

SURVEY REPORT:

Video Industry Making Significant Progress on Path to 4K/UHD



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Among other insights, a new survey by TV Technology has found that the transition to 4K/UHD has begun, but 1080p still dominates most workflows. Cameras, editing systems, and archiving are leading areas for 4K adoption, and most organizations are also looking to upgrade storage capacity and strategy.

Anyone who walks into a store selling televisions today will probably get the impression that 4K video is now the primary format for television. Certainly there are a number of displays in other formats such as 1080p and lower, but the flagship offerings from most manufacturers are 4K (3840 x 2160 pixels) displays. This year, new features such as HDR (high dynamic range), better contrast, and brighter displays are also becoming popular with customers looking for ever-higher quality images. Technically savvy viewers are starting to seek out UHD (ultra high definition) content to take full advantage of their new displays.

With all of this activity on the consumer side, content providers are having to plan their transition for producing and delivering UHD content. In order to better understand how far the media and entertainment industry has progressed towards this goal, *TV Technology* magazine conducted a global survey of more than 400 business and technology professionals. The survey was underwritten by Quantum, a leading expert in workflow storage, archive, and data protection

based in San Jose, California. Quantum had input into the survey questionnaire, but *TV Technology* had final approval on the survey. This research report analyzes these responses to help provide an accurate picture of how much progress has been made towards realizing the full potential of UHD.

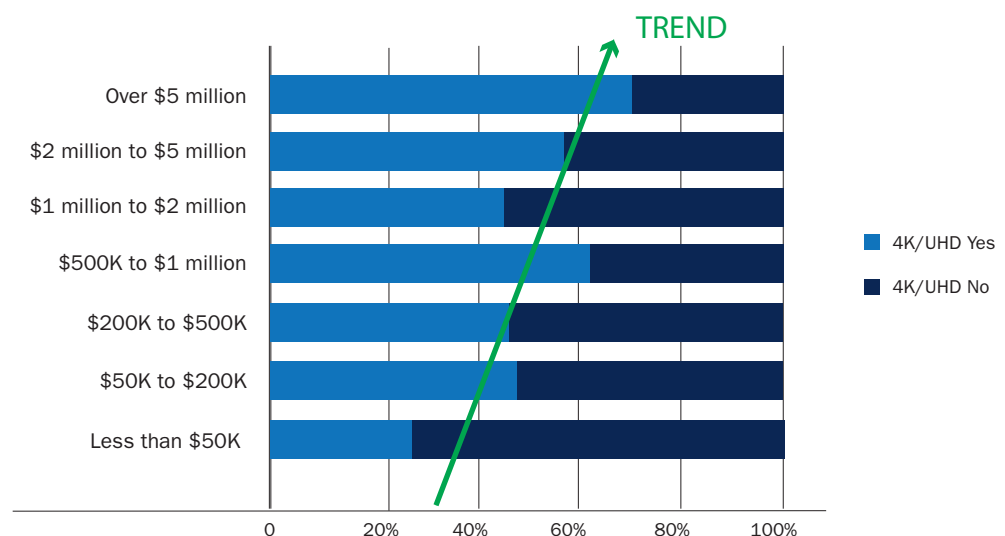
4K/UHD Usage Linked to Organizational Size

It's perhaps not surprising that large organizations were much more likely to use 4K technology than were smaller ones. Almost 65 percent of organizations with annual video production activities over \$500K (including operating expenses, capital expenditures, and staffing costs) reported current use of 4K technology. Smaller organizations (those with under \$500K in annual video production activities) were less likely to support 4K technology, with only 42 percent reporting current usage.

As shown in **Figure 1**, these trends were even more pronounced for the largest video producers

Figure 1

4K/UHD Use by Size of Organization



(72 percent of those over \$5 million use 4K) and the smallest ones (only 29 percent of those under \$50K reported 4K usage). These responses probably reflect the fact that large organizations have a greater capacity to allocate a portion of their overall budget to new technologies that might or might not offer an immediate payback. Larger organizations may also have a wider range of clients and projects and thus have sound, near-term business justifications for adopting new technologies to satisfy customer requests.

