



## REPOSITIONING FOR 2021 – THE IABM TECHNOLOGY AND TRENDS ROADMAP HELPS DETERMINE YOUR FUTURE DIRECTION

*IABM's CTO, Stan Mooté discusses how the changes everyone made in 2020 will help focus on having a fresh look at all businesses in the media content chain*

It goes without saying how embracing newer technologies kept our industry “on-air” during 2020. So what will be the new norm in 2021? The first step to establishing some sort of direction is to understand the direct affects of COVID over the past year on technology and trends. For example, pretty much everyone jumped into cloud and learned that it isn’t as scary for live and remote operations as many were concerned about. The use of off-the-shelf collaboration tools works – perhaps not ideal, but keep our media factories running. Business teleconferencing tools, built-in cameras within mobile devices and webcams permitted work from home



scenarios, not only for production crew, but also for on-air talent. All this being said, audiences started to accept glitches, streaming issues and for that matter more often than not poor video and audio quality; our expectations for more 4K UHD in 2020 turned into “COVID Quality”. The IABM Technology and Trends Roadmap is being used by both business leaders and technology types to both help plot out their companies’ future directions and also assure that during each growth phase, no technology or trend is overlooked. I was fortunate to assemble a roadmap team of vendors and end-users covering all aspects of our industry. Although our team didn’t

agree on every aspect, we did ultimately come to an agreement to produce this roadmap as an industry reference – a jumping-off point for your business.

For the 2020 IABM Technology and Trends Roadmap we felt it was best to understand the aspects of change in 2020, so we started out with a COVID Impact section plotting each area of the content chain over an impact range of negligible to major. As you can see in the graphic, some areas such as Publish had little impact, particularly on general playout and OTT except during a live event; remote delivery suddenly took on a whole new meaning.

**VIEW/DOWNLOAD THE FULL ROADMAP** Please note, you will need to be a registered user of our website to access this page.

