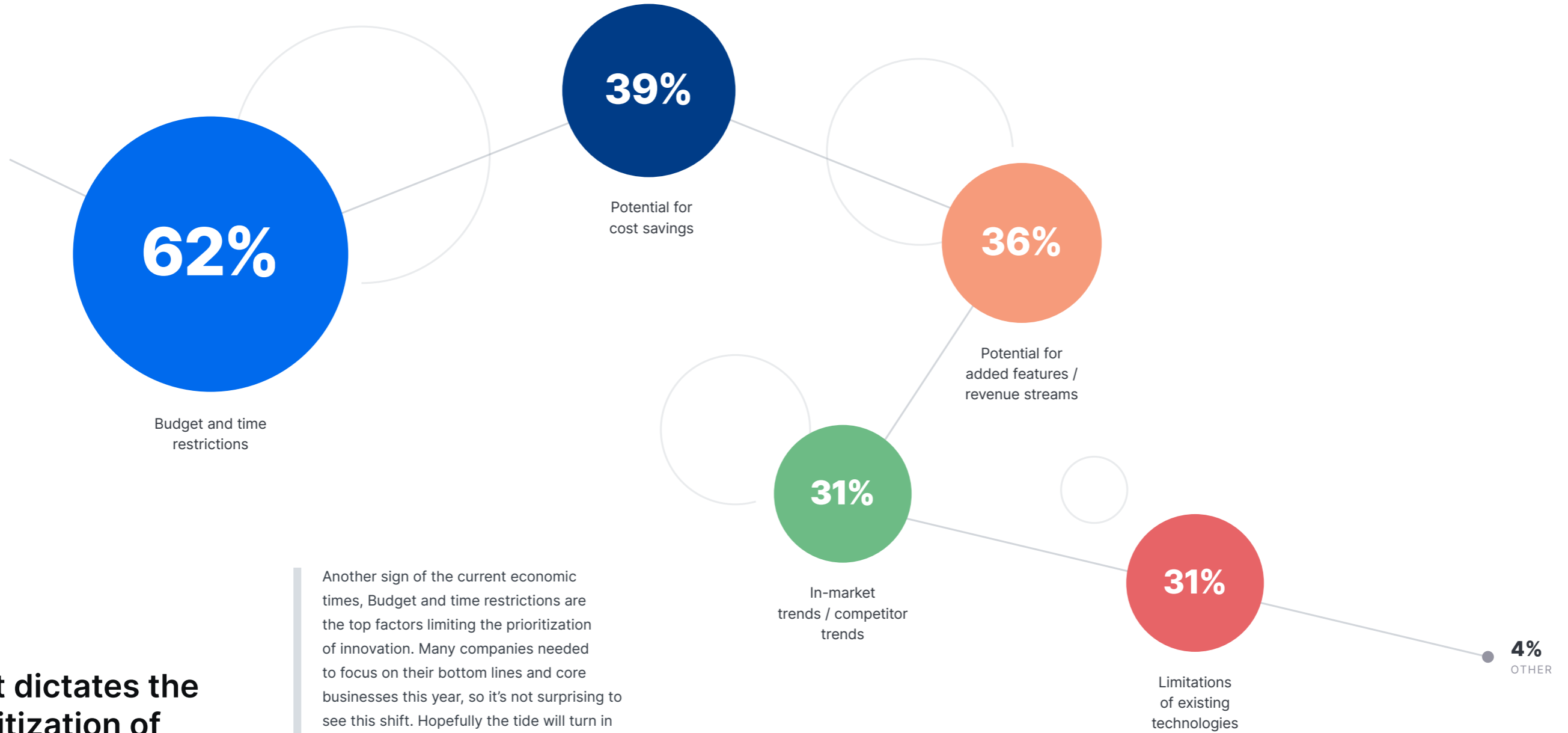
## Where do you see the most opportunity for innovation in your service?

Taking the top spot this year is Advertising. Ad-based monetization models saw significant growth with some industry heavyweights like Netflix getting into them for the first time since we last ran our survey. Pluto TV's FAST channel success was followed by both new and established companies entering that space in an effort to squeeze some revenue from the bottom of the market. It's clear from these results that despite the growth, there is still plenty room for innovation and improvement.

Coming in a close second was a new option, AI generated content and video enhancements. With all the AI hype and advancements over the past year, there's clearly a lot of interest and potential for its application to video workflows. It will be interesting to see how much of it is actually deployed into production over the next year.







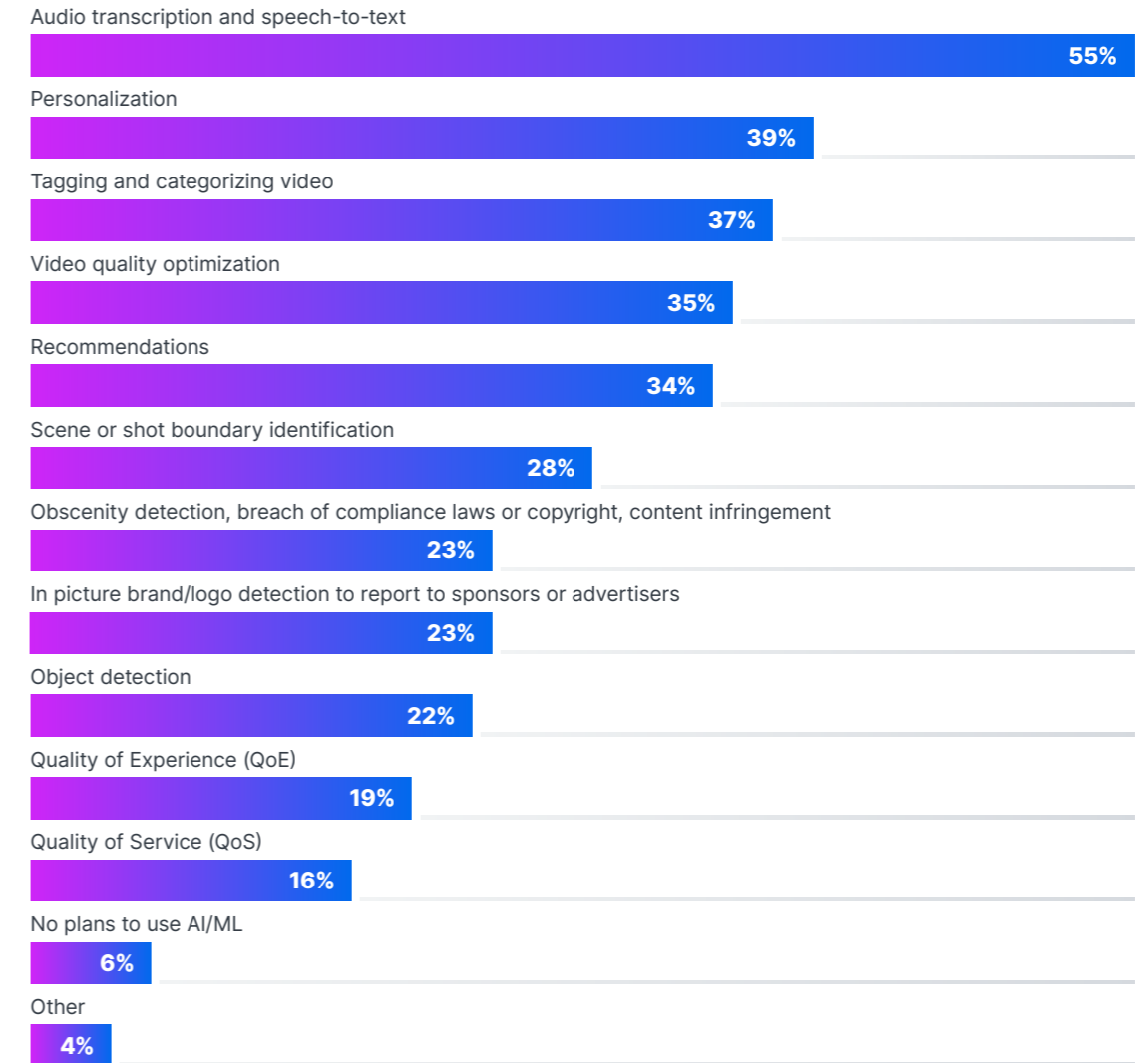
## What dictates the prioritization of innovation?

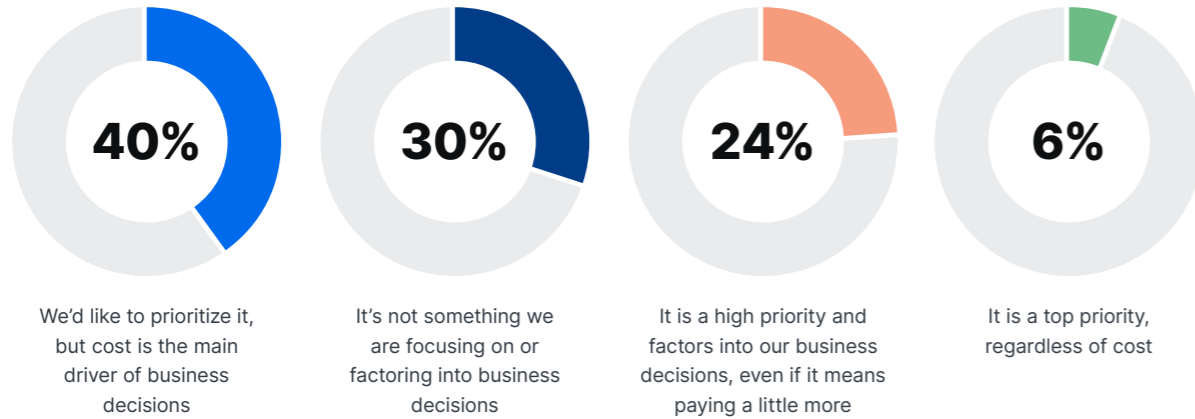
Another sign of the current economic times, Budget and time restrictions are the top factors limiting the prioritization of innovation. Many companies needed to focus on their bottom lines and core businesses this year, so it's not surprising to see this shift. Hopefully the tide will turn in 2024 and allow companies to reach beyond their current capabilities.

## For which of the following video use cases do you expect to use machine learning (ML) or artificial intelligence (AI) to improve the video experience for your viewers?

Audio Transcription and Speech-to-Text was the top use case for AI and ML, by a wide margin. It's the most mature use case we have for AI in the video workflow space and remains the most practical and important for both accessibility and discoverability.

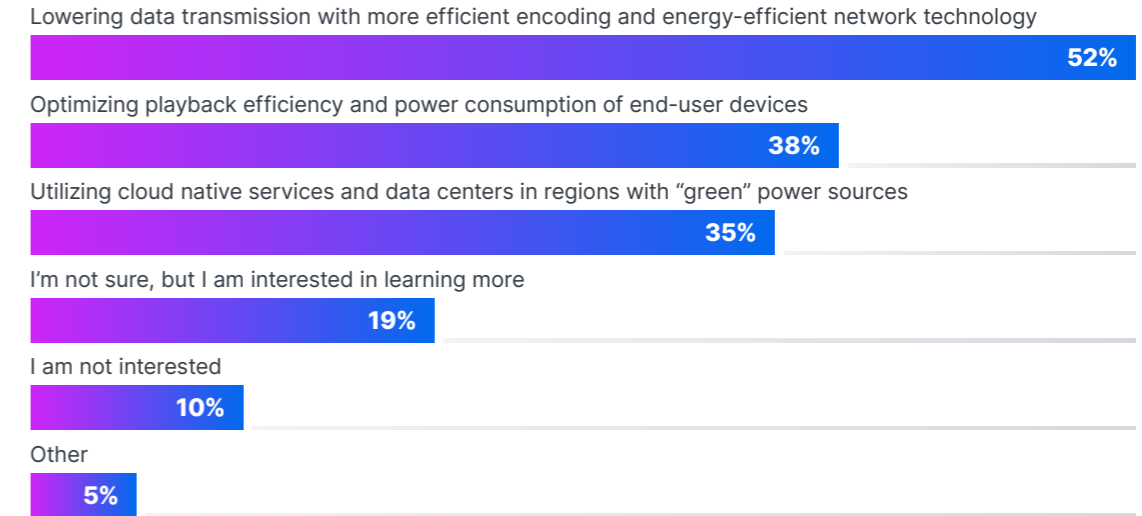
Personalization saw a significant jump from seventh place to the second most important use case, while tagging/categorizing and video quality optimization remained near the top.