1080p is Still Most Prevalent in Workflows

While many respondents reported using at least some 4K/UHD technology, the format has not yet become the primary one for production—outside of a small number of early adopters. The survey asked respondents to indicate the video resolution that is most prevalent at each stage of their current workflow. As **Figure 2** shows, 1080p is currently the top choice at every step along the workflow for most respondents. The prevalence of 1080p probably reflects the realities of today’s market—while 4K might be desirable, 1080p provides a flexible format that

can easily be converted into 720p or 1080i. The 1080p format even produces acceptable results in some circumstances when upconverted to 4K. In addition, the costs of producing in 1080p with current generation equipment and software are lower than the costs of upgrading to an entirely 4K workflow.

It is not at all surprising to note that 4K is used most heavily at the first step in the workflow—at the camera, with 18 percent of organizations using it at this stage. The widespread availability of inexpensive, high-quality cameras that support 4K operation is one factor that has certainly affected this usage. Also, if an organization is transitioning to 4K, it makes more sense to have 4K signals coming out of the camera before upgrading the downstream portions of the workflow. At two other stages, namely editing and graphics/animation, 4K usage is relatively higher (at 12 and 11 percent respectively). Again, this makes sense because these two stages are key to creating high-resolution programming. Another point where it makes sense to use 4K is at the very last step—archiving. According to the survey results, 11 percent of organizations currently archive in 4K. This is only logical, since

Figure 2

Most Common Resolution at Each Stage of Workflow

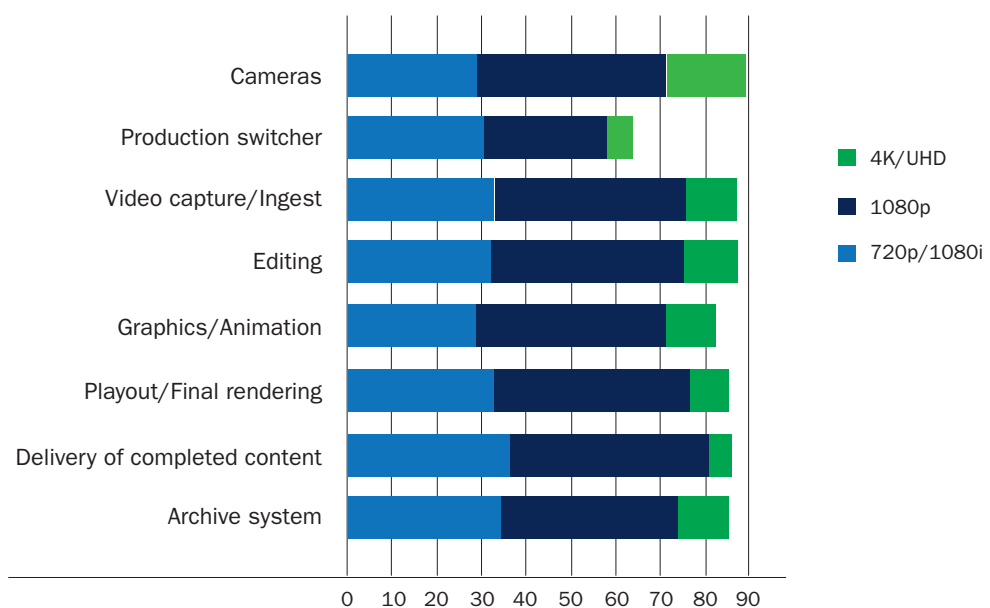
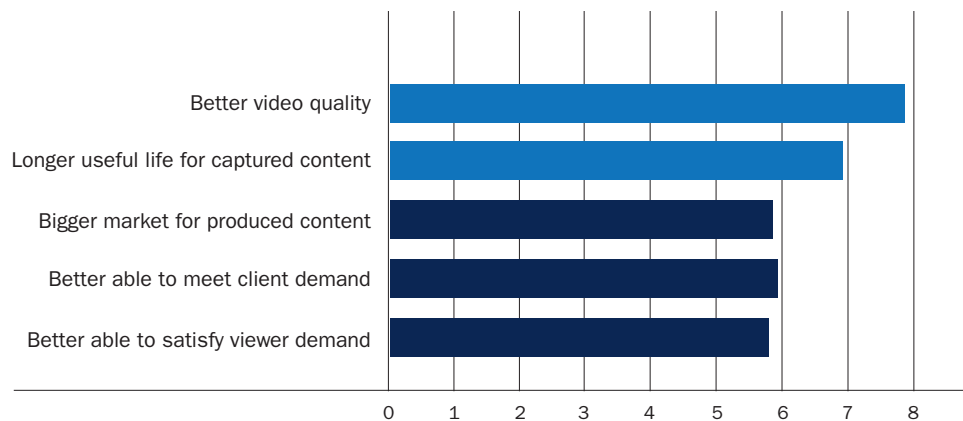


