

### NTS 2020 - KEEP CALM AND CARRY ON NETWORKING PROGRAMME

TUESDAY 23 JUNE 2020 (10:00AM - 17:30PM CEST)

#### 10:00 – 10:15 Welcome & Introduction



**Antonio Arcidiacono** is the EBU's Director of Technology & Innovation. He has extensive experience in conceiving, developing and taking new products and services to market. He is an internationally acclaimed expert in digital television, satellite communications, IP-based multimedia services and mobile telecommunications. With strong knowledge of the European market, he has worked closely with the leading players in the fields of Digital TV and Multimedia Services, and with European institutions at a technical, standardization, regulatory and competition level. Antonio was Director of Innovation, and a Member of the Management Committee, at Eutelsat from 2008 -2018 where he was responsible for launching innovative IP based satellite services. He joined Eutelsat in 1990 and took part in key phases of its development from an international organization to privatization in 2001 and to the IPO in 2005. Before working at Eutelsat, Antonio worked for the European Space Agency and started his career working for Telespazio and Selenia Spazio. He has a Doctorate in Electronics & Telecommunications Engineering from the University of Pisa.

**Hans Hoffmann** (EBU) is EBU Senior Manager and head of unit on media fundamentals and production technologies in the EBU Technology and Innovation department. He has been for 9 years with the Institut fuer Rundfunktechnik (IRT) as research staff in new Television production technologies department until moving to the EBU in 2000. In the EBU he has been leading many activities on media integration, production technologies, video codec evaluations, he established the EBU HDTV testing lab, and work with EBU Members on IT based digital workflows and recently UHD TV. He has been author of many EBU Technical documents; IEEE papers and is a standing speaker and contributor to international conferences. Hans is a fellow of the SMPTE and a member of the SID and FKT and IEEE and was the SMPTE Engineering Vice President from 2011-13.



#### 10:15 – 10:45 Lessons learned from the lockdown joint keynote



Moderated by **Phil Tudor** (BBC) Phil Tudor (BBC) is a Principal Technologist at BBC Research & Development, London, U.K. He read Electrical and Information Sciences at Cambridge University. Phil's technical background includes video compression research, software engineering, digital television standardisation, and the development and standardisation of professional media file formats. Phil leads a team of researchers looking at file-based workflows for production & archives, high-speed IP networking for live production, capturing richer production data sets, and the development of open standards. He was awarded the SMPTE workflow systems medal in 2014 for his work on MXF, AAF, IP production and the UK's Digital Production Partnership. Phil is a SMPTE fellow, a Chartered Engineer and a member of the IET.

With contributions from:

**Karl Petermichl** is responsible for Strategy, Innovation and Governance in the CTO Office at the Austrian public broadcaster ORF. His career at the ORF began 35 years ago as a sound engineer, followed by positions as Newsroom Technical Manager, Project Engineer and Head of ORF's Radio Operations. He was chairman of the EBU Euroradio Engineers and is a member of several EBU, ARD and IRT working groups and initiatives.



**Dave Matthews** is Head of Operations - Engineering in RTÉ, responsible for design and development on all large scale projects and productions across Radio, TV and News. Dave has a BE in Electronic Engineering from University College Dublin and an MSc in Integrated System Design from Trinity College Dublin as well as a graduate diploma in Project Management. His background is IC and Hardware design, working on HD chipsets with National Semiconductor and multiviewer products with Zandar, Leitch and Harris



#### SESSION 1: TECHNICAL BUSINESS TRANSFORMATION

MODERATED BY NICK HOPEWELL (BBC)



**Nick Hopewell** has 20 years of experience in the IT industry with a background in software engineering and business analysis. This experience is now focused on connecting media and broadcasting strategy to execution enabling flexibility and adaptability across the broadcasting supply chain so that business capabilities can keep pace with new business models and the ever increasing changes in customer demand. He has been keen to explore and develop how the use of new tools and methods like business capability and process models can be used to provide a common basis for understanding and communicating how broadcast media technology needs to be shaped to meet public service media companies strategic objectives