Starting with Live Events, large-scale mobilization of production

# IABM Technology and Trends Roadmap



COVID Impact	BaM	Negligible	Minor	Moderate	Major	Synopsis
<b>Live Events</b> Sports, Concerts, Virtual Events	Create Produce Manage Publish Monetize					Larger scale virtualization of production systems for live events won't return to normal mode of production for some time. Greater focus on higher quality audio, utilizing global motion picture audio mixing/tracking concepts has seen practical success. Zero Client technology will continue to be more readily adopted. Lower-bit rate compressed production on broadcast-like production components enables smaller-scale venues.
<b>Studio Productions</b> Scripted, Live Shows, News	Create Produce Manage Publish Monetize					The industry quickly pivoted off the shelf available, general purpose solutions using tools such as Zoom, Eclypsing, Teams, Slack, etc. These applications when used in combination with broadcast tools and workflows achieve a working level of integration deliver rich workflows including virtual audiences. The acceptance of 'COVID Quality' is driving expectations for lower cost solutions.
<b>Distributed Infrastructure</b> Home Studio, Backstage Workflows, Cloud Production Delivery	Create Produce Manage Publish Monetize					A year ago our attention was focused on innovative at-home sports production. This year we literally have news staff producing and accelerating deployment and performance. These include VPR, Zero Trust, cloud-based workstations using PCoIP and low latency high bandwidth video transmission for remote production and monitoring. However, use of these tools highlights the fundamental need for IP fabric, switches, routers, IT infrastructure and home UPS systems.
Technology & Trends	BaM	Bleeding Edge	Early Adopter	Mature	Commodity	Synopsis
<b>Collaboration</b> mobile, desktop & conferencing	Create Produce Manage Publish Monetize					For many videoconferencing solutions, we employed primarily by corporate entities. Proliferation of smartphones, improved mobile networks and VoIP technologies enabled new conferencing apps and improved collaboration tools while broadening their base. The pandemic has created a competitive race to produce the user-friendly rich media and secured apps. These include Zoom, Microsoft Teams and a host of others. The pandemic has also driven the industry to invest in cloud-based videoconferencing production live shows from home.
<b>Cloud</b> XaaS/Cloud-as-a-Service	Create Produce Manage Publish Monetize					Cloud and Hybrid Cloud solutions have been increasingly used; this has been dramatically accelerated by the pandemic. It can be argued that this has pushed more areas into the 'mature' and 'commodity' columns faster than might otherwise have been the case. The pandemic has also driven the industry to invest in cloud-based videoconferencing production live shows from home.
<b>Compute &amp; Storage</b> CPU, GPU, FPGA, MMIO, PCIe, SSD	Create Produce Manage Publish Monetize					Compute acceleration via GPU and FPGA is now common. From specialized AI workstations and real-time video conversion to NICK, density increases continue in both HDD and SSD, as 3D NAND and MLC packing techniques improve NVMs is now a common theme to flash storage. NAND is in its early adoption, providing much needed storage from MC to GPU. AI acceleration is driving the need for high performance compute architectures, including 3D NAND, 3D XPoint, and HBM. AI acceleration, accelerating databases, metadata analytics and machine learning.
<b>AI/ML-Analytics</b>	Create Produce Manage Publish Monetize					Facial/gestural recognition is solid. Speech-to-text works in over 100 languages. Bleeding-edge AI-powered sports systems are being used to analyze game data. AI is being used to analyze content, including metadata, to create targeted advertising. AI is also being used to analyze content creation as well as remote working.
<b>Immersive Imaging</b>	Create Produce Manage Publish Monetize					NDR and NDC are now common delivery formats from OTT providers, and extend theatrical venues. Immersive audio, including Dolby Atmos, is being used in live events and in high-end theatrical releases. HDR continues to dazzle audiences at gaming and location-based entertainment venues, although with mixed results in theatrical releases. Volumetric capture is being used to create high-quality, high-resolution, high-quality and robust cuts, and when combined with LEDAR-enabled point-cloud environments, drive the pitch-LED walls.
<b>Blockchain</b>	Create Produce Manage Publish Monetize					Blockchain has shifted from 'the talk of the town' to a more practical implementation. Of note are now mesh-based techniques that have an alternative approach to CDN-based delivery. It's also being seen in the area of rights management and distribution. Blockchain is being used to create digital assets and to manage the distribution of content. There is hope that blockchain will assist with parking out deep lakes.
<b>Security</b> Cyber, Physical, Compliance, Access, Data Trust	Create Produce Manage Publish Monetize					Security should be considered at all stages of product development, deployment and operation, and recent events have accelerated decentralized production and ready pushed look out of the studio and into the homes of staff. This required an intense focus on secure operations in fundamentally insecure, distributed remote contexts. Technologies like VPN, Zero Trust, and secure access service edge (SASE) are being used to secure remote work. The battle against piracy is strengthened with advanced monitoring techniques.
<b>Virtualization</b> Visualize/Converge/Control Full, Partial, Infrastructure	Create Produce Manage Publish Monetize					Server virtualization is standard for many workloads, although latency-sensitive & graphics-intensive tasks like color correction are slow to embrace it. Advances in virtual NIC software stacks improve utilization of all of server resources. A new wave of server virtualization is being used to create digital assets and to manage the distribution of content. Network virtualization allows software-defined network functions to be spun up and down. Newer efficient methods like ARM networks and SD-WAN are becoming common.
<b>Transport/Networking</b> 4G/5G/6G, ST 2110, SON	Create Produce Manage Publish Monetize					1, 10 and 100 GbE networks are commonplace with 40GbE and 100GbE becoming the norm. 5G is emerging with 5G-Advanced standards and recommendations (3GPP R16, R17, R18) with 5G-Advanced networks being deployed. 5G-Advanced networks are being used to create digital assets and to manage the distribution of content. Network virtualization allows software-defined network functions to be spun up and down. Newer efficient methods like ARM networks and SD-WAN are becoming common.
<b>Delivery</b> SD-WAN/ATSC-OTT	Create Produce Manage Publish Monetize					Added from live content, OTT is solid and growing. AVM techniques are improving compression, however licensing isn't standardized. Having video anywhere, on any device, at any time is commonplace, not just expected but demanded. The push for virtual zero latency continues. ATSC 3.0 and 5G deployments are well underway. Monetization models are still very much in flux.
<b>Super Trends</b> Sustainable/Convergence Systems/Personalized	Create Produce Manage Publish Monetize					Smart media devices pioneered internet-of-things (IoT) though IABM research shows this is not a priority of media companies in the near term. However, the industry is seeing a shift towards more sustainable and converged production environments. There is a solid bar between the creation of gaming technology and entertainment production, i.e. synthetic productions, camera based LED walls/cenings. The production of video for social media is a must.