Figure 3

Motivating Factors for Using 4K/UHD



efforts to capture and edit in 4K would be wasted if archives did not preserve the higher-resolution signals for potential future use.

Two other responses that seem to be connected are the low usage rates of 4K technology for both delivery of completed content and production switchers (a.k.a. vision mixers). Both of these activities are associated with live productions, and it doesn't make much sense to go to the added expense and effort to do a live production in 4K if the resulting program is going to be delivered at a lower resolution. However, it might still make sense to capture and archive live footage at higher resolutions in case the content is needed at some point in the future. These results seem consistent, therefore, with current practices in video production.

4K is not yet the primary technology—even for those respondents who indicated their primary business was post-production. Those in this group most commonly use 1080p in their workflows. For example, 55 percent of these respondents use 1080p for editing. It is also interesting to note that 21 percent of these respondents are archiving in 4K, which is a higher percentage than most other types of organization. This finding aligns with the high percentage (31 percent) of post-production facilities that indicated they were primarily using 4K cameras, which is also higher than other market segments.

Better Video Quality is the Main Motivation for 4K

Survey respondents were asked to rate their level of motivation for adopting 4K technology in relation to several different factors using a scale of 1 to 10, with 1 being low motivation and 10 being high. The average response for each item was then calculated. As **Figure 3** shows, the strongest motivation (7.9) was the desire to produce better video quality. This result reflects the prevalent attitude in the industry that more pixels are better. The second strongest motivation (6.9) was the desire for content to have a longer useful life, anticipating that more video production and delivery in the future will be based on 4K content. This response probably reflects the experiences that many broadcasters and content providers had with the transition from SD to HD, as well as the fact that viewers tend to perceive that SD content is older than HD content of a comparable age.

Survey respondents also evaluated other possible motivations for adopting 4K, none of which prompted a significant response either pro or con. These other motivations included bigger markets for content, a greater ability to meet client demands, and a greater ability to satisfy viewers. Taken together, these responses indicate that industry professionals are not yet experiencing sufficient demand from clients or viewers to motivate their transition to 4K.

Major Workflow Changes Anticipated for 4K/UHD

Manufacturers are currently rolling out new versions of equipment and software tools in order to support the quadrupling of bit rates required by 4K as compared to 1080p (or a factor of eight increase, as compared to standard HD). Changes in device interfaces, hardware processing speeds, storage capacities, and software throughput will all be required to meet the challenging demands of 4K/UHD. Most organizations recognize that upgrading to 4K/UHD will require significant changes to their current workflows, as summarized in **Figure 4**. Note that these figures include changes that organizations that have already begun the transition to 4K have experienced, as well as changes that organizations that have not yet made significant progress with the transition are anticipating.