### 10:45 – 11:15 Standardising the new normal - what needs to change?



Bruce Devlin, SMPTE Standard Vice President and Mr MXF, takes a look at how our media industry might change after Covid and how an organisation like SMPTE might assist. How can we strike the balance between agile, flexible, versatile workflows that are not defined by geography and solid, stable, reliable technology platforms on which we can innovate. Does eliminating the physical meeting room mean a reduction in creativity? Do people with good internet now have a workplace advantage? Will we ever return to the glory days of September 2019? You won't get all the answers, but there will be better questions and an update on what SMPTE is doing to help you, the EBU, and the industry move forwards.

**Bruce Devlin** MA C.Eng MIEE. Founder Mr MXF; Standards Vice President, SMPTE. Bruce Devlin is well known in the media industry for his work on files and systems; particularly MXF and IMF. In the last 3 decades his presentations and Bruce's

Shorts videos have become the go-to resource for CFOs, CTOs and students wanting to figure out the business of technology. Bruce has designed everything from ASICs to algorithms. He tweets as @MrMXF, he literally wrote the book on MXF and is now responsible for standardisation activities at SMPTE. Bruce is an alumni of Queens' College Cambridge England fellow of the SMPTE and member of the DPP, IABM, The IET and IMIS recipient of SMPTE's David Sarnoff Medal & the IMIS Achievement award keen to educate the world about media technology and a rider of bicycles (occasionally quickly)

### 11:15 – 11:45 Virtualization vs. Serverless

In computing, virtualisation refers to the creation of a software representation of an object or resource such as an operating system, server, storage system or network.

Serverless is a rapidly growing cloud computing technology that can be seen as a new step towards virtualisation. It promises the user services at large scale and low cost while eliminating the need for infrastructure management. In this presentation, we will explain the evolution of the virtualisation from virtual machines (VM) to function as a service (FaaS) which is a capability of most of the serverless systems. In the second part, we will compare FaaS and Kubernetes technologies on the angle of microservice orchestration and scaling.



**Alexandre Rouxel** is a Data Scientist and AI/Data project Engineer at the EBU in the Technology and Innovation department. Before joining the EBU, he cumulated an extensive experience as algorithms and systems design engineer acquired within successful innovative high-tech companies. He is data enthusiast, eager at designing and promoting efficient algorithms and systems for extracting and valuing information from massive amounts of data.

**Joost Rovers** (Rovers IT) Experienced Senior Software Engineer with a demonstrated history of working in the broadcast media industry. Strong engineering professional skilled on various platforms and computer languages, nowadays mainly focused on serverless computing.

### 11:45 – 12:15 Orchestration: From Discord to Harmony

As the industry moves towards an IP-first world, or even an IP-only world, users require access to a range of flexible, agile and scalable resources able to encompass both technical and business priorities, across a large complex operation eco-system, yet avoid a single point of failure.



**Jemma Phillips** has worked in and around Media for over 20 years. She currently works as a Senior Architect for the BBC, where she is responsible for the long term strategy of Control Systems.

**Ivan Hassan** is part of the BBC D+E Technology Strategy & Architecture Team, focusing on future strategy, connectivity innovation, 5G and performant agile resourcing. He has near 30yrs experience in broadcast production and engineering, OTT content delivery, IT and innovation having worked for PSB and commercial media companies around the globe.



### 12:15 – 12:45 Driving the adoption of Live IP



Current events will have a significant impact on broadcasters' adoption of live IP, further emphasising the importance of interoperability and flexibility in chosen solutions. EBU members have been active in this area through the JT-NM Tested programme, and we summarise the state of play following the Spring event. We present an updated version of the Tech 3371 Technology Pyramid, and review what the industry is doing for further specification and training in this area. We look at further challenges related to live IP -- such as how to benefit from automation, how to work across multiple facilities, and how to work with the cloud -- and present the audience with a call for action to get involved in tackling these!