## Which option most closely matches your company's current approach and prioritization of Sustainability and Green Streaming initiatives?

While it's encouraging to see the majority of respondents are at least interested in prioritizing more sustainable solutions, it seems the economic realities of the last year have dictated that cost is still the main driver of business decisions.



## Where do you see the most opportunity for reducing the carbon footprint of streaming workflows?

We asked this question to gauge public perceptions of the opportunities for making streaming more sustainable. Most green streaming initiatives are fairly new and there is still some uncertainty around where efforts should be focused for the greatest impact. Hopefully in the coming year we will get some solid guidance from organizations working on this problem like our GAIA project, Fraunhofer Fokus and Greening of Streaming.

# Video Workflows

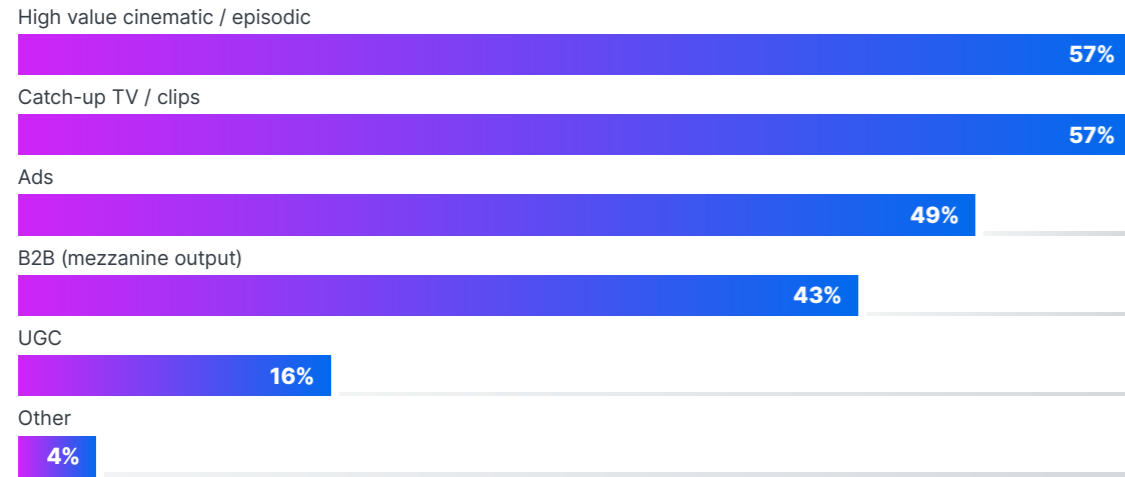
A photograph of two men in a dark room, looking at a laptop screen. The man in the foreground is wearing glasses and a dark shirt, looking intently at the screen. The man in the background is wearing a blue t-shirt and is leaning over, also looking at the screen. The background is dark and out of focus.

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With AVC now over 20 years old and HEVC over 10, we're still firmly living in a multi-codec world, despite the availability of several newer, more efficient codecs. Last year we separated Live and VOD codec usage for the first time and this year we added a few new questions to gain some insight into live contribution formats and how content type affects encoding and turnaround time expectations. Keep reading to learn more about the trends observed and what they mean for our industry in the coming years.

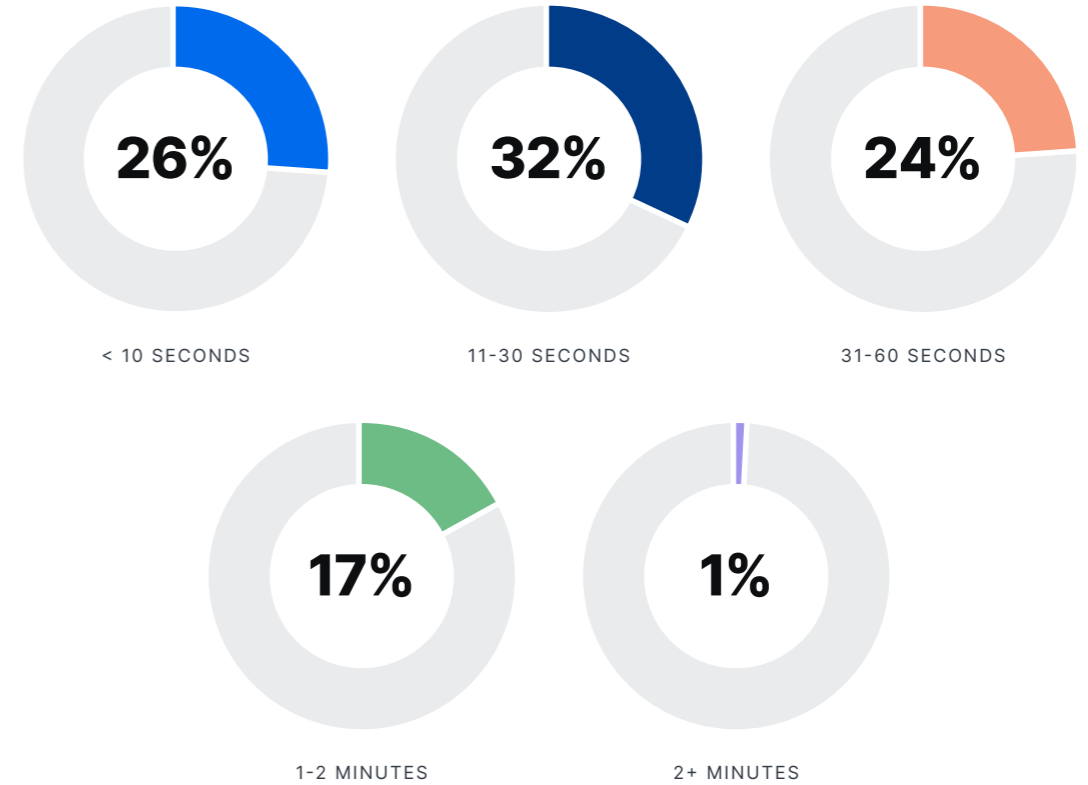
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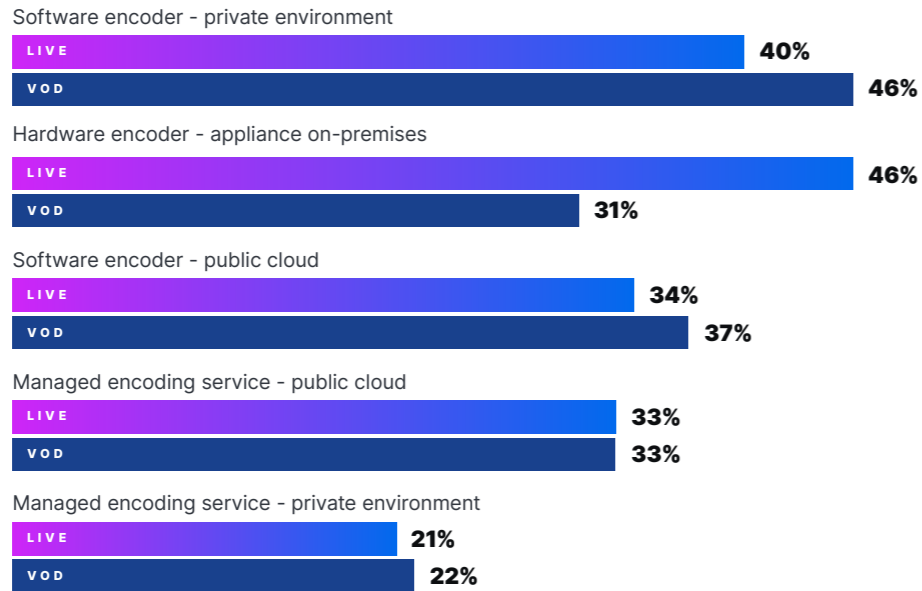
## Which of the following VOD encoding workflows exist in your organization?

We asked this question for the first time to get a better understanding of the types of VOD content respondents are encoding. There was a decent mix and some overlap with High value cinematic content and Catch-up TV/clips at the top. Somewhat surprisingly only 16% reported they were working with user generated content (UGC).



## When transcoding short (<2 minutes) videos for ABR streaming, what is your expected turnaround time?

With the increase in ad-based workflows over the past year, we wanted to capture the current expectations for encoding turnaround time of ads and other short form content. The most common response was 11-30 seconds and only 18% expected it to take more than a minute.



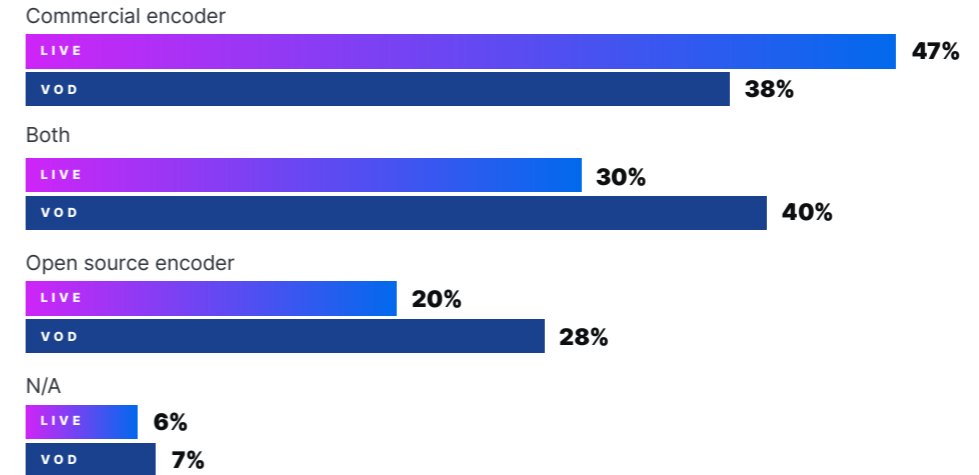
## Where do you encode video?

We have broken down the analysis like we did last year between Video-on-Demand (VOD) and Live Encoding to understand the impact of content types on encoding location.

For Live encoding, running hardware encoding appliances on-premises is still the most common scenario, but using software

encoders in public clouds did increase from 28% last year to 34% this year.

Use of managed encoding services in the public cloud saw slight decreases for both Live and VOD, while running software encoders in private environments gained some ground.

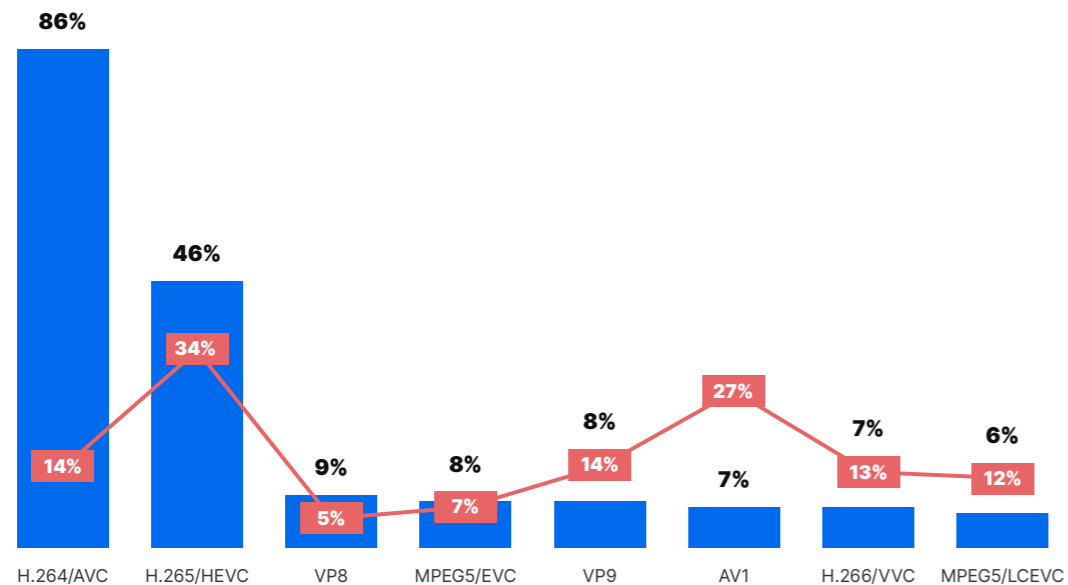


## Do you use a commercial encoder or an open source based encoder?

This year's responses show a slight shift toward open source compared to last year for VOD encoding, while Live encoding still shows a strong preference for commercial encoding solutions.