The biggest workflow change (73 percent) involves upgrading or replacing cameras. This makes sense, since there is no real benefit, for example, to upgrading an editing system to support 4K video if the highest resolution video being edited is 1080p. The next most commonly cited workflow change (72 percent) is increased storage costs. This also

makes sense, as the quadrupling (or increasing by a factor of eight relative to HD) of uncompressed video signal bit rates will certainly have an impact on storage. Other areas where more than half of the respondents anticipated or experienced changes in their workflow due to the 4K transition included upgrading or replacing workstations (58 percent) and upgrading or changing storage architecture (52 percent).

Interestingly, relatively few respondents (36 percent) anticipated or experienced the need to upgrade or replace networks within their studios when moving to 4K/UHD. This frankly a little puzzling. One possibility is that the respondents' organizations have already upgraded their networks to handle the higher bandwidths needed to handle uncompressed 4K signals that operate at 12 gigabits per second. Another possibility, which is perhaps more likely, is that respondents have not yet come to grips with the full impact that these new formats will have on their networks.

The Challenges of 4K/UHD

Any new technology brings potential challenges, and respondents seem to be appropriately

Figure 4

Actual or Expected Workflow Changes

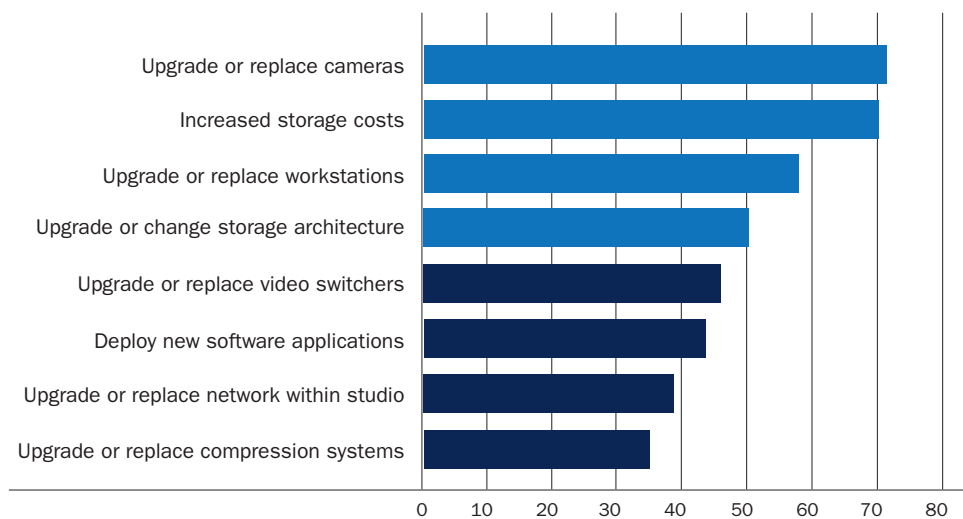
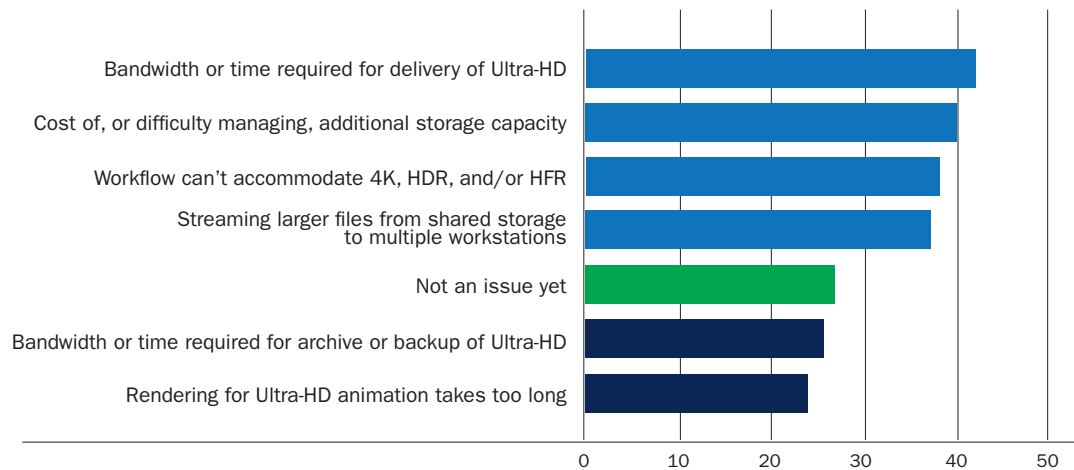