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## TECHNOLOGY TRENDS

systems for Sports and Venue Events won't return to normal for the immediate future. Concert-like venues with large audiences tend not to be hosting live events, moving toward a live-remote-collaboration model of 'conference call' like technologies to produce and engage spectators. Higher quality audio, utilizing global motion picture editorial/scoring/tracking concepts has seen practical success. The use of Zero Client technologies has enabled segments previously constrained to facility based high-end graphics or special-effects to be done totally remotely. Lower-bit-rate compressed production on broadcast-like production components has permitted small-scale venues.

News and Talk Shows quickly moved away from studio productions and took advantage of off-the-shelf scalable, general purpose solutions using tools such as Zoom, Facetime, Teams, Slack, etc. to keep on-air. Typically news had a huge head-start

as they already were using bonded cellular and Internet tools for remotes on a daily basis. With scripted series and talk shows, the off-the-shelf general applications used in combination with broadcast tools and workflows have achieved a surprising level of integration deliver rich workflows including virtual audiences. Currently with the acceptance of "COVID Quality" there is an expectation for lower cost solutions. With the bubble concept being used for scripted productions, one group told us they are so efficient having everyone locked away together, no waiting for people, no travel delays etc, on a go forward basis they want to continue using the bubble concept for shoots well into the future.

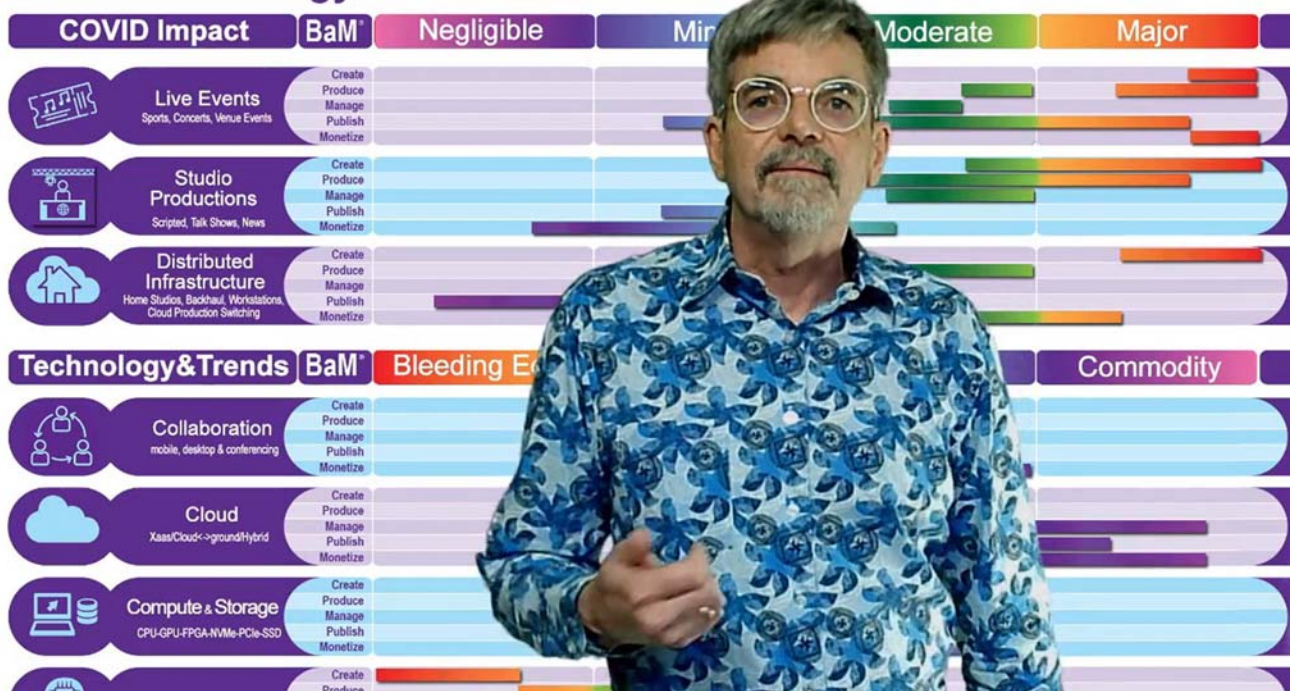
A year ago our attention was focused on innovative at-home sports production. This year we literally have news staff producing live programs from their homes with

Cloud Production Switching. Old technologies have taken on new value in current circumstances, and new technologies are accelerating deployment and performance. These include VPN, Zero Trust, cloud-based workstations using PCoIP, and low cost/latency/bandwidth video transmission including consumer-focused tools. However, use of these tools highlights the fundamental need for a robust, diverse, secure IT infrastructure and home UPS systems to handle Home Studios, Backhaul and remote Workstations.

Next the roadmap team took forty-plus technologies and trends and put them into similar groupings, plotting on the range from bleeding edge use-cases to commodity products and services.

No question, 2020 has been the year for collaboration, so we added this in as a trend as videoconferencing solutions have become indispensable. Proliferation

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of smartphones, improved mobile networks and VoIP technologies enabled new conferencing apps and improved collaboration tools while broadening user base. The pandemic has created a competitive race to produce the user-friendliest, richest-featured and securest apps. Remote content production and broadcast demands are pushing these technologies further including collaboratively produced live shows from homes.

Cloud and Hybrid Cloud solutions have been increasingly used; this has been dramatically accelerated by the pandemic. It can be argued that this has pushed more areas into the “mature” and “commodity” columns faster than might otherwise have been expected. Organizations previously reticent to consider cloud for

storage and processing are now embracing it. Here is a key thought for 2021 as a risk factor analysis: rather than moving to the cloud being perceived as risky before 2020, it’s now perceived as risky not to.

Compute acceleration via GPU and FPGA is now common, from specialized AI workstations and real-time video converters to NICs. Storage density continually increases for magnetic hard drives as well as solid state drives, as 3D NAND and MLC packing techniques improve. NVMe is now a common interface to flash storage, and PCIe 4 is in early adoption, providing much more bus bandwidth from NIC to GPU

(bypassing CPU memory). By using the new techniques of moving NAND to the memory bus gone is the traditional HDD/SSD SAS/PCIe driver & software latency, hence accelerating databases, metadata analytics and machine learning computations.

Using Artificial Intelligence for facial/object recognition is solid. Speech-to-text now works in over 100

venues. Immersive audio, rendered in real time from an object-oriented mix is standard in high-end theatrical releases, and HFR continues to dazzle audiences in gaming and location-based entertainment venues, although with mixed results in theatrical releases. Volumetric capture (RGB +Depth) systems continue to improve quality and reduce costs, and when combined with LIDAR-



“We see creative collaboration as central to success for our industry and we have launched a number of initiatives aimed at fostering this over the last 18 months. The Technology and Trends Roadmap is another large step forward in nurturing the partnerships that will drive all our futures. As with the BaM Content Chain®, it is also a ‘living’ concept that can provide a secure basis for business decisions not just now, but way into the coming years too.”

**PETER WHITE, CEO, IABM**

languages and has remarkable natural feel. Bleeding-edge AI-powered sports systems record entire games (panoramic view), while detecting/tagging all movement to create highlights. Intelligent transport architectures use ML to evaluate historical transfer information to choose the optimal number of parallel transport streams and acceleration protocols. AI/ML now augments content production from smart trackers through to sensing emotional reactions assisting content creation as well as remote working.

HDR and WCG are now common delivery formats from OTT services, and select theatrical

scanned point-cloud environments, drive fine-pitch LED walls.

Blockchain has shifted from ‘pie in the sky’ or not yet media-relevant to some early implementations. Of note are new mesh-based techniques that have an alternative approach to CDN-based delivery. It’s also being seen in the area of rights management being the logical place to take advantage of the inherent advantages of distributing metadata via blockchain. There is hope that blockchain will assist with parsing out deep fakes.

I can’t emphasize how important that security must be considered at all stages of product development, deployment and

operation. Since recent events have accelerated decentralized production and rapidly pushed tools out of the studio and into the homes of staff, security concerns are even more imperative to be in strict practice. Technologies like VPN, Zero Trust, Endpoint Protection as well as cloud-based security and tools are enabling remote operation and fundamental business continuity across production and business units. The battle against piracy is strengthened

host OS and the orchestration layer allowing re-use of libraries and other server resources. Network virtualization allows software-defined network functions to be spun up and down. Newer efficient methods like Mesh Networks and SD-WANs are becoming more common.

1, 10 and 100 GE networks are commonplace with 25GE interfaces becoming so. 400GE is emerging with 800GE in development. The drivers are uncompressed low latency live

Aside from some live content, OTT is solid and common. AI/ML techniques are improving compression, however licensing isn't standardized. Having video anywhere, on any device, at any time is commonplace, not just expected but demanded. The push for virtual zero latency continues. ATSC 3.0 and 5G deployments are well underway. Monetization models are still very much in flux.

To capture other areas such as Social Media, Esports, Gaming, Synthetic Production and Internet-of-Things (IOT), we group them as Super Trends. Our industry pioneered IoT with smart media devices, although sorrowfully IABM research shows this is not a priority of media companies currently, despite the growth in connected entertainment. Esports productions are becoming less of a trend; they are now

higher end productions, the difference being using more networking tools, over traditional broadcast. There is a solid blur between the crossover of gaming technology and entertainment productions- i.e. synthetic productions, camera locked LED walls/ceilings. The production of video for Social Media is a must and COVID has made this abundantly clear. ■



“One of the constantly moving challenges in our industry is not only keeping up with all the new technology trends, but also having a deep enough dive to understand what is truly relevant and not simply just a ‘fad’. Our industry pumped 25% of hard-earned revenue back into R&D in the last half of 2018 - so every penny spent needs to be as close to a sure bet as possible. End-users also have a similar issue understanding which technology to bet on, what they can’t live without – the ‘must haves’ - and which will capture more market share for them, as well as providing a path of profitable growth. The Technology and Trends Roadmap will help address these fundamental business questions for everyone involved with broadcast and media technology”

**STAN MOOTE, CTO, IABM**

with advanced monitoring and watermarking techniques.

Server virtualization is standard for many workloads, although latency-sensitive & graphics-intensive tasks like color correction have been slow to embrace it. Advances in virtual GPU and NIC software stacks improve utilization of shared resources. A newer approach is where containers use the same

content, live remote production and collaboration. Interoperable standards and recommendations (SMPTE ST 2110, TR-1001-1) with dropping bandwidth costs have enabled IP WAN-LAN convergence. SDN and new orchestration offerings enable real time remote production and transmission while driving down production costs and facilitating more creative offerings.

Source : IABM