



Tuomo Tolonen - *Sr. Director for Pro Audio at Shure with over 25 years of experience in the professional audio industry.*

Extensive experience of RF co-ordination and wireless technology having worked at large global events

Steering Group member of BEIRG (British Entertainment Industry Radio Group) and the UK Spectrum Policy Forum

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PMSE WHAT IS IT?

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The Early Days (CBS 1954)



The Importance of **Wireless**



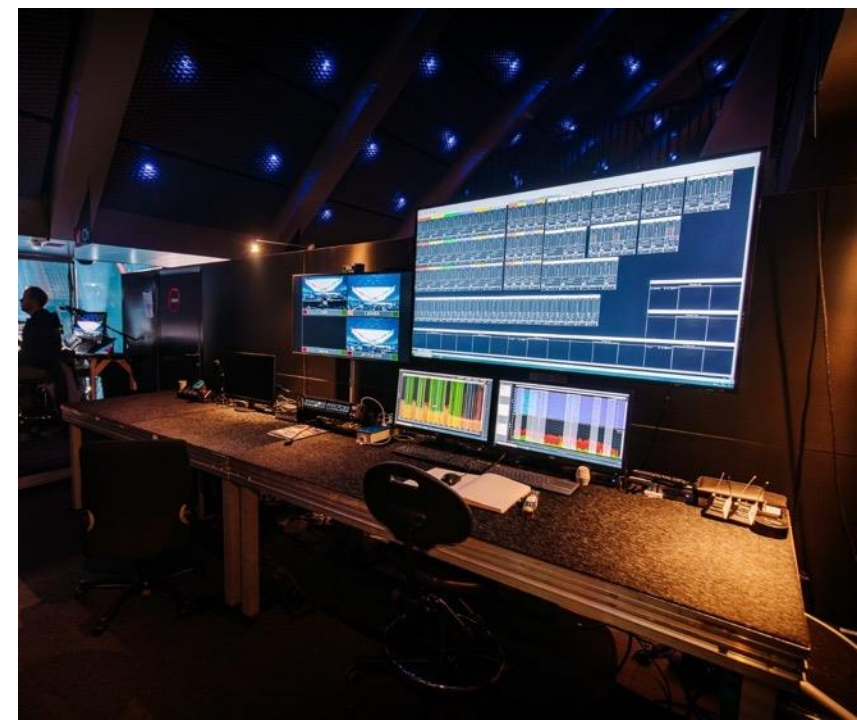
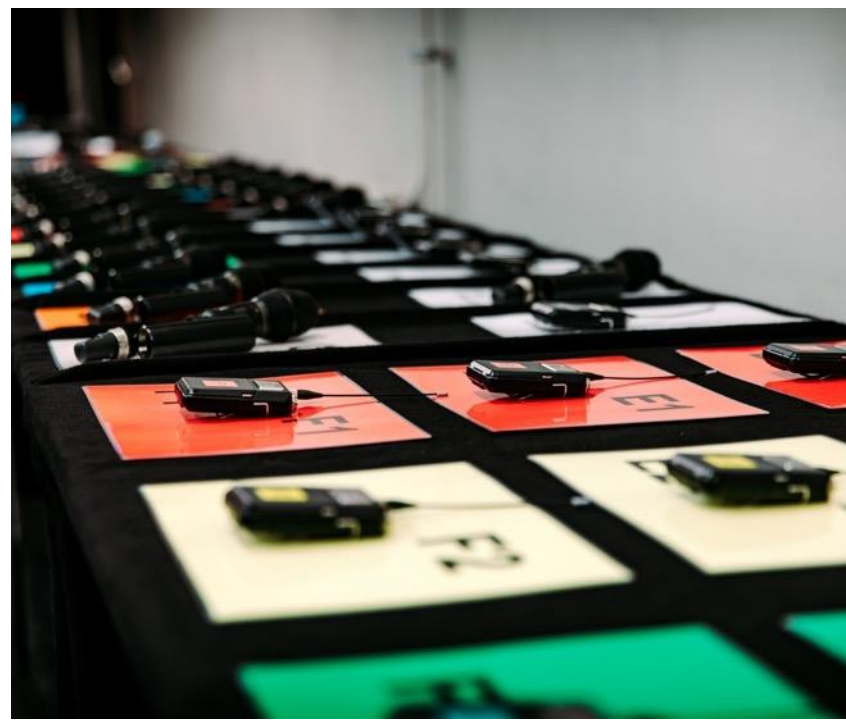
Live Events