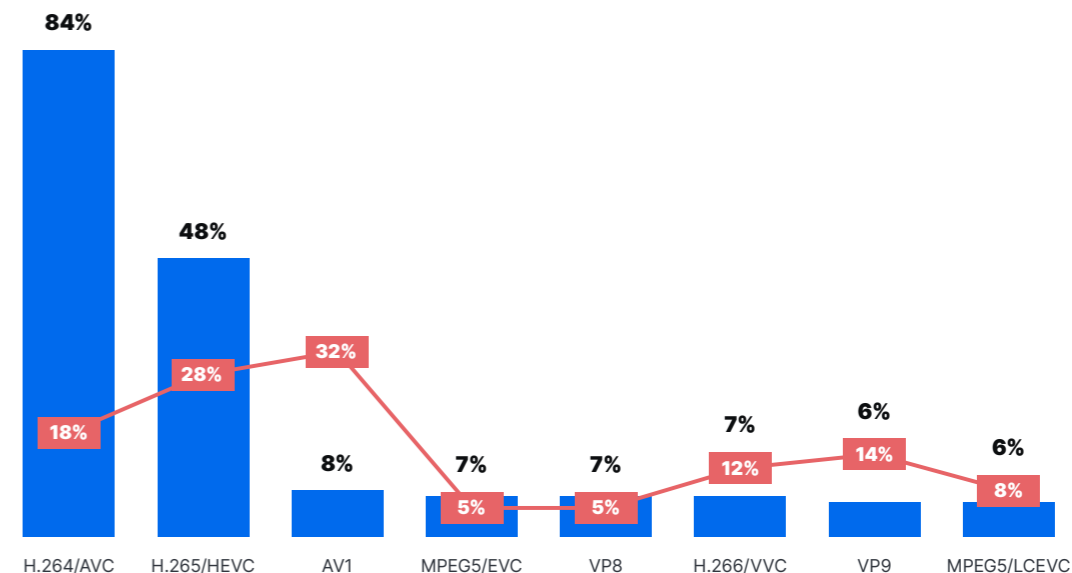
## LIVE ENCODING

■ In production ■ In planning



## VOD ENCODING

■ In production ■ In planning



Which video codecs are you using in production and which codecs are you planning to implement within the next 12-24 months?

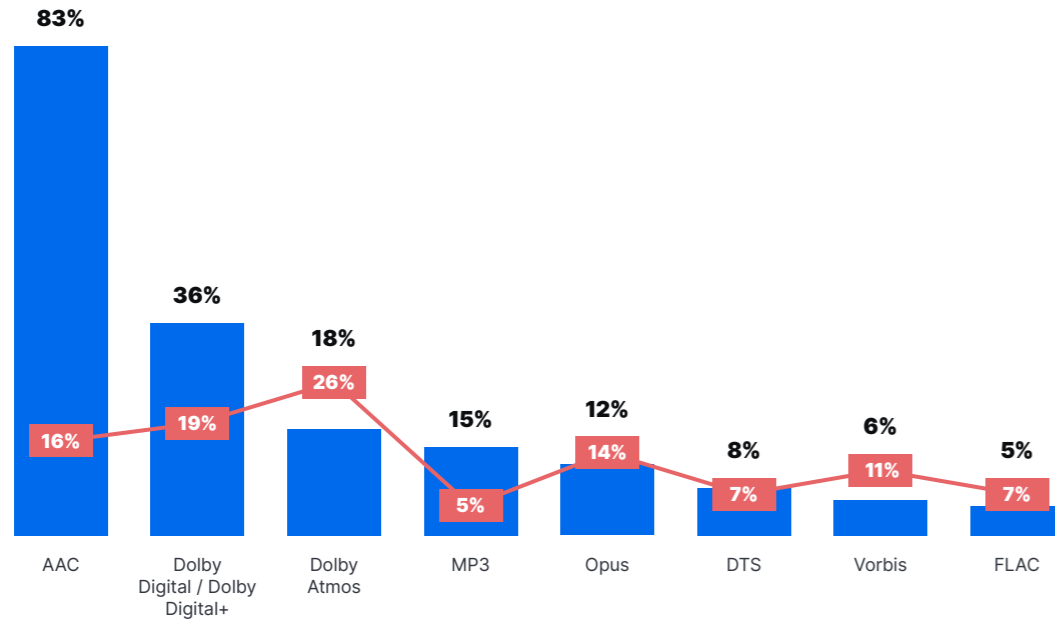
H.264/AVC is still far and away the most popular video codec, with its successor HEVC seeing some modest gains for both Live and VOD compared to last year.

Another "older" codec VP8 is still seeing a bit of use in WebRTC workflows, but its numbers are on the decline.

Adoption of newer generation codecs is still disappointingly low, but AV1 seems to have the most optimism around it for the coming year, likely driven by Apple adding support to its latest mobile and desktop processors.

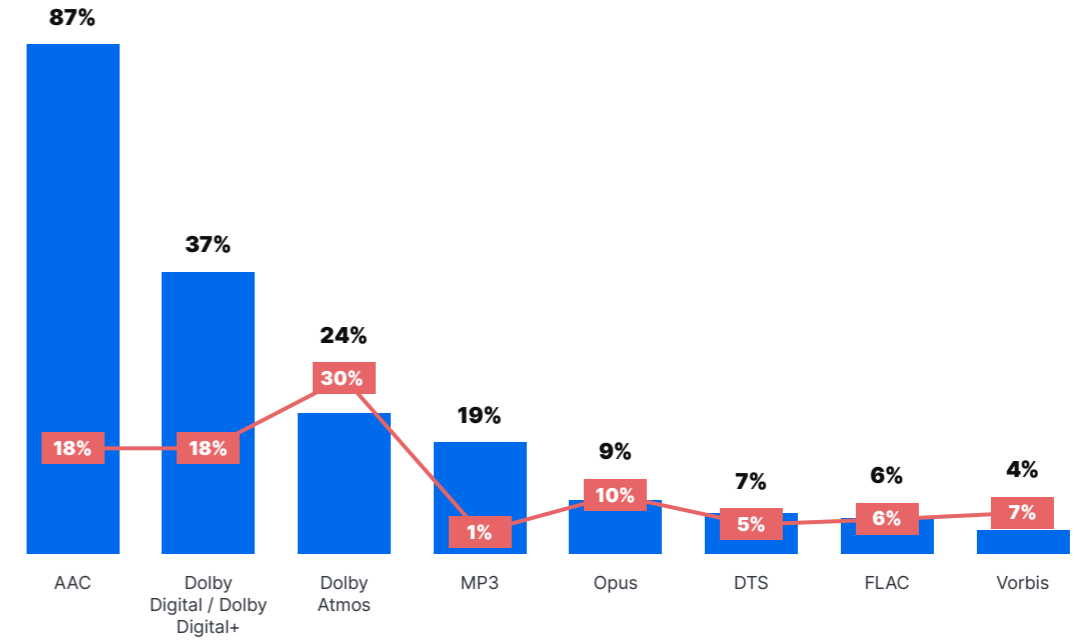
## LIVE ENCODING

■ In production ■ In planning



## VOD ENCODING

■ In production ■ In planning

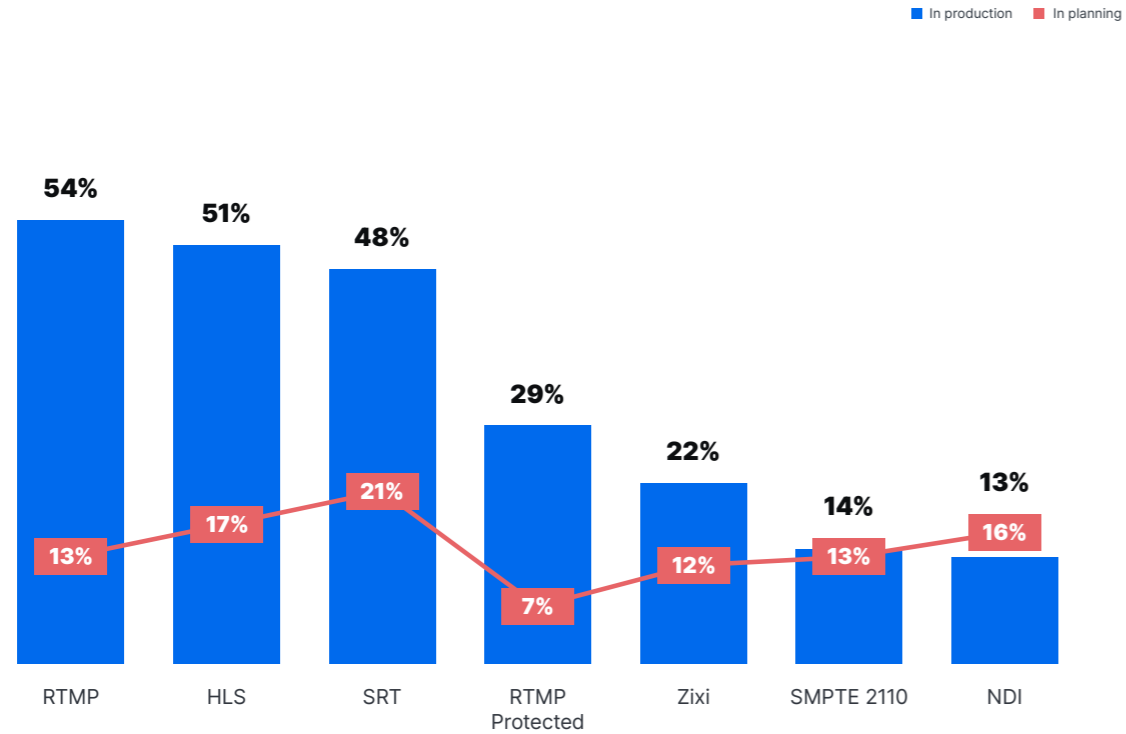


Which audio codecs are you using in production and which are you planning to implement within the next 12-24 months?

AAC and Dolby Digital+ remain the #1 and #2 on the chart, but Dolby Atmos moved into 3rd, replacing declining MP3.

Atmos also has the highest percentage of people saying they're planning to add it, so it will be interesting to see if it becomes the most popular Dolby audio codec next year.



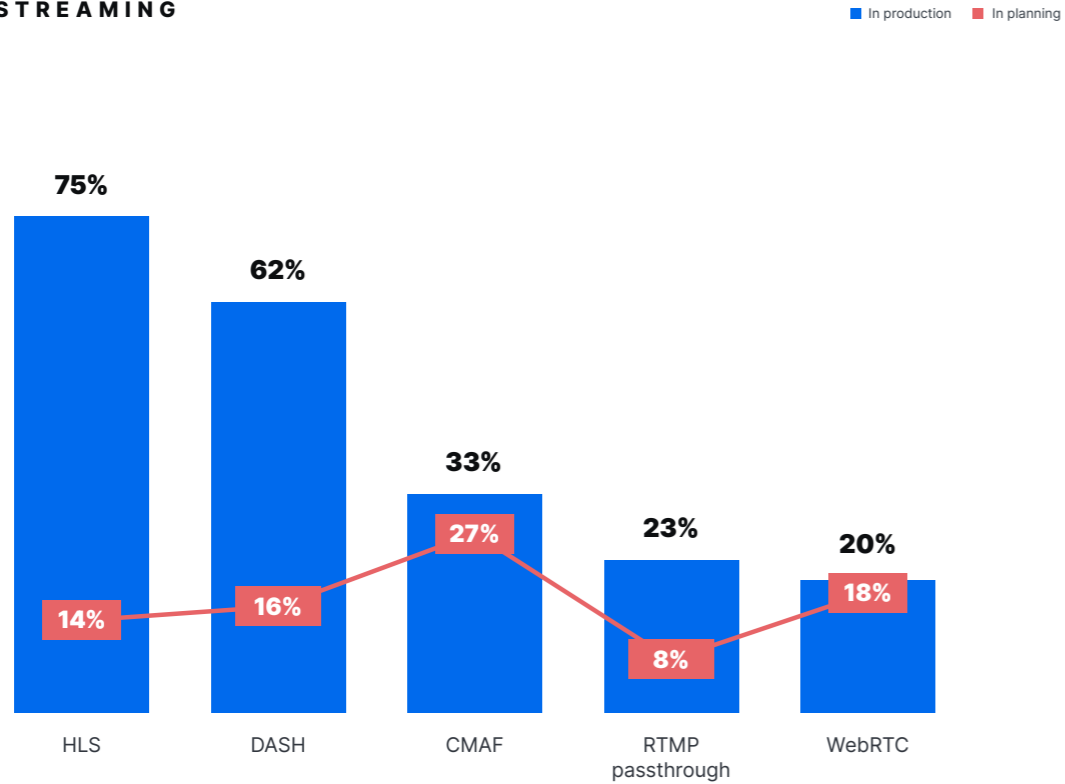


## Which stream formats do you use for Live contribution feeds and which are you planning to use within the next 12 months?

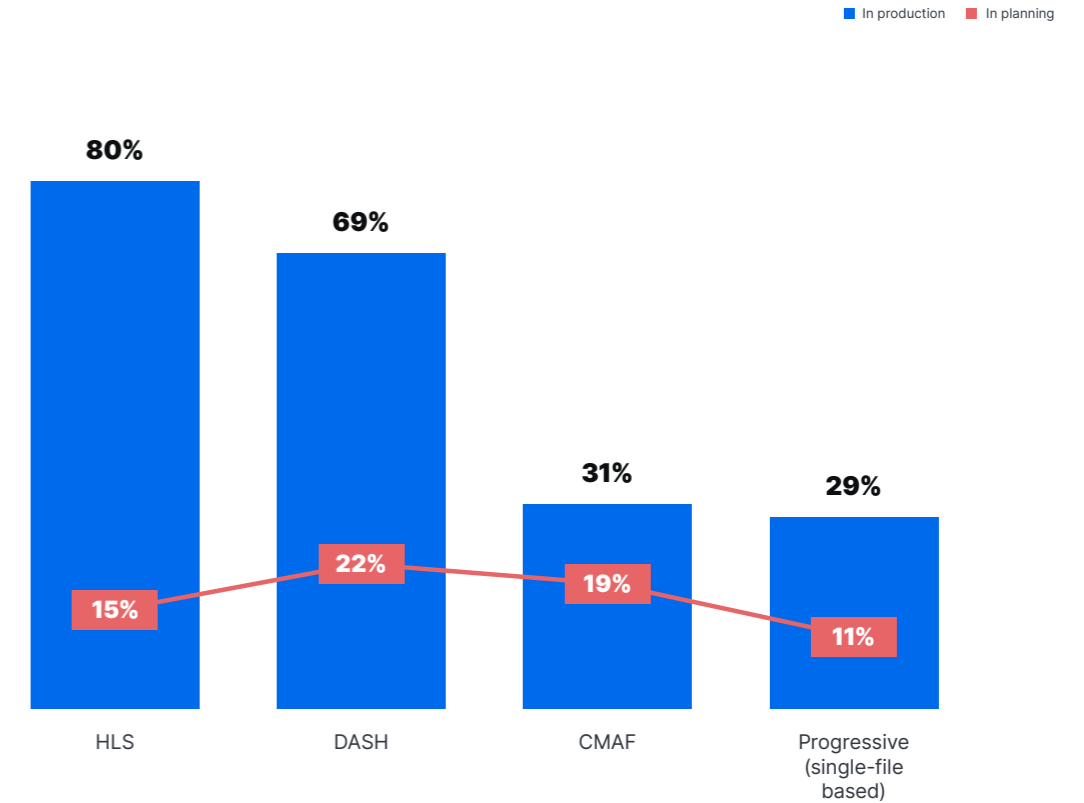
In past surveys, we focused on distribution formats, but we added this question to start tracking the use of different “first-mile” contribution formats for live streaming.

Stalwart RTMP was most popular, but HLS and SRT were close behind and had more people saying they’re planning to add them in the coming year.

## LIVE STREAMING



## VOD

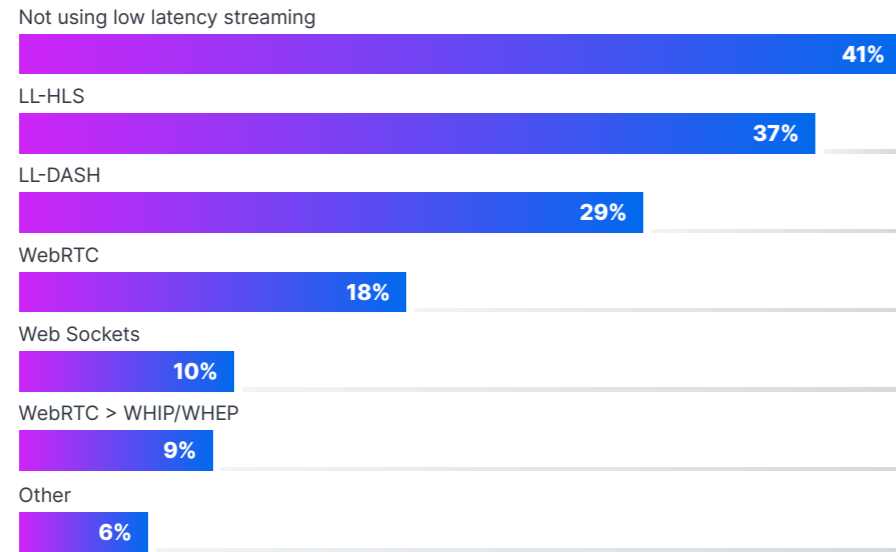


**Which streaming formats are you using in production for distribution and which ones are you planning to introduce within the next year?**

Live streaming distribution formats were roughly similar to last year, with the exception of CMAF (DASH/HLS) surpassing RTMP passthrough, which declined from 38% to 23%.

For VOD workflows, DASH saw the biggest increase, from 51% last year to 69% this year.

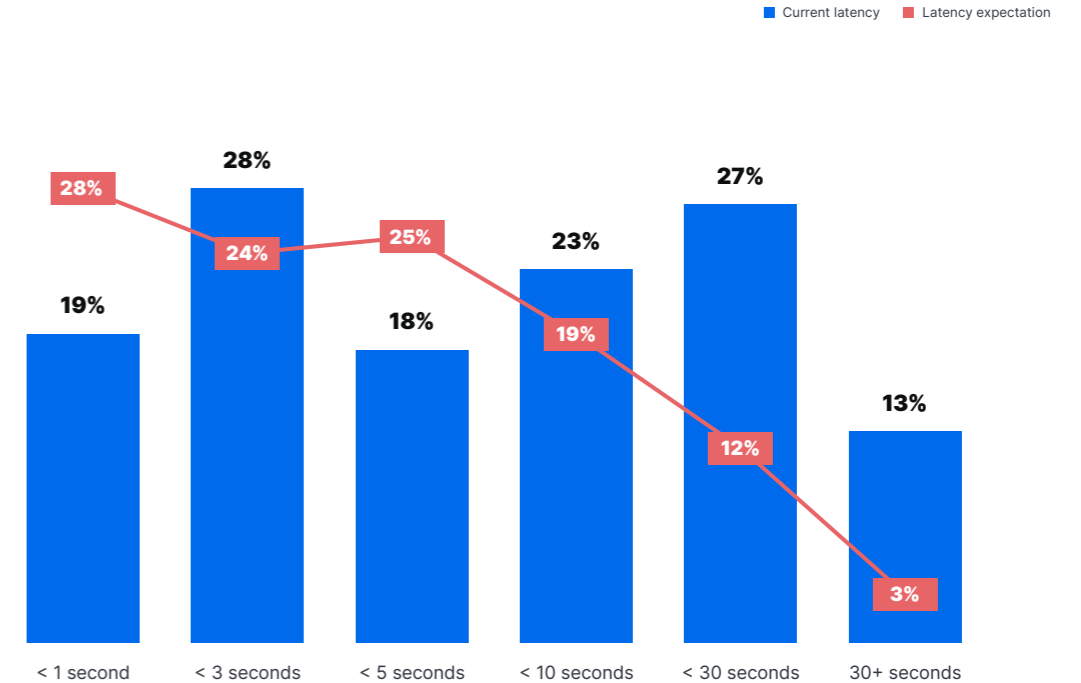
What are your thoughts on this? Join the conversation on social media using this hashtag #VideoDeveloperReport



## Which technology do you use for low latency streaming?

LL-HLS was the biggest gainer compared to last year, up to 37% from 23%. LL-DASH also saw increased usage, up to 29% this year.

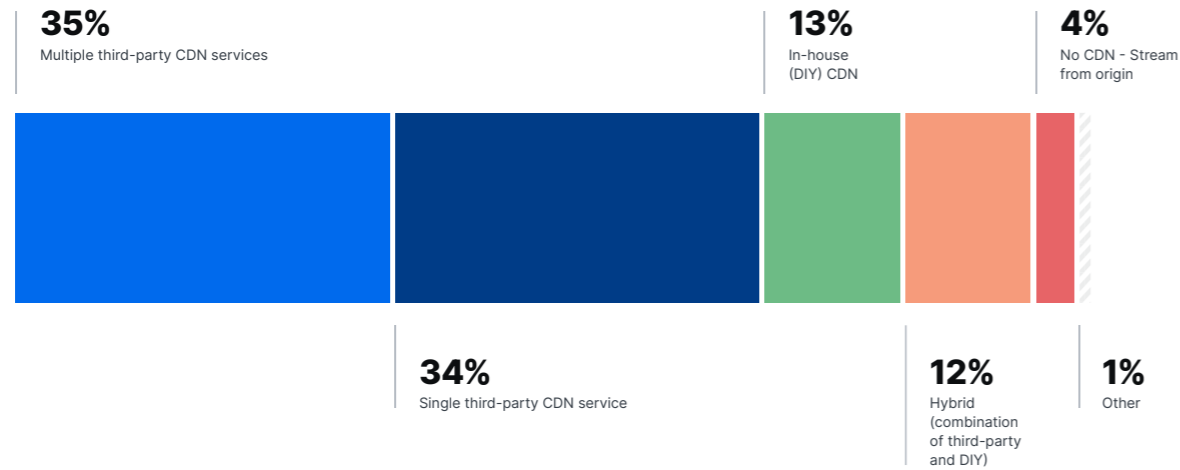
WebRTC saw a decline this year, but WebRTC → WHIP/WHEP was a new option that probably captured some of its share.



## What is your current latency, and what is your expectation / demand?

Last year, the most common response was <5 seconds, but this year <3 seconds took the top spot.

The spread of responses is likely due to variations in content type and applications, but overall there is a trend of moving toward lower latency, especially when looking at the expectation numbers.



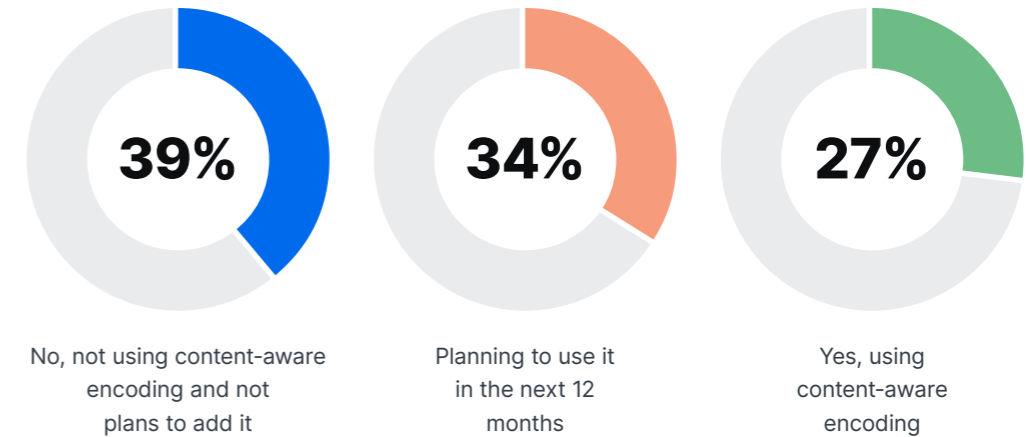
## Which CDN solution are you using?