**Willem Vermost** (VRT) recently move to VRT as a Design & Engineering Manager. Prior to this role, he was the topic lead on the transition to IP based studios at EBU. With 20 years of experience in broadcast, he is an expert and project manager of international strategic, expert groups and events. Willem has a master degree in electronic engineering and a master in applied computer science. He worked on various projects, including the multiple award-winning VRT Live IP proof of concepts, the JT-NM Tested Program and started the open source project EBU Live IP Software Toolkit project (LIST) which has grown to an international project.

**Peter Brightwell** is a Lead Engineer at BBC's R&D South Lab, where he is leading work to guide the BBC's transition to IP. Working mostly at R&D but also in other parts of the BBC, Peter has an extensive background in broadcast and technology, in particular video compression, file-based acquisition, networked delivery, and virtual graphics. He is a frequent contributor to industry work on interoperability and is currently chair of AMWA's Networked Media Incubator, and of EBU's Automation and Provisioning project.



### SESSION 2: LEARNING FROM IT AND CLOUD

MODERATED BY PETER BRIGHTWELL (BBC)

#### 14:00 – 14:30 The Cloud enabling interaction



With a strong background in radio, **Floris Daelemans** is working on innovative radio solutions at VRT. Starting out as an enthusiast by building his own FM transmitter when he was eleven, radio and technology always were a perfect match for him. After many years of both producing and hosting national broadcast radio shows, Floris chose to finally do something on the other side of his spectrum. Today he is an innovator who works hard on defining the future of radio, enhancing the many strong aspects of broadcast radio with the new opportunities of the Internet.

#### 14:30 – 15:00 IT Thinking for Professional Media



What would it mean to think about approaching professional media from the perspective of someone who has been looking strategically at our industry as an IT professional? What key best practices can we steal from the IT industry? What fundamental differences in thinking are baked into the IT world that we ignore at our peril? Attendees will learn about the key parts of IT Thinking we should be stealing from that domain and applying to our industry. The speaker will frankly assess our current approach to IP and media, addressing areas where the current approach fails to deliver solutions requested by users. The presentation will outline the benefits of adopting IT Thinking, especially for the dynamic construction and reuse of resources in a new type of media facility.

**Brad Gilmer** is President of Gilmer & Associates, Inc, he is a founding member of the Joint Task Force on Networked Media, Executive Director of the Video Services Forum (VSF), and Executive Director of the Advanced Media Workflow Association. Brad is a SMPTE Fellow and the first recipient of the SMPTE Workflow Systems Medal. Brad was previously employed at Turner Broadcasting System in Atlanta where he and his staff were responsible for Engineering and Operations for the Entertainment Division Worldwide. He is an author and editor, contributing two times to the NAB Engineering Handbook, and serving as Editor-in-Chief of the File Engineering Handbook. He has written many articles on computers and networking for industry publications.

#### 15:00 – 15:30 Lessons from cybersecurity

**Gerben Dierick** (VRT)

### KEYNOTE

INTRODUCTION BY PHIL TUDOR (BBC)

#### 15:30 – 16:00 State of IP Video Networking and Distribution



I will discuss the state of IP Video including the production side and consumption side.

On the production side, the combination of the SMPTE ST-2110 protocols and high-speed Ethernet enables much more flexible in-house and remote Television studios.

On the consumer side, there has been a significant shift in viewing behavior towards SVOD, accelerated by new entrants into the space, the increased amount of content available, the ability to consume this content on any device and last not least the Covid-19 crisis.

**Andreas "Andy" Bechtolsheim is Chairman**, Chief Development Officer and Co-Founder of Arista Networks, a leading vendor of cloud networking solutions.

Previously, Andy was a Co-Founder and Chief System Architect at Sun Microsystems, responsible for next generation server, storage, and network architectures.