Ceremonies & Events



Ceremonies & Events



Sporting Events



Sporting Events



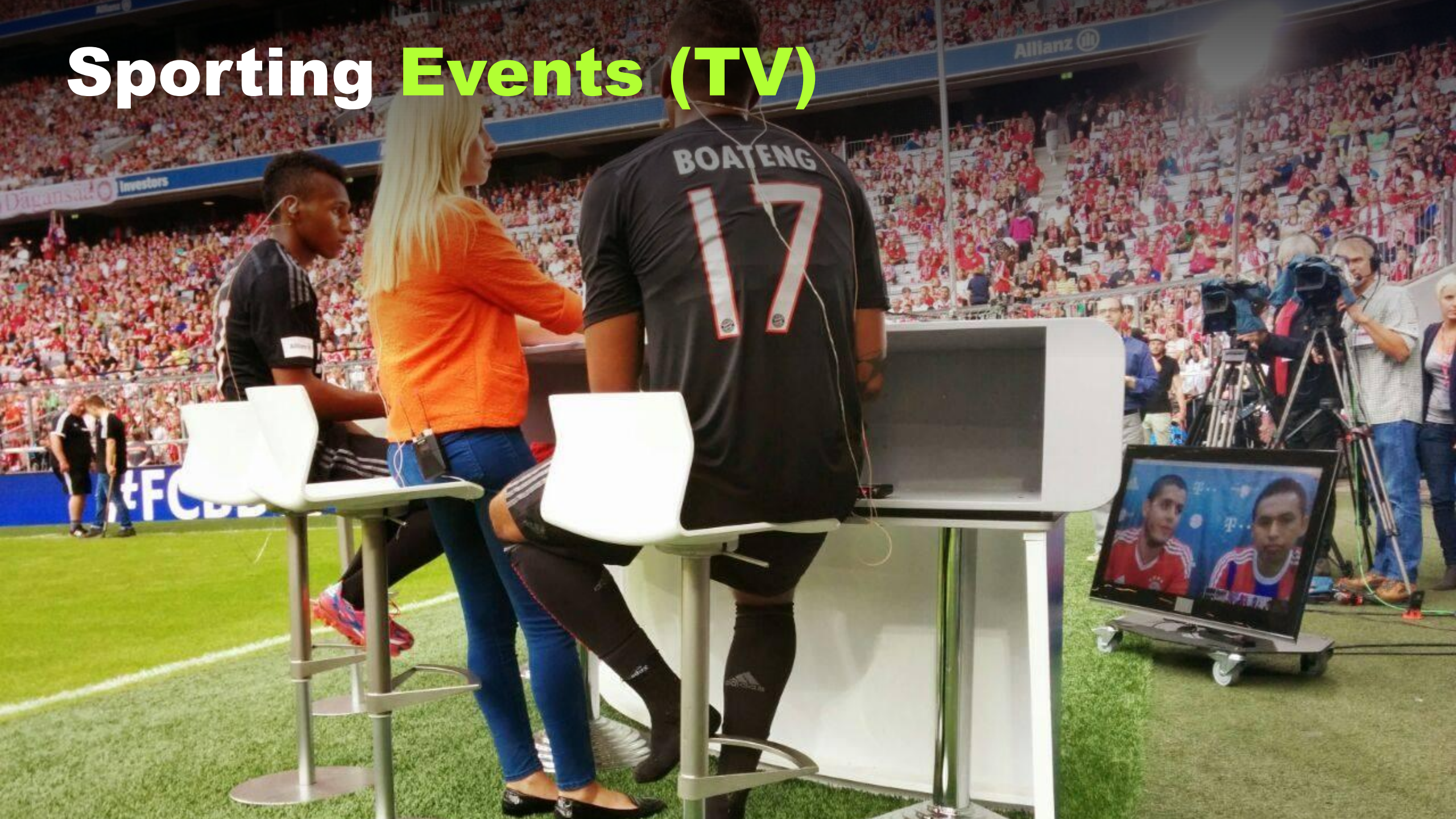
MCI 2-0 AVL
66:08



VAR



Sporting Events (TV)



Television Studios



Electronic News Gathering



NAPLES, FL
12:30 PM

BREAKING NEWS

HURRICANE IRMA SLAMS FLORIDA KEYS AS CATEGORY 4 STORM

LIVE
MSNBC