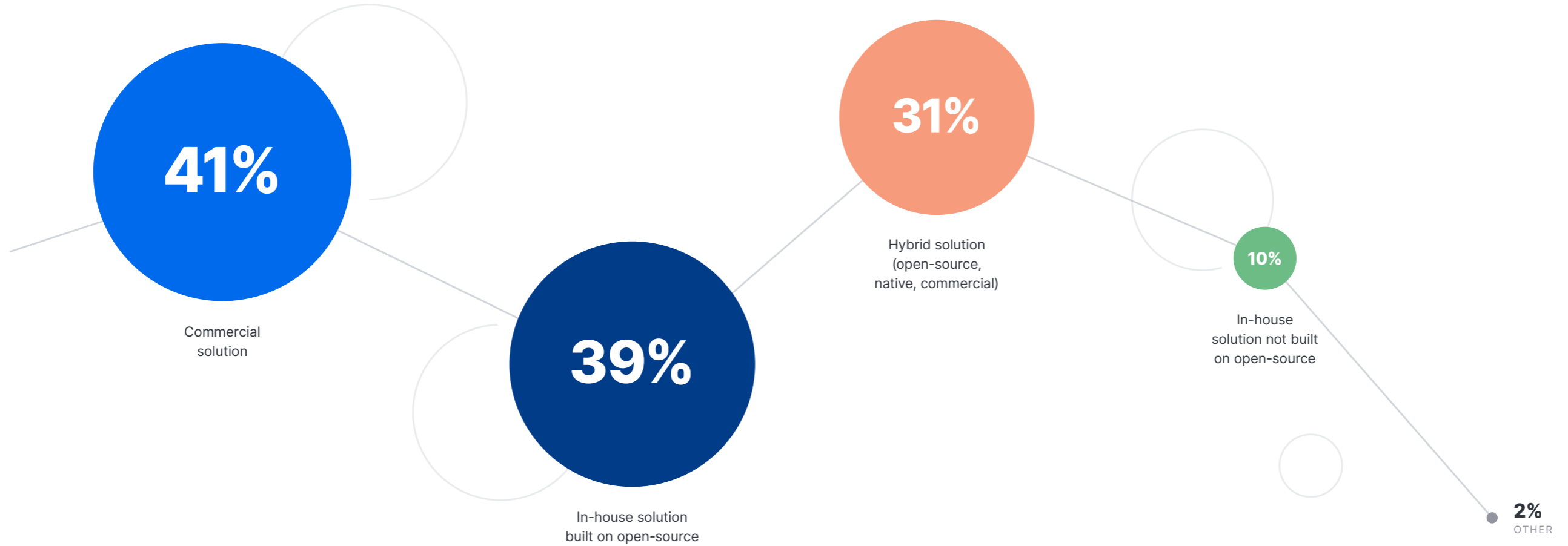
Running a CDN is a specialized, complex and costly operation and we see the trend toward more use of commercial solutions and less companies building in-house solutions. This year only 13% of respondents rely on their own CDN, down from 23% last year.

## Are you using or planning to use content-aware encoding technology?

These numbers are all roughly unchanged, which means the people who said they were planning to use content-aware encoding last year didn't actually get around to it. This is likely another side-effect of

the current economic conditions where companies were deferring making drastic changes or exploring new innovations. For many of them, adopting content-aware encoding would actually save them a considerable amount of money in the long run, so hopefully more will be able to take advantage of it in the coming year.





## Which player codebase are you using?

Following a trend we've seen in some other categories this year, more people opted for using a commercial solution for their player codebase, over building it themselves with open source software. The biggest drop was for in-house proprietary solutions NOT built on open source, down from 20% to 10% this year.

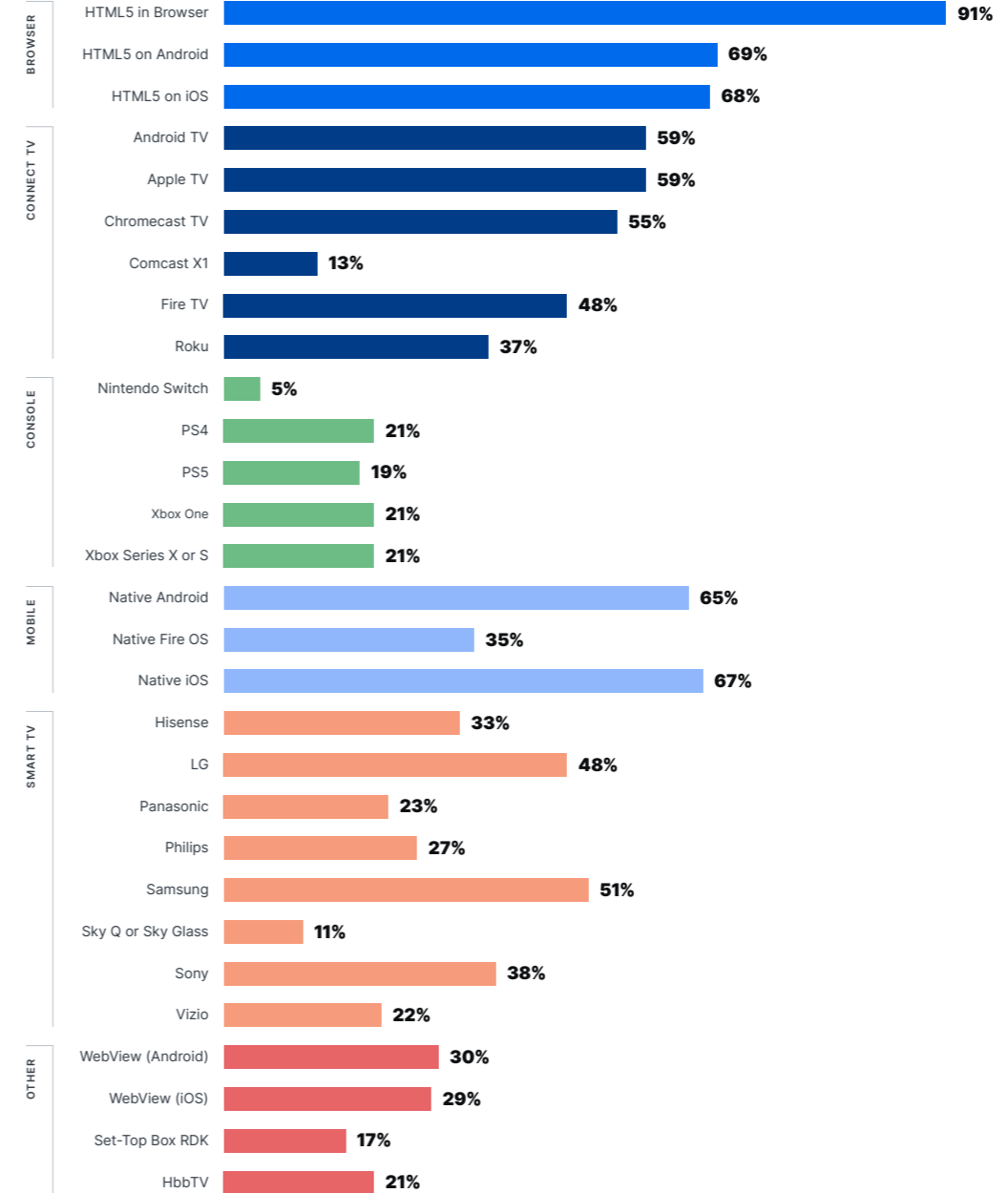
## Which of the following platforms and devices do you support to stream video or audio content?

HTML5 in desktop browsers was by far the most common response again this year, used by 91% of respondents.

Games consoles remain the smallest category overall, having roughly the same numbers as last year, with the exception of the decline of Nintendo Switch down to 5%.

On iOS and Android, use of native players increased and is roughly even with HTML5 usage on those platforms.

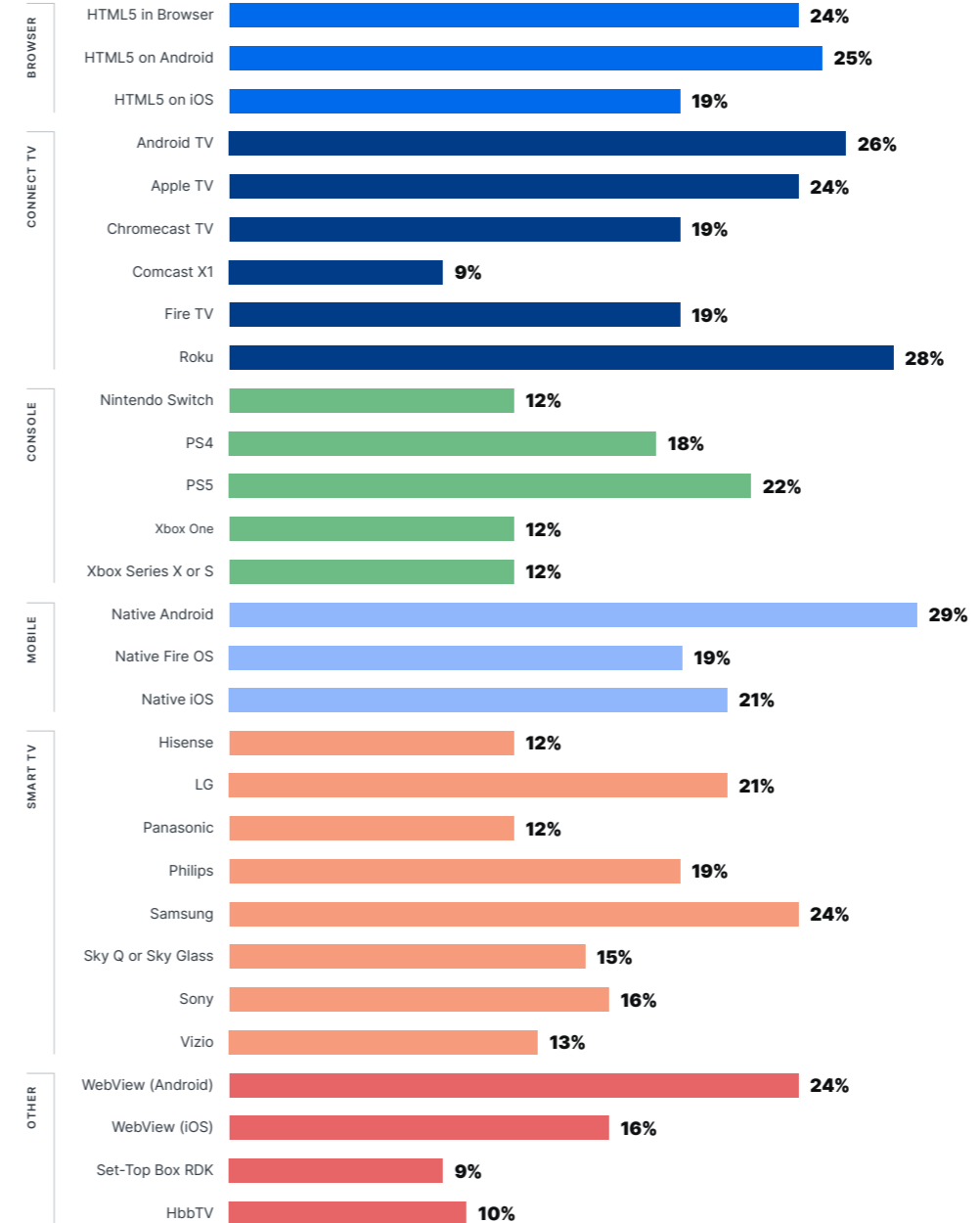
Samsung and LG are still the most popular Smart TV brands, but Sony, Hisense and Philips all saw increased numbers compared to last year.



## Which of the following platforms and devices will you support to stream video or audio content in the next 12 months?

Native Android and Roku are the top 2 responses for additional platforms that will be added in the next year, but not by huge margins.

This chart captures the never-ending challenge of device fragmentation as developers are planning to support multiple devices in each category.



# Business Insights



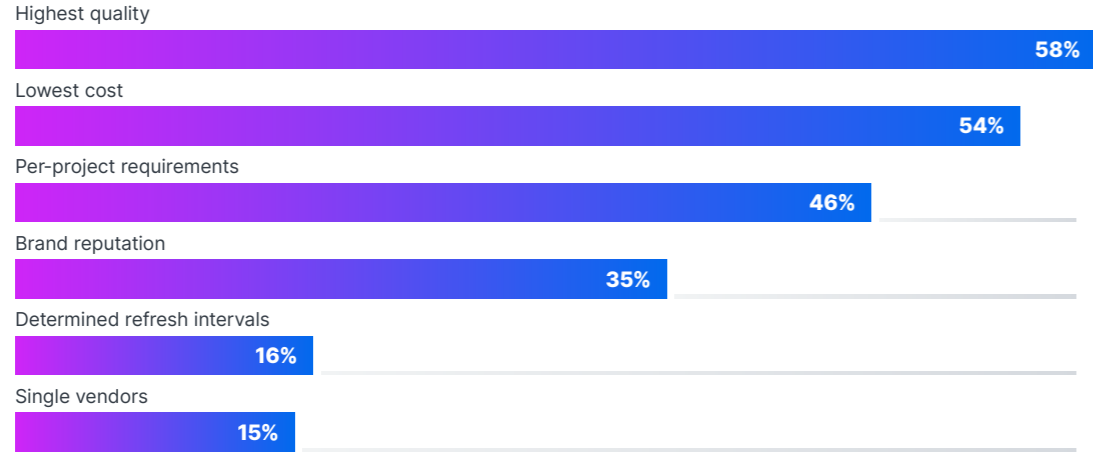
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2023 was a challenging year with many streaming companies facing consolidation and contraction while exploring new business models and opportunities to stay afloat. From smaller startups to major established brands, headlines reporting staff reductions were common. With more focus on the bottom line, many sought additional revenue from new and expanded ad-supported workflows.

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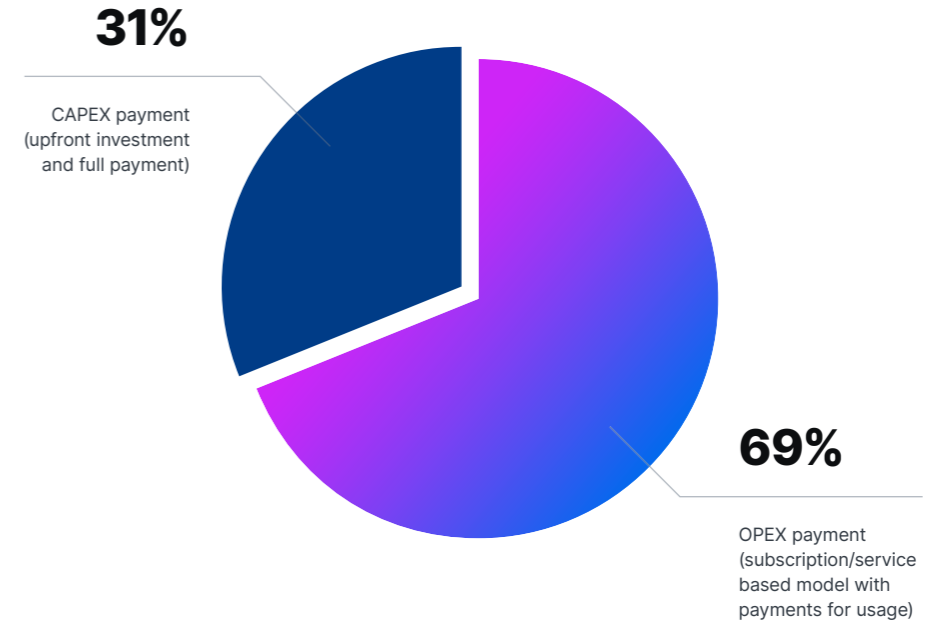
This next section explores a variety of topics related to the business aspects of the streaming industry, including the purchasing process, development resources and monetization models.





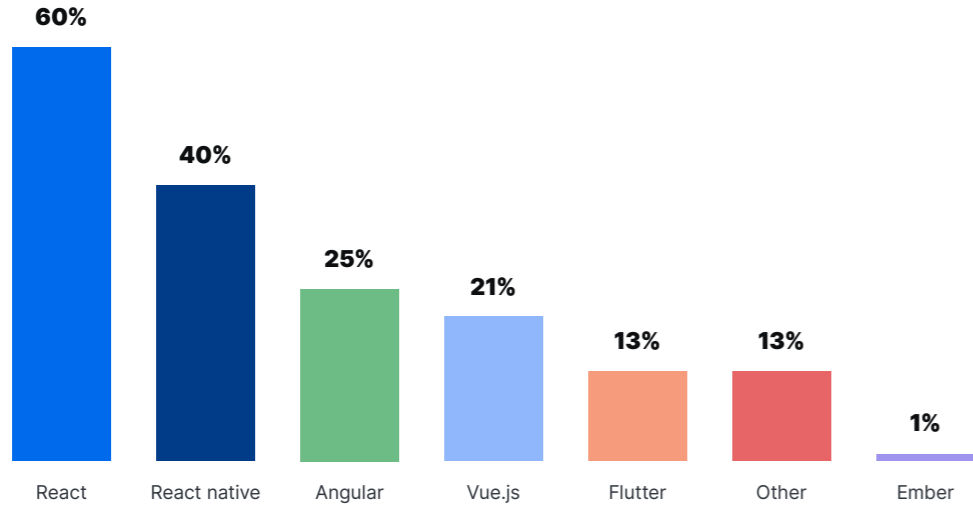
## Which of the following are considered during the buying process for encoding solutions?

Highest quality and Lowest cost solutions are often at odds with each other, but they were cited as the 2 most important factors in the buying decision process for encoding solutions. The fact that Single vendors was the least considered factor shows that buyers are willing to pick and choose the best solutions from multiple vendors and don't place as much emphasis on one-stop shopping.



## Do you prefer CAPEX or OPEX?

With another first time question in our survey, we wanted to capture and begin tracking the general purchasing preferences of those in our industry. OPEX payments were preferred over CAPEX payments by more than a 2:1 margin.

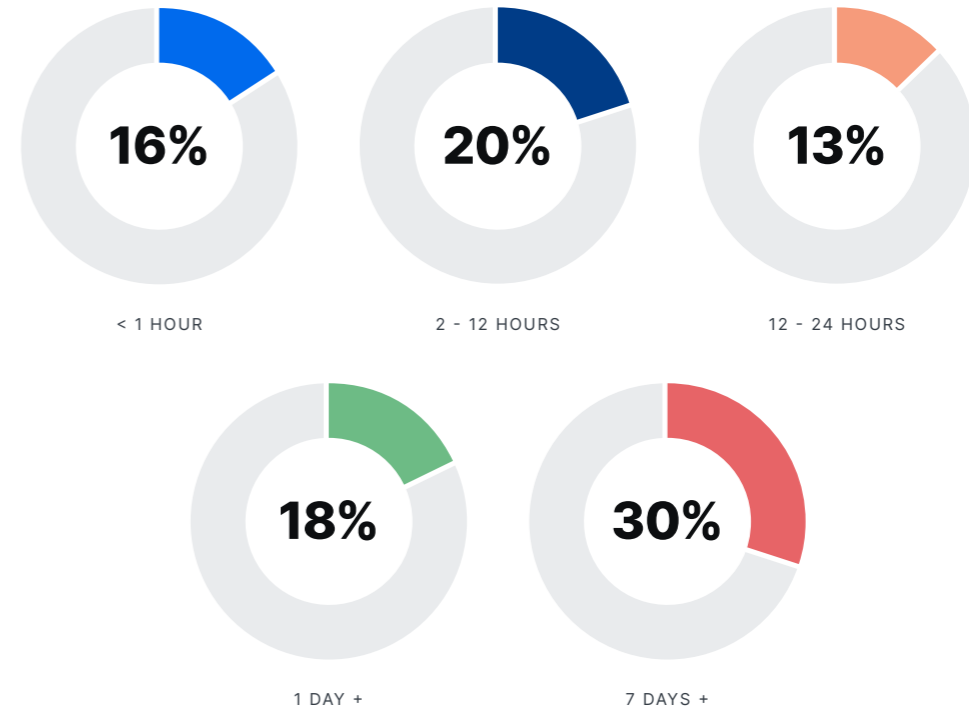


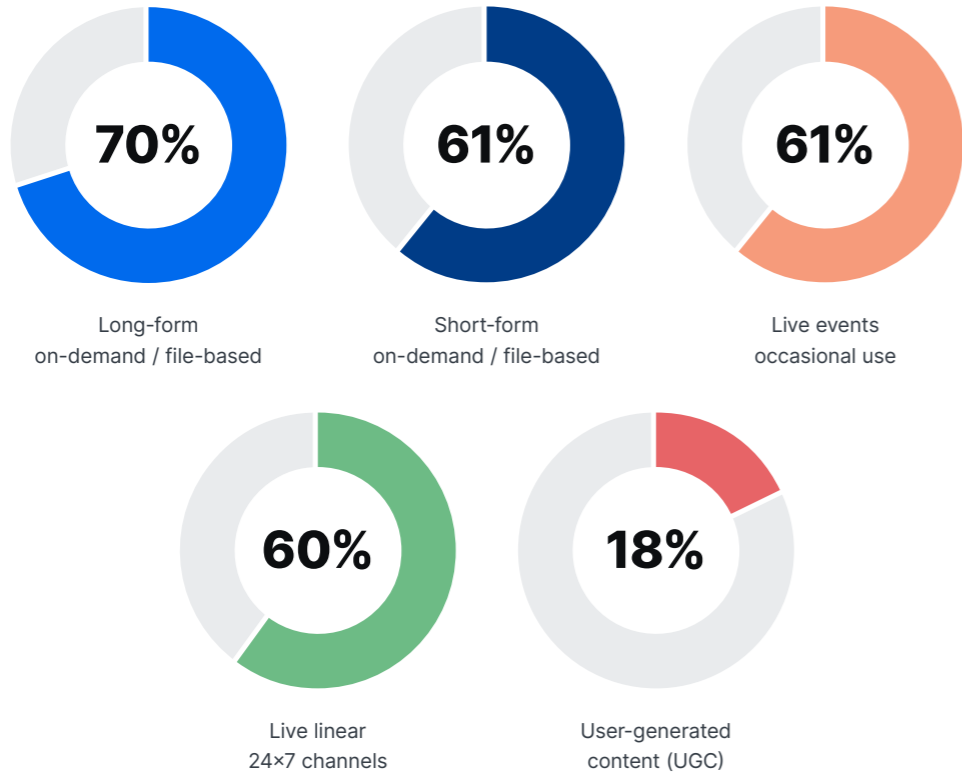
## Which development frameworks do you use?

This was a new question last year and this year's responses are very similar with React increasing its lead in the top spot, and React Native and Angular coming in second and third with their numbers holding steady.

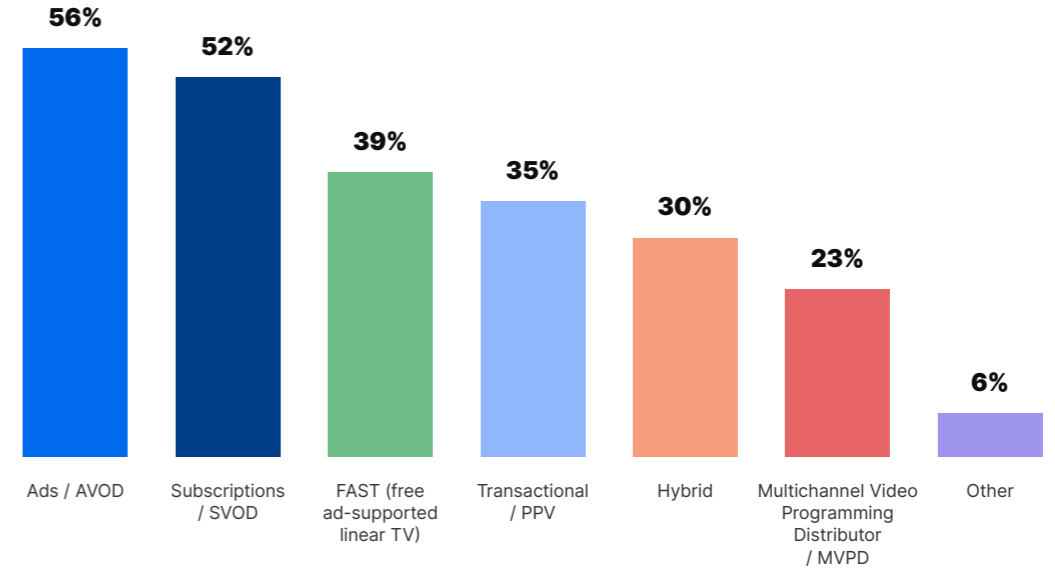
Vue.js and Flutter both saw moderate declines in their numbers compared to last year.