Figure 5

Challenges in Preparing 4K/UHD Workflow



concerned about the challenges they might need to overcome for a successful deployment of 4K/UHD. As **Figure 5** reveals, the challenge that most respondents have experienced or anticipate (44 percent) is the amount of bandwidth consumed or the length of time required for delivery of Ultra-HD. This concern makes sense because the file sizes for higher resolution video are larger. Similarly, 38 percent of respondents expressed concern about the difficulties of streaming larger files from shared storage to multiple workstations, and 42 percent saw the cost of managing additional storage capacity as a challenge. Taken together, these three responses show a sensible level of concern about the larger files and streams that are produced with 4K content.

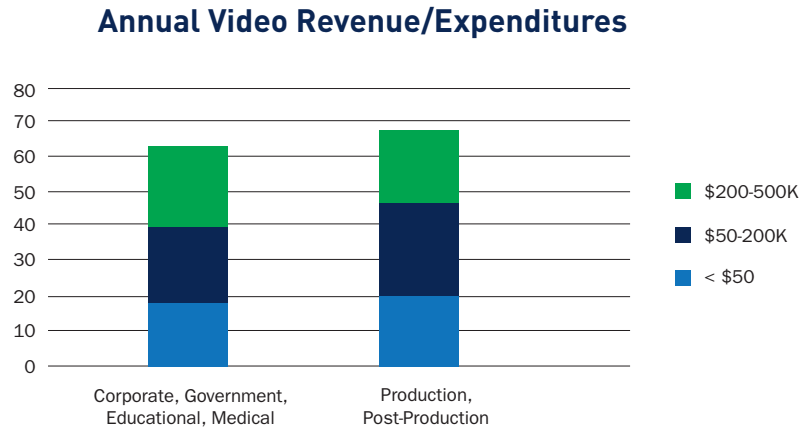
Somewhat paradoxically, only 27 percent of the respondents indicated that the time/bandwidth required to archive or back up 4K/UHD would be a challenge. As in the case of the responses concerning upgrading or replacing networks in the previous section of this report, this figure seems to suggest either that respondents have already provisioned their workflows with the higher capacity that will be needed (which seems unrealistic) or that respondents have not yet fully considered the impact of much larger files on their archive systems and other in-house devices.

Mixed Messages on HDR

UHD video promises a number of benefits for video producers and viewers—and these go beyond the benefits of more pixels. With high dynamic range (HDR), scenes with wide variations in brightness can be more accurately captured and reproduced. The ability to work with HDR signals is another factor that organizations considering UHD production need to consider, particularly in light of the “UHD Premium” branding requirements issued by the UHD Alliance during CES in January 2016. This new performance standard for displays describes a set of minimum requirements for brightness, contrast, color gamut, and of course, HDR. Displays from a number of suppliers that have been manufactured to meet this new certification level have already started to appear in stores.

According to survey respondents, HDR has not yet had a major impact on today’s workflows. In small organizations (less than \$500K in annual video production), only 17 percent currently use HDR. In larger organizations (those with over \$500K in annual video costs or revenues), only 28 percent currently use HDR—although another 30 percent of those who don’t currently use HDR are planning to begin doing so within 24 months. These numbers, which are much smaller than the corresponding rates of 4K adoption, probably

Figure 6A



reflect the relatively short amount of time that has passed since the UHD Premium specifications were finalized.

When respondents were asked to assess the impact of HDR on their organizations and on the industry, another set of perplexing results surfaced. On the one hand, most respondents (an average of 7.22 on a scale of 1–10) expect that UHD Premium will have a big impact on the video entertainment industry. However, respondents on average did not expect UHD Premium to have a big impact on their own organization (average of 5.59) or on their plans for their workflow (average of 5.55). One possible explanation for these conflicting results could be that respondents have already thought through the potential impact of HDR and made plans accordingly. It could also be that most respondents are underestimating the impact of HDR on their workflow. Only time will tell which explanation is closer to reality.

Comparing Two Markets

Using the demographic data gathered in the survey, it is interesting to look at two major video markets that both have significant potential for 4K/UHD deployment. The first market comprises traditional production and post-production facilities for the broadcast industry. This group contributed the largest number of responses to this survey. The second market is a combination of corporate/government/educational/medical (CGEM) respondents, which collectively also contributed a significant number of survey responses. These two markets both consume and produce large amounts of video content. The main difference is that CGEM organizations predominantly use video to support other business/organizational activities, whereas in the broadcast production/post-production realm the main product is the video content itself. **Figures 6A–D** illustrate a few pertinent comparisons between these two markets.

Figure 6B

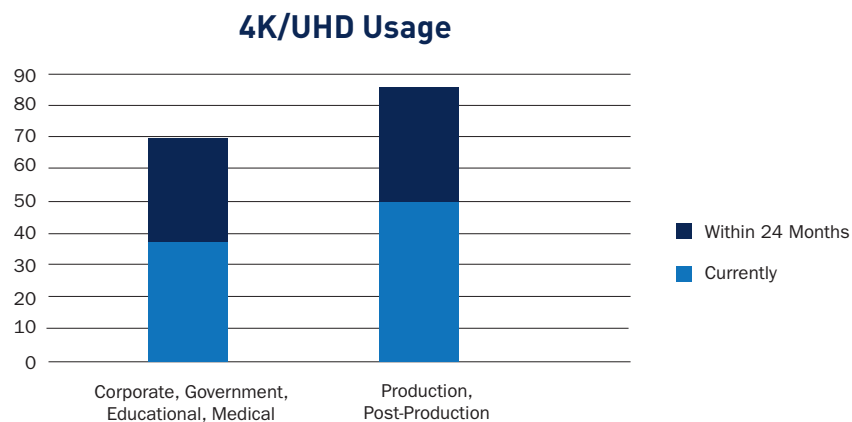
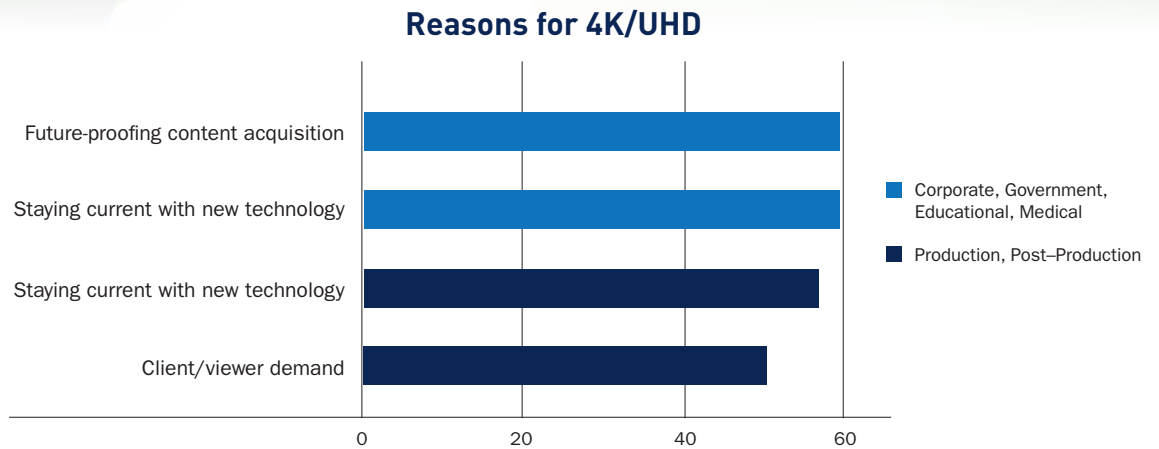


Figure 6C



Sixty-nine percent of the CGEM organizations produce less than \$500K of video annually. Of the post-production organizations, 72 percent fell into this category as well (see Figure 6A). This level of expenditure would typically cover a group of five full-time people or fewer, so these groups are either small departments that are part of larger CGEM operations or small businesses/freelancers in the production business. Some of the clients of the small production houses could be CGEM organizations, although there is no way to verify this within the survey results.

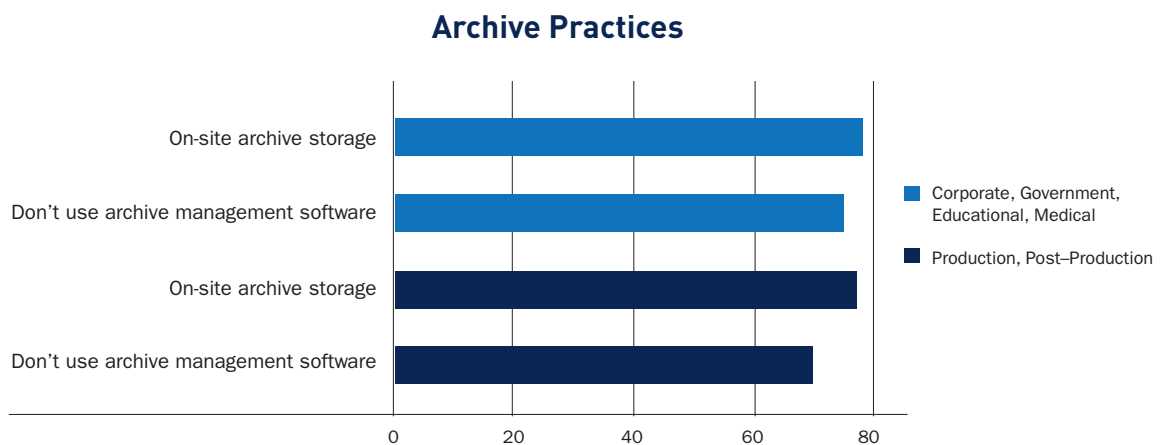
CGEM usage of 4K/UHD video is fairly high overall, with 43 percent currently using 4K/UHD video, as compared to 59 percent of the post-production market (see Figure 6B). In addition, almost half (49 percent) of those CGEM organizations that don't currently use 4K plan to begin using 4K/UHD within 24 months, as

compared to 65 percent of the post-production teams. This means that, overall, 70 percent of the CGEM group and 85 percent of the post-production group plan to be using 4K within two years.

For both CGEM and post-production organizations, 1080p is the most commonly used format at every step of their workflows. This result is consistent with the overall survey and corresponds to the finding that 4K/UHD technology is just beginning to be widely adopted.

Figure 6C shows that the two most popular reasons for using 4K in CGEM organizations are "Future-Proofing Content Acquisition" and "Staying Current with New Technology," both at 60 percent. The top two reasons for using 4K in post-production houses are "Staying Current with

Figure 6D



Manufacturers are currently rolling out new versions of equipment and software tools in order to support the quadrupling of bit rates required by 4K

New Technology,” at 57 percent, and “Client/Viewer Demand,” at 50 percent. For CGEM organizations, the costs of acquiring new content (such as hiring talent and booking studio time) can easily dwarf the costs of the remaining steps in their workflows. It therefore makes sense that they would want to capture new footage in 4K to give it as long a useful life as possible. In contrast, since many post-production organizations do not own the rights to much of the content that they routinely process, it is not surprising to see that long-term shelf life of the content is not a high priority. Satisfying customer demands, on the other hand, is a major motivating factor for half of these respondents.

In CGEM video groups, 80 percent of the respondents use on-site archives for their raw and/or finished content, and 76 percent do

not use archive management software (see **Figure 6D**). The figures are similar for the post-production segment, with 78 percent using on-site archives and 71 percent not using archive management software. These results are consistent with the fact that there are many small organizations in both of these market segments.

In terms of demographics, expenditure, 4K usage, and archive practices, therefore, there is a fair degree of similarity between the post-production and CGEM segments, including demographics and their acceptance of new technologies.

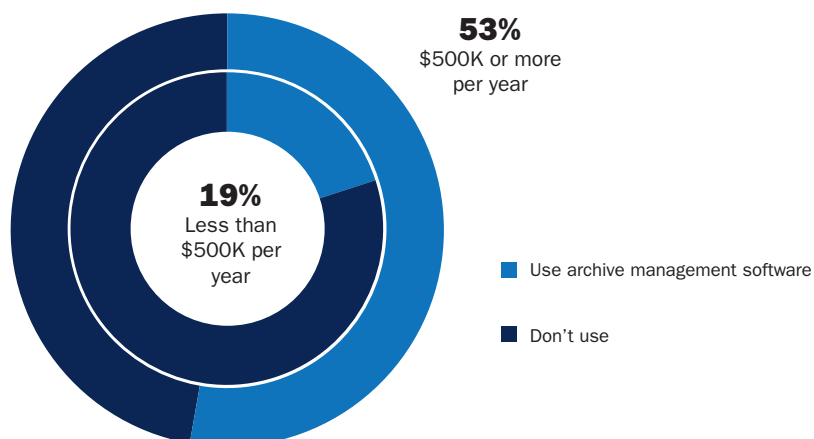
Archiving and Storage

More than 70 percent of respondents use on-site storage for archives, regardless of an organization’s size. The second most popular archive storage location (22 percent) is offsite at another location within the same organization. These figures could indicate that ease of access and control of the physical media are more important to most organizations than protection from major disasters.

Large video producers are much more likely to use an archive management software tool. Only 19 percent of organizations with less than \$500K in video activities annually use these

Figure 7

Archive Management



tools, whereas 53 percent of organizations over \$500K do use such a tool (see **Figure 7**). As organizations grow, the benefits of using management tools become more attractive as the costs of setting up and maintaining these systems on a larger scale are greater. Small organizations, on the other hand, may be able to get away with using low-cost paper- or spreadsheet-based methods for managing archives. Storage technologies are also related to organizational size, with over half of large (>\$500K) organizations using both SAN and NAS technology. In small (<\$500K) organizations, direct attached storage (DAS) is very popular, with 60 percent deploying the technology.

Conclusion

The majority of TVs sold today are 4K, and video content production is making the transition, even though the overall penetration of 4K TVs remains low relative to an enormous installed base. Half of the responding organizations have already put this new technology to use, and another 45 percent are planning to do so within the next 24 months, bringing the total to over 70 percent of all organizations. This migration is not consistent across all phases of the workflow, with cameras taking the lead, followed by editing, graphics/animation, and archiving. Producers are primarily motivated to use 4K because of their desire to create video with higher image quality and longer future shelf life—rather than reacting to customer

demand for UHD content. The challenges of increased bandwidth and storage costs are certainly on the minds of respondents, but they do not appear to be overwhelming negatives that will hold back adoption. Although only a small percentage of respondents has actually sampled HDR technology, most of those surveyed feel that the technology has the potential to have a major impact on the industry going forward.

Two market segments have been relatively rapid adopters of 4K/UHD technology: the post-production market and the CGEM market, although for different reasons. While the adoption in post-production has been driven in large part by customer demand, the CGEM market has been seeking to capture higher quality content for current and future use. Clearly, market forces are working to move the video industry into a 4K future. ●

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