HURRICANE IRMA	WIND SPEED 130 MPH	WIND GUSTS 160 MPH	DIRECTION/SPEED MOVING N @ 9MPH	45 MILES NNE OF KEY WEST
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Made for **Television**



Location Sound



Conferences



Theatre



Theatre



House of **Worship**



Corporate



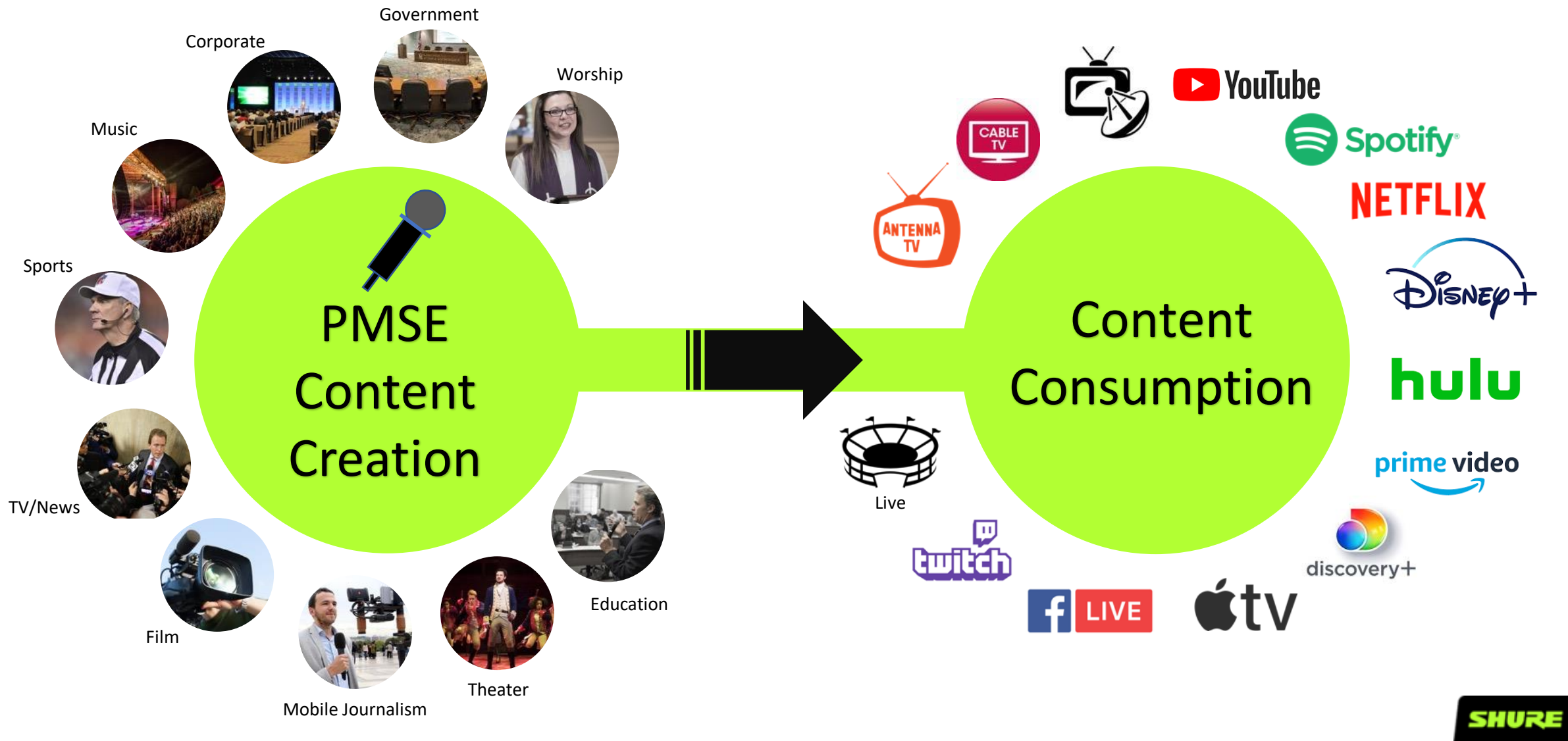
PMSE WHAT IS IT?