As a private venture investor, Andy has been involved in the funding of numerous companies including Google, VMware, Mellanox, and Brocade. He has served on the Board of Directors of over 25 companies, the majority of which went public or were acquired.

Andy earned a M.S. in Computer Engineering from Carnegie Mellon University in 1976. He was a doctoral student in Computer Engineering at Stanford University from 1977 to 1982.

He has been honored with a Fulbright scholarship, a Studienstiftung scholarship, the Stanford Entrepreneur Company of the year award, the Smithsonian Leadership Award for Innovation, and he is a member of the National Academy of Engineering.

### SESSION 3: RESILIENCE AND BUSINESS RECONFIGURATION

MODERATED BY PHIL TUDOR (BBC)

#### 16:00 – 16:30 Virtual tour of Flanders 2020

Tour of Flanders, the classic that heralds the cycling season. VRT, the Belgian public broadcaster, is well known to cover cyclist races. Usually, our crew is even selected to cover those sports at the Olympics. The event that every cycling enthusiast and our staff is looking forward to had to be cancelled due to the covid-19 pandemic. This is like a cafe without beer or a Belgian without fries. Now what? Within the current measures, it was impossible to send cyclists onto the track unless you think out-of-the-box. What if every cyclist just stayed at home? Put his bike on the rollers and the pedals steer a simulation? This does exist, right? It is used for training in your own home. What if a bunch of professional cyclists stay at home and drive their bike on the rollers? Can they compete with each other and are we able to make a live program just like it was the real thing? Together with Flanders classics, bkool and kiswe, Sporza (VRT sports channel) produced the first mixed reality cyclist race ever. 13 professional cyclists, racing against each other to win the first-ever e-sports Tour of Flanders. The pandemic forced us to think and act out-of-the-box. The mix of digital natives and seasoned broadcast engineers has proven to be working very well. Internet technologies do enable a lot of opportunities for the production of content that never have been created before. This paper will provide you with the insides of how we

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brought the real cyclist, racing through a virtual landscape to the viewers home. How we used internet technologies like RTMP, open-source software such as OBS Studio, ... mixed with a demanding director and two old-school, world-famous (at least in Flanders) commentators. Furthermore, the concept, the setup, the operational part and lessons learned will be described.

**Wouter Degrave** employee VRT 1997 - 2002 : technician master control room 2002 - 2014 : technician satellite - fiber - microwave 2014 - : chief engineer TV/radio broadcast

### 16:30 – 17:00 Big Project Implementation Challenges during Lockdown

Eurosport is in the process of finishing building, configuring and commissioning a large broadcast and remote production ecosystem. The limitations of lockdown has created some serious challenges to every part of the project, this session looks at these challenges and how we've coped with them

**Steve Fish** (Discovery/Eurosport)

### 17:00 – 17:30 Space Exploration-Networking challenges for taking us all along for the adventure



NASA has a long history of using video and imagery to take all of us along for the ride as astronauts and robotic probes explore the solar system. In years past that was largely accomplished via traditional linear television and news outlets. Today NASA can reach the public directly, but that presents both technical and budgetary challenges.

**Rodney Grubbs** began his career as a co-op motion picture photographer at NASA's Marshall Space Flight Center while a student at the University of Alabama. He is currently the NASA Imagery Experts Program Manager and Chairs the NASA Digital Television Working Group. He is responsible for the NASA video distribution architecture including NASA TV and internet video distribution. He has been a Principal Investigator for flights of High Definition Television (HDTV) and Digital Cinema cameras and related experiments on the Space Shuttle and International Space Station (ISS), including the first ever live HDTV program from a spacecraft and more recently, the first ever Ultra High Definition program from a spacecraft.