## How many hours per month does your development team spend on maintaining your video player solution?





### What type of content do you distribute?

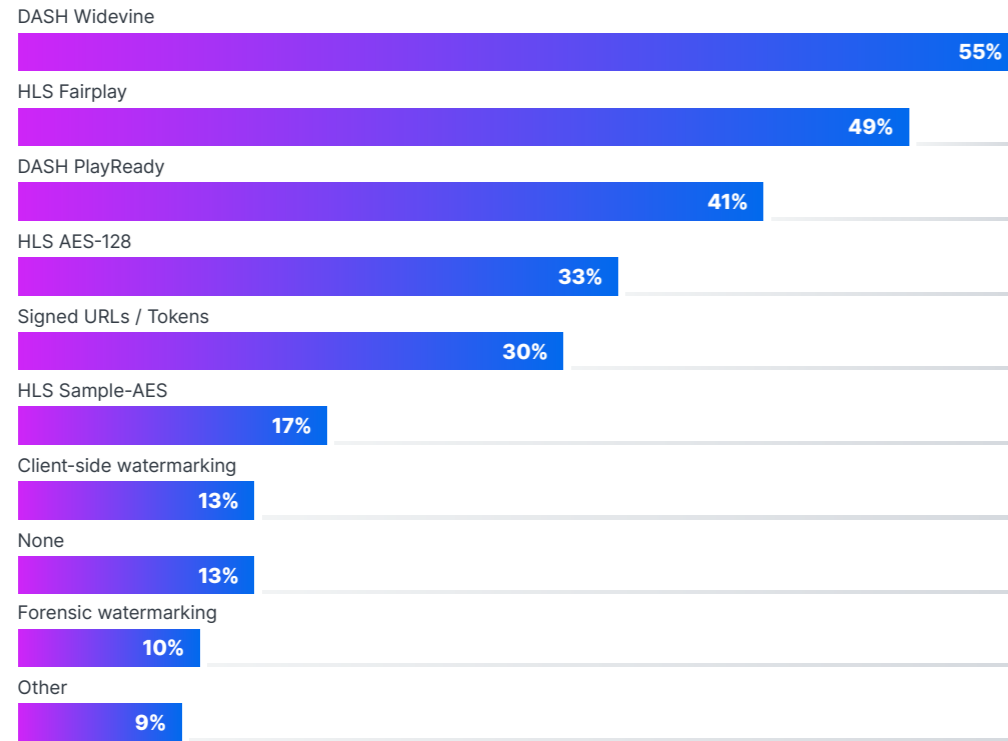


### What monetization model do you use?

SVOD fell from the top spot, but still carried a large share with 52% of respondents. The biggest gainers this year were Ads/AVOD and FAST workflows with both seeing double digit jumps in their percentages compared to last year.

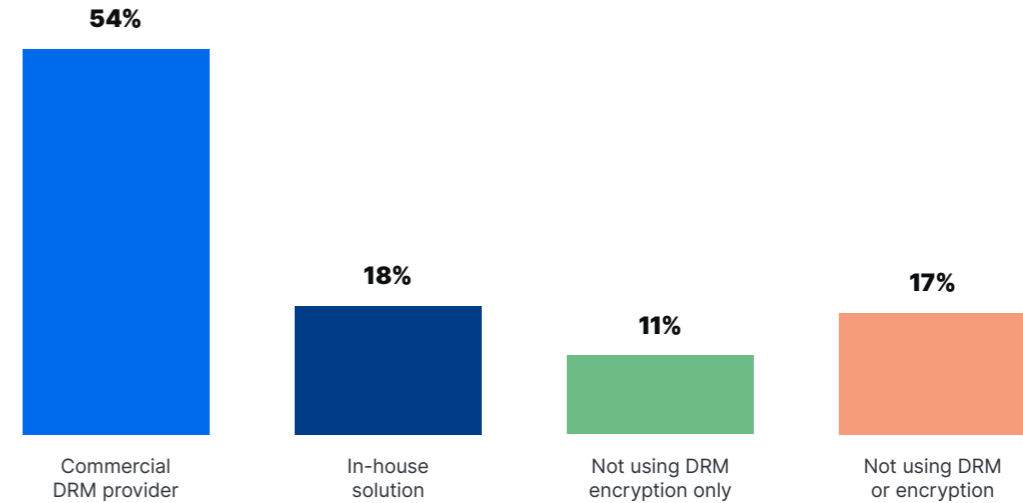
Will this trend continue or did we see the peak of ad-based monetization this year?

Join the conversation on social media using this hashtag #VideoDeveloperReport



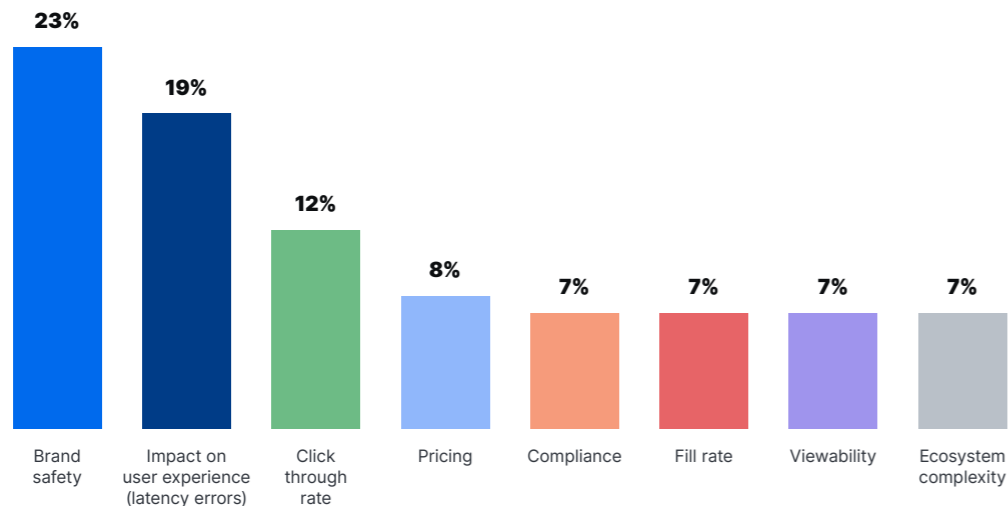
## What type of content protection do you use?

This year saw very little change in the ranking of content protection types, but one good signal was that the percentage of people using no content protection dropped from 20% down to 13%.



## How are you implementing DRM in your workflow?

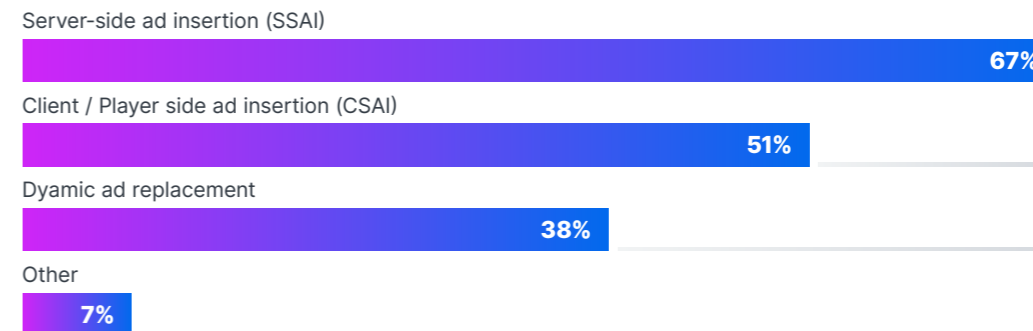
DRM is one of the more complex and specialized parts of a streaming workflow, so it's not surprising that over 50% use a solution from a commercial provider. The number of people deploying an in-house solution dropped by 25% compared to last year's responses.



## When running ads, what aspects are you most concerned about?

Brand Safety is once again at the top of the list of concerns people have when running ads. There has been a spotlight on this aspect of the online ad industry over the past year, especially with some social networking sites.

Impact on user experience moved into second on the list. With more platforms rolling out AVOD subscription tiers and FAST workflows, finding the right balance of frequency and limited impact to the end user is key to maintaining a viable business model while minimizing churn.



## What ad architecture are you using today?

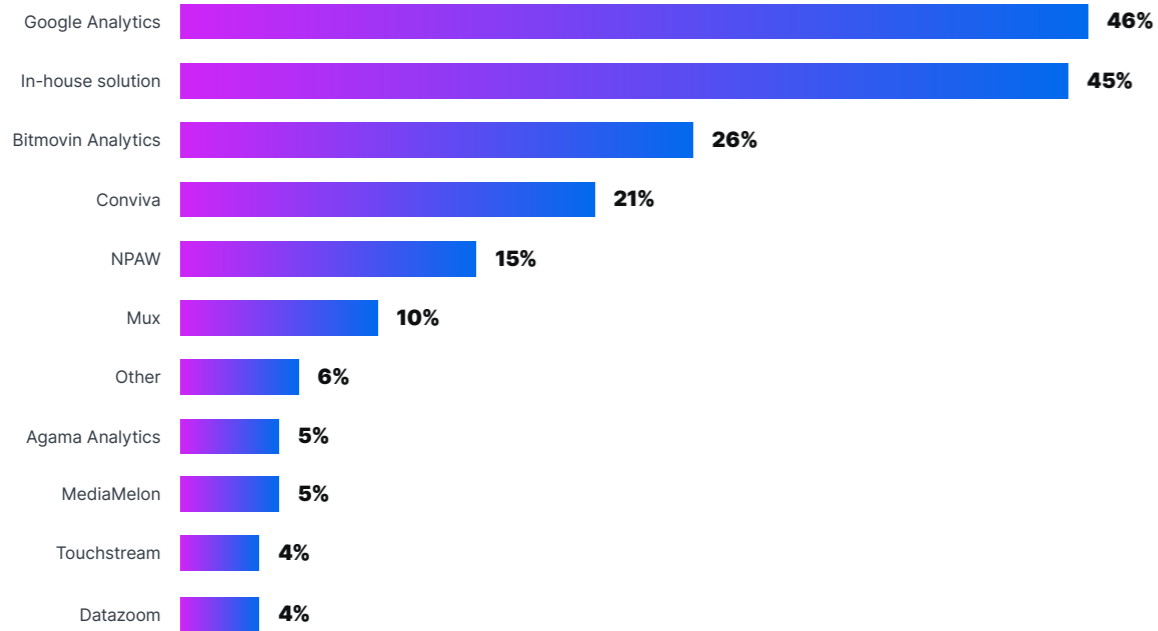
The order here remains the same as last year, with SSAI being the frontrunner and still one step ahead of CSAI. Across the board the numbers increased with more people and companies using ads to

boost and supplement their existing revenue models.

How have the changes to the Ad Ecosystem affected your business? Join the conversation on social media by using this hashtag #VideoDeveloperReport

The background is a dynamic, abstract composition of light streaks. A central point of convergence draws the eye, from which numerous thin, bright lines radiate outwards. The color palette is dominated by deep blues and purples, with some streaks appearing as bright white or light blue. The overall effect is one of motion and energy, reminiscent of a high-speed light trail or a data visualization of a complex system.

**Analytics**

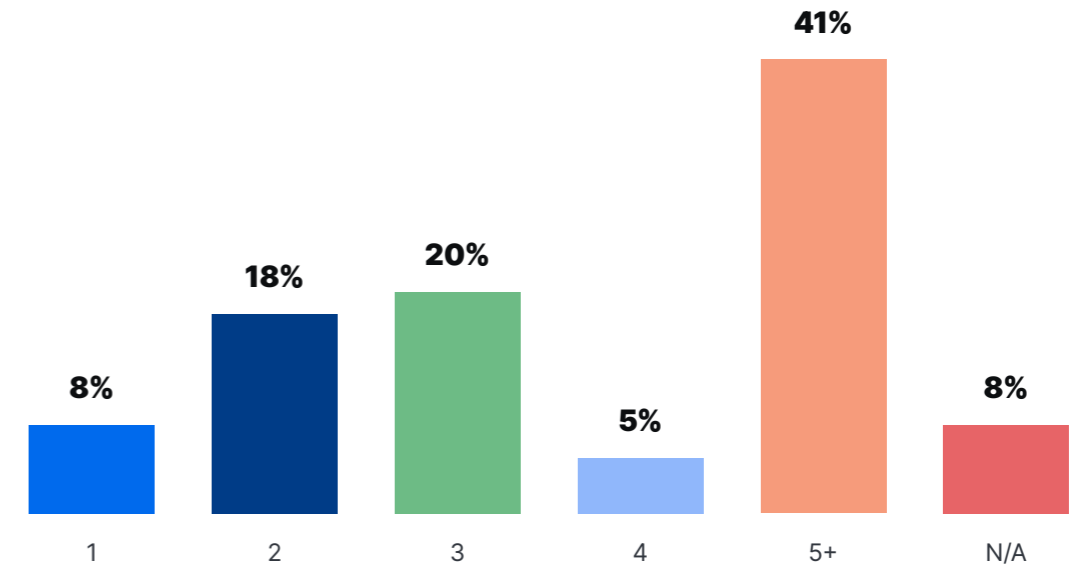


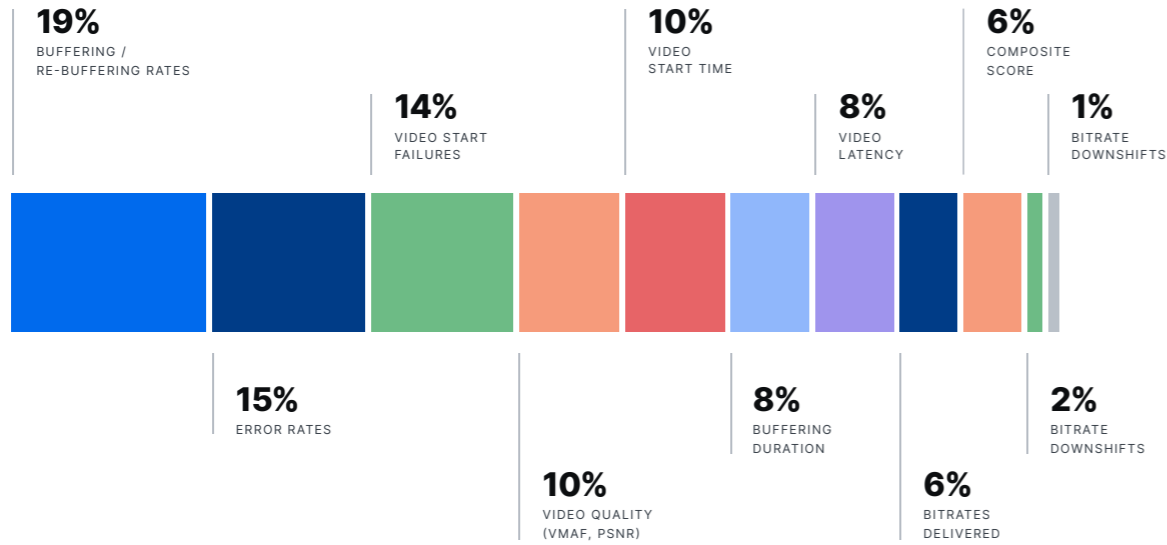
## What video analytics provider / solution do you use today?

Compared to last year, we see far more people reporting their use of Google Analytics and in-house solutions. For commercial offerings, both Bitmovin Analytics and Conviva show double digit growth, followed by NPAW and Mux with slightly higher numbers than last year.

## How many sources do you collect video streaming related data from?

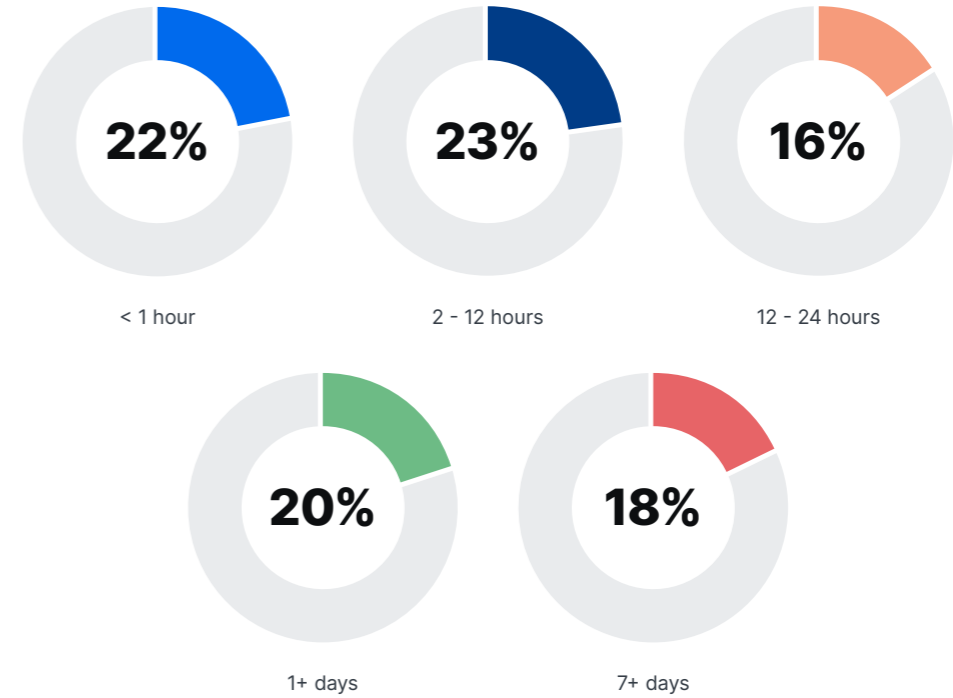
Like last year, but by an even larger margin, most survey participants are collecting streaming related data from 5+ sources in order to get a complete picture of their workflow health and user experience.





## What video performance metric is most important to you?

Buffering/re-buffering rates remained at the top of the list this year, followed by Error rates and Video start failures. Video Quality came in 4th and another quality-related metric, Bitrate(s) delivered dropped significantly from 2nd to 8th.

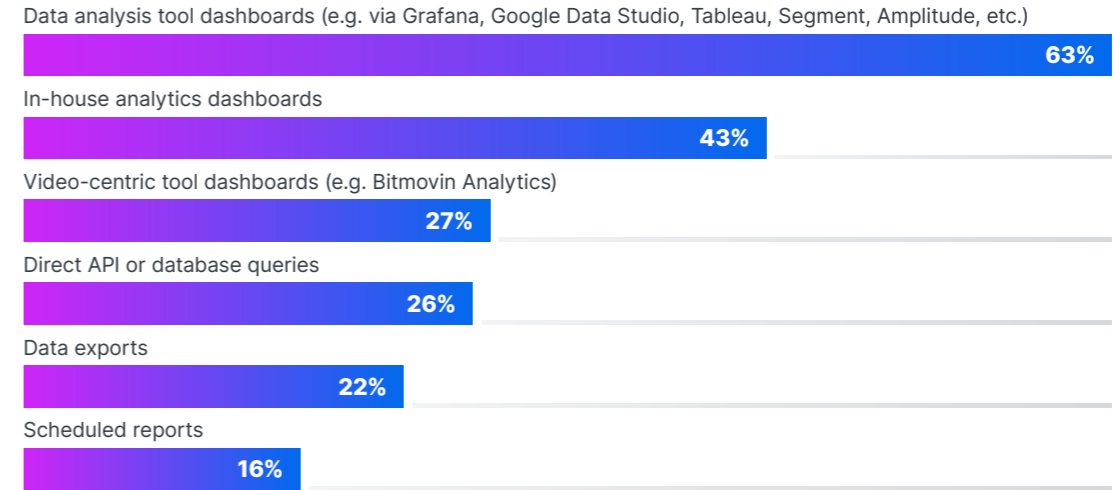
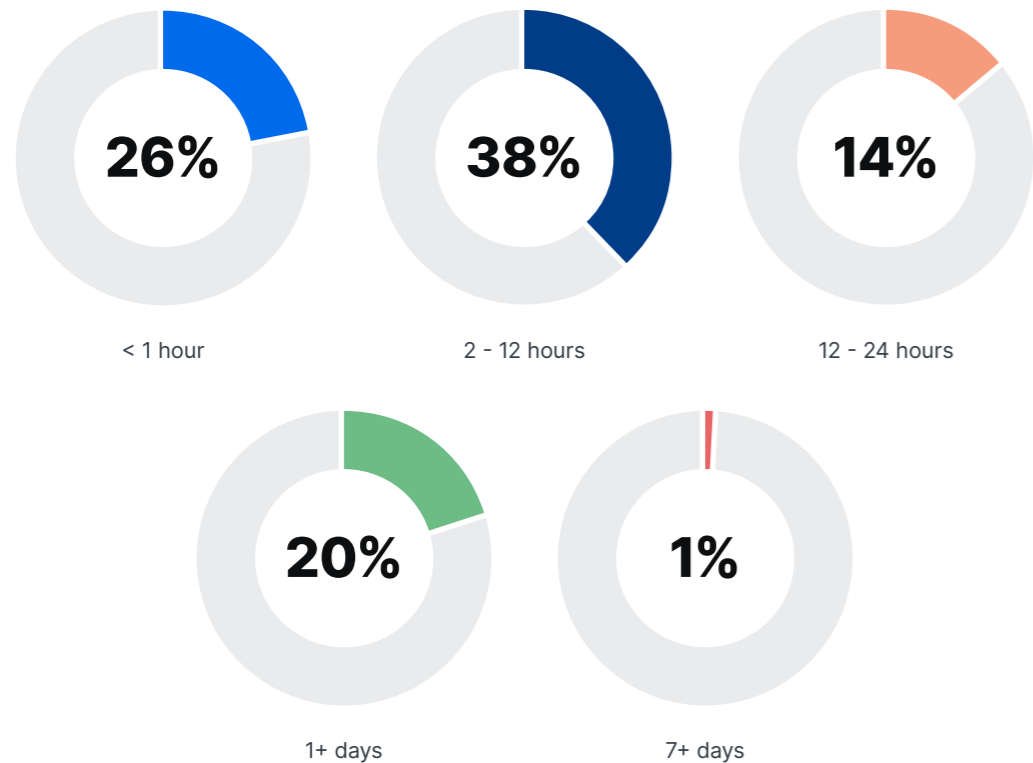


## How many hours per month does your development team spend on maintaining your video streaming analytics solution?

Compared to last year, we see increases on opposite ends of the spectrum in this year's numbers. The percentage of respondents spending less than 1 hour per month maintaining their analytics solution increased from 17% to 22% and most likely represents those using a single off-the-shelf commercial solution. On the other end, those spending More than 1 day or More than 7 days per month saw similar growth, and likely represent those building in-house or hybrid solutions.



## On average, how long does it take your team to find the root cause of streaming-related issues?



## How do you access your video analytics data?

This year's data shows that more people are using Data analysis tool dashboards (up from 50% last year) and Video-centric

tool dashboards (up from 17% last year). Direct API or database queries saw the biggest drop, so perhaps there has been a small shift away from developers accessing data directly to using more technician and operations staff friendly dashboards.

Built for technical professionals in the OTT video market, Bitmovin's software solutions are designed to optimize customer operations and reduce time-to-market, resulting in the best viewer experience imaginable. This is achieved through Bitmovin's unparalleled device reach, flexible integration, and commitment to supporting their customers.

Bitmovin's cloud-native solutions ensure the most flexible and scalable media encoding, playback, and analytics solutions are available. Optimize your content globally using future-proof codecs on the largest number of devices and screens in the market today. Enable teams to customize media workflows to align with rapidly evolving changes in business so they can identify, reduce, and control operational costs quickly. With Bitmovin, be on every screen, every new device, in every market, quicker than the competition can even blink.