PMSE provides an essential service that connects people through the digital economy



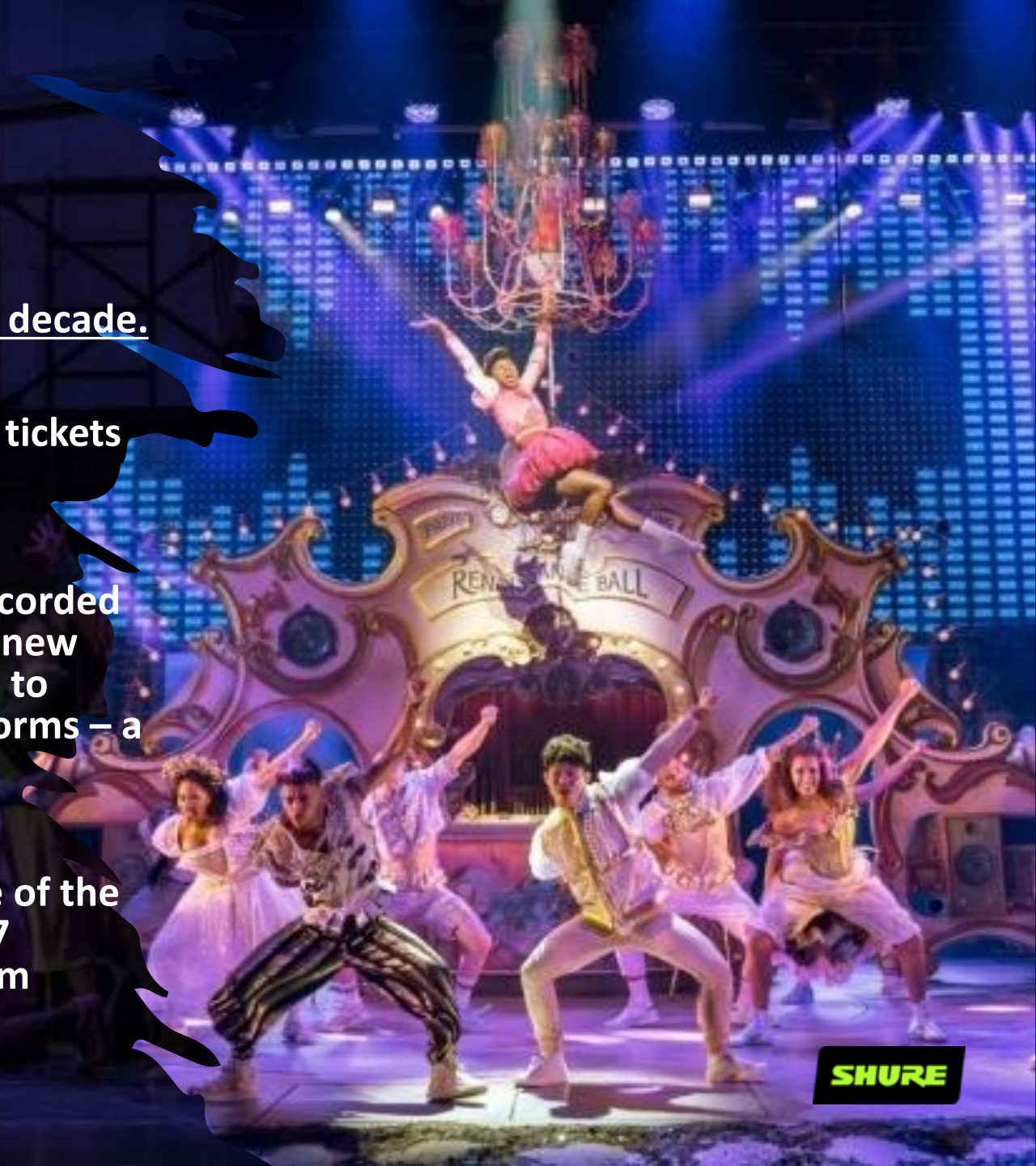
Content Creation Enables Consumption



UK Theatre

Theatre audiences have grown year on year for over a decade.

- Theatre sales throughout the UK reached 34 million tickets in 2018, up 80% from 18 million in 2014.
- In addition to the traditional live audiences, both recorded & live streams to cinemas, globally opened a whole new audience. In the face of a pandemic, this has grown to include the online, on demand, live-streaming platforms – a new engagement that is here to stay.
- The National Theatre's NT at Home scheme was one of the biggest virtual successes of lockdown; it screened 17 productions and garnered more than 15m views from audiences in more than 170 countries.



UK Film and TV

- Production value, audio capture, location-recording and reality TV productions have developed exponentially, in terms of volume, scope and scale of production.
- The industry spend was £3.6Bn in 2019, showing a 16% increase on 2018
- Revenue represents 20% of the whole creative sector
- Globally, Netflix anticipated \$17bn spend on Content Creation in 2020, rising to \$26Bn in 2026

In 2022 Disney budget a \$33 billion investment in content creation - 8 billion more than for 2021



The 2022 audience

NETFLIX

Disney+

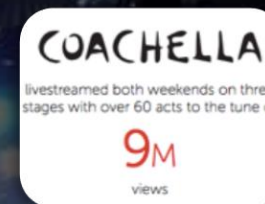


Apple tv

prime video

Music & Festivals

- In the music sector, over 30 million fans attended gigs and festivals in 2019, contributing £4.5bn to the UK economy alone
- During the pandemic we have seen a transition driven by the resilience of the sector and the power of the human spirit that has found new ways of reaching not only that same that audience as before but a more diverse, wider global audience as well
- Ticketmaster reported Summer 2022 as "busiest summer on record"
- Glastonbury 2023 sold out in less than 1 hour despite price increase and cost of living crisis



GLASTONBURY SHURE

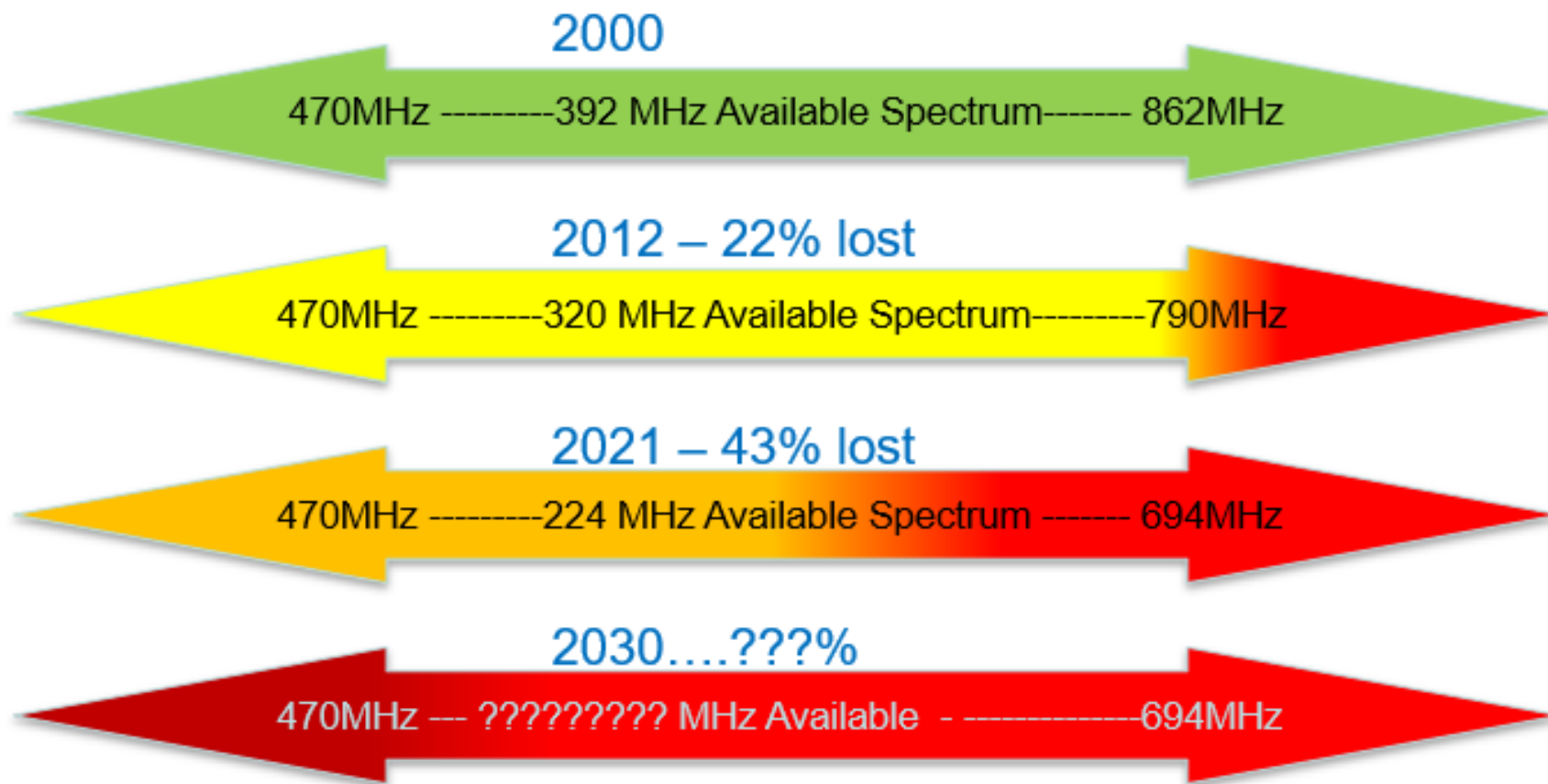
Direct & Indirect Economic Impact

- Events generate hotel stays, visits to restaurants, bars and shopping tours.
- A large number of jobs are created and secured as well as generating high tax revenues for the municipality.
- Programme making and film production often introduce large numbers of staff into an area enhancing the financial income of that area.



PMSE is a fundamental part of the UK's content production industry and is important to its cultural activities alongside producing considerable income to the country's treasury and job market.

PMSE Spectrum Access



Other Technologies?

Digital Technology has mitigated the issues presented by the 800MHz and 700MHz clearances

Other Technologies?

The PMSE industry seeks every opportunity to exploit new technology

- Currently developing WMAS (Wireless Multi-Channel Audio Systems)
- Exploring the possibilities of 5G and beyond

BUT

none of these are short timescale projects

and

it is not expected that these wideband solutions will substitute current technology

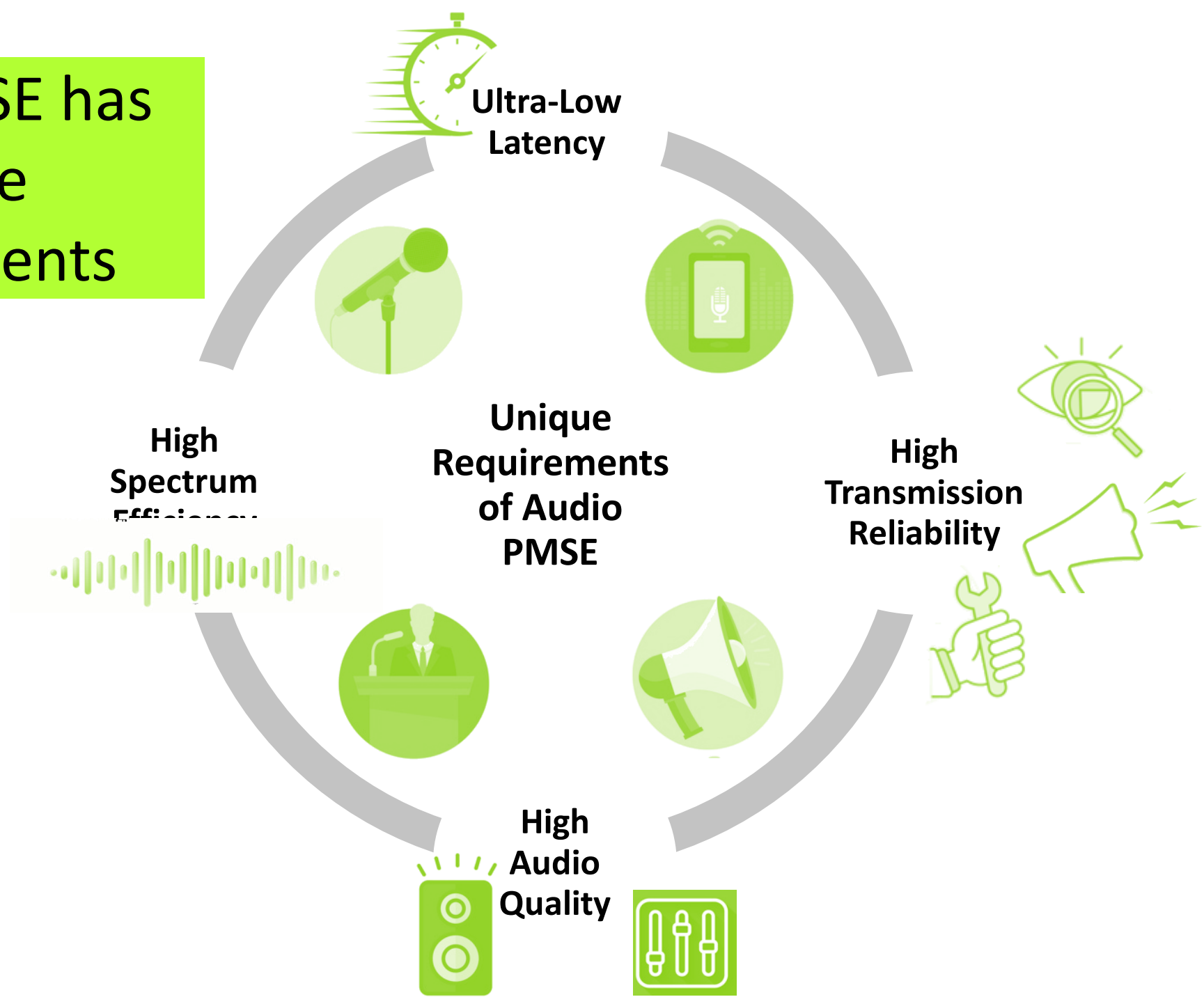
and

these new technologies still need a spectrum resource

and

the core band for audio PMSE is 470 -694 MHz

Audio PMSE has
unique
requirements



Typical PMSE Spectrum Needs

- A typical event production today needs 40 – 80 wireless microphones and in-ear monitoring systems with high quality of service, which requires more than 60 MHz of high-quality spectrum in the UHF band below 1 GHz.
- Studies in Europe concluded that approximately 96 MHz are sufficient for the daily use of audio PMSE in the UHF band below 1 GHz [[Lamy Report](#)*].
- [Report](#) on spectrum requirements for Audio PMSE (24.3.2022), SRF (Schweizer Radio und Fernsehen)
 - Average spectrum needs range from 42 MHz for small events to 115 MHz for large events.
 - Major events: 174 MHz
- Audio PMSE has been sharing the band with TV stations for more than 60 years successfully, without creating interference issues.

The continued availability of sufficient, interference-free spectrum is key to meet the growing demand for wireless PMSE technologies

PMSE WRC-23

- **WRC-23 Agenda item 1.5 seeks to review the 470-960 MHz band**
- **WRC-23 might consider future mobile allocations (IMT identification?) in the 470-694 MHz band**
 - **CEPT CPG PTD and ITU-R TG6/1 are tasked with this work**

Need a long-term solution for PMSE in 470-694 MHz

PMSE SUMMARY

- Over the last decade we have seen PMSE spectrum reduce dramatically. In parallel with this, the industry has improved spectral efficiency to mitigate the losses
- Demand for PMSE created content is experiencing significant growth driven by both the traditional audiences and the new global audience realised by new delivery platforms
- PMSE is often thought of as a consequence of policy decisions

PMSE SUMMARY

- Globally harmonized spectrum, in the 470-694MHz range dedicated to content creation is a critical requirement for us all as many activities are peripatetic on a worldwide basis
- Regulators should recognize the collective need for a long-term, global solution that allows PMSE to thrive and in turn feed the digital revolution mobile and the internet enables

AD40A	1400000	[AXT10]	056	G-Ch-	534,450 MHz*	Default	056	188.88.30.124
AD40A	1400000	[AXT10]	056	G-Ch-	534,800 MHz*	Default	056	188.88.30.124
AD40A	1400000	[AXT10]	056	G-Ch-	535,150 MHz*	Default	056	188.88.30.125
AD40A	1400000	[AXT10]	056	G-Ch-	535,500 MHz*	Default	056	188.88.30.125
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AD40A	1400000	[AXT10]	056	G-Ch-	536,900 MHz*	Default	056	188.88.30.126
AD40A	1400000	[AXT10]	056	G-Ch-	537,250 MHz*	Default	056	188.88.30.126
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AD40A	1400000	[AXT10]	056	G-Ch-	538,300 MHz*	Default	056	188.88.30.127
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AD40A	1400000	[AXT10]	056	G-Ch-	539,000 MHz*	Default	056	188.88.30.127

QUESTIONS?



AD40A	1410000	[AXT10]	056	G-Ch-	550,200 MHz*	Default	056	188.88.30.125
AD40A	1410000	[AXT10]	056	G-Ch-	550,550 MHz*	Default	056	188.88.30.126
AD40A	1420000	[AXT10]	056	G-Ch-	550,900 MHz*	Default	056	188.88.30.126
AD40A	1430000	[AXT10]	056	G-Ch-	551,250 MHz*	Default	056	188.88.30.126
AD40A	1440000	[AXT10]	056	G-Ch-	551,600 MHz*	Default	056	188.88.30.126
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AD40A	1460000	[AXT10]	056	G-Ch-	552,300 MHz*	Default	056	188.88.30.127
AD40A	1470000	[AXT10]	056	G-Ch-	552,650 MHz*	Default	056	188.88.30.127
AD40A	1480000	[AXT10]	056	G-Ch-	553,000 MHz*	Default	056	188.88.30.127

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IVC Server not found