He is currently Principal Investigator for the National Lab's Red Digital Cinema camera on the ISS and the Imagery Subsystem Lead for the Lunar Gateway. He also chairs the Consultative Committee for Space Data Systems Motion Imagery and Applications Working Group. [www.linkedin.com/in/rodgrubbs](http://www.linkedin.com/in/rodgrubbs) @rod4dvt on twitter (NASA)

## WEDNESDAY 24 JUNE 2020 (10:00AM - 16:10PM CEST)

### TUTORIALS

MODERATED BY WILLEM VERMOST (VRT)

### 10:00 – 10:45 Engaging your staff with broadcasting in the cloud

**Hugo Ortiz** (RTBF) &



**Karel De Bondt** is managing VRT's Video Snackbar, an initiative that supports VRT Belgium's online content creators. ([www.videosnackbar.vrt.be](http://www.videosnackbar.vrt.be)) Vloggers, Podcasters, Webvideo creators, Live Streamers and Gamers are returning customers. Video Snackbar also investigates how new technologies and solutions can help the storytellers of today and tomorrow. Recent PoC's involved solutions such as NDI, SRT, Dante, cloud multicam production, smpte 2110, Touch Designer, vMix and much more. By organizing live on-air productions that are using these tools, VRT quickly gets a good taste of their potential. Since January 2020 Video Snackbar brings together likeminded initiatives from within other European broadcasters. Currently no less than 15 members are meeting monthly to collaborate and share learnings from experiments, PoC's and real life experiences. ([www.videosnackbarhub.com](http://www.videosnackbarhub.com))

Karel was also managing the VRT Sandbox Live IP project, an award-winning collaboration between VRT, EBU and 10 technology partners, which built world's first multivendor video over IP live production studio (2015-2016). Karel has a past in radio and MCR operations, applications engineering, project and account management in the media and telco industry.

### 11:00 – 11:45 Sustainable Equipment and Equipment Rooms



The broadcast industry has traditionally been at the forefront of technology, with a large amount of equipment required to deliver our services. The sustainability agenda is now much more prominent than it used to be, and with the help of other industry sectors such as the Cloud Computing sector, what can we do to minimise the environmental impact of our equipment?

**Mike Ellis** (BBC) has worked for the BBC since leaving university in 1993 and has been involved in four major building projects run by the BBC in the last two decades, including MediaCityUK and Phase 2 of Broadcasting House. These projects gave him exciting new challenges to face, both broadcast-related and network-related, and the chance to work with an excellent team of designers and project managers to help develop innovative solutions. Mike is currently the Head of Architecture for Production Systems in the BBC, covering everything needed to turn an idea into delivered content. He focuses mainly on the future of content, finding efficient ways to use cost-effective technology to produce discoverable, personalised content that can be distributed to and consumed seamlessly by the audience wherever they are and on whatever device they wish to use.

### 12:00 – 12:45 Towards continuous deployment of media over IP infrastructure

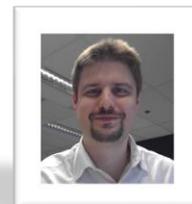
CBC/Radio-Canada is putting the finishing touch to its new IP-based production center in Montreal. During the design and early deployment of this major facility, it became clear that we would need to automate and manage the staging and configuration of the thousands of media devices in a fashion similar to an IT datacenter. In fact, those new devices require thousands of parameters to be configured, including IP and multicast addresses, and - since it is new technology - there is more frequent software or firmware updates than for conventional devices. Often, the configuration tools provided by the vendors are not suited for batch configuration and our multi-vendor ecosystem required many different

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tools which pose a challenge for training and coordination. Moreover, once the system will be put on air, the business continuity impose careful management of system changes in order to minimize the risk of technical regressions or human errors. The good news is that the IT industry has solve that problem in order to operate huge datacenters that require high availability. CBC will present the architecture and implementation details of its continuous deployment workflow. They will demonstrate a typical staging workflow of new device using IT tools and open source code they developed. They will share the challenges they face and their roadmap for further development.



**Félix Poulin** is with the national public broadcaster CBC/Radio-Canada where he leads the Media over IP Architecture Lab, developing tools and testing IP-based equipment for the new headquarters to be on air in 2020 and upcoming national deployments. Before that mandate, Felix was lead expert on live IP at the EBU, co-chairing Joint Task Force on Networked Media (JT-NM), organizing training and events, coordinating expert groups and the multi-award winning VRT Sandbox LiveIP project. Felix completed his diploma in electrical engineering at Montreal's Polytechnique with his final thesis done at MIT. He began working as an audio engineer at Solotech on Cirque du Soleil and international productions. Felix is an active contributor to the SMPTE, EBU and user-chair of the AMWA NMOS Steering board.)

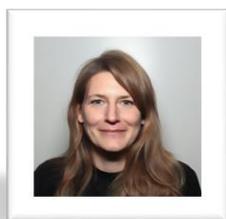


**Alexandre Dugas** is the Project Leader Infrastructure and Media Services Technologies at CBC/Radio-Canada responsible for the configuration and staging processes of the real-time network on the New Maison Radio-Canada project. He has over 10 years experience in the broadcast and telecommunication industry. Prior to joining CBC, he was responsible for developing and implementing video hardware processing platforms and complex test sequences for various telecommunication and broadcast equipment companies. He holds a Master degree in Video and Picture Processing from the University of Sherbrooke.

### SESSION 4: CHALLENGES OF "CLOUD-ENABLING"

MODERATED BY JEMMA PHILLIPS (BBC)

#### 14:00 – 14:25 Live-ing in the Cloud



Live-ing in the cloud has been a major challenge for broadcast. The presentation will give an overview of the building blocks, how live production in the cloud can be done successfully on the example of a real world use case. It will share insights about the experiences made during Covid-19 and how cloud production from home will make a difference on how broadcast will be done in the future.

**Larissa Görner** is Director of Product Management, Advanced Technology at Grass Valley, a Belden Brand, overseeing Grass Valley's SaaS and Cloud offerings. Before joining Grass Valley, Larissa worked at Net Insight where she held roles in the CTO office and Product Management. She held numerous broadcast vendor roles in R&D, Marketing, Product Management and Business Development. She further is an active freelancer supporting major live production events, like the Eurovision Song Contest or the Olympics. She has been an active member of the Board of Directors of AIMS and is member of the board of FKTG, represents SMPTE at IBC and is a regular contributor and speaker at a multitude of Industry events.

#### 14:25 – 14:50 RIST and SRT - basics and test results

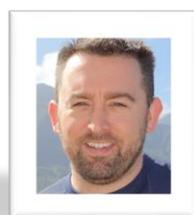


**Sonja Langhans** (Dipl. Ing) is a Senior Engineer in the Department of Network technologies at IRT GmbH in Munich. At IRT she has been working in the field of audio and video over IP. For the last 3 years she had the project lead for the new ARD HYBNET III.

**Andreas Metz** (IRT)

#### 14:50 – 15:15 High Throughput JPEG 2000 (HTJ2K) for Content Workflows

**Pierre-Anthony** Lemieux (Sandflow Consulting)



**Michael D. Smith** has worked as a digital imaging and intellectual property consultant since 2003. He has worked on projects for many organizations including Warner Bros., Sony Pictures Entertainment, DCI, NOAA, Dolby, and DTS. He currently is co-editor of the JPEG 2000 High-Throughput image compression standard. In 2018, he received a screen credit for his color science work on Mary Poppins Returns. From 2013-2015, he was co-chair of Blu-ray Disc Association's UHD-TF Video Subgroup which defined the video-related requirements for the Ultra HD Blu-ray disc format.

Michael's work on more than 35 intellectual property matters related to infringement and validity of patents has resulted in payments of approximately \$1.7 billion. He was editor of the book "3D Cinema and Television Technology: The First 100 Years" published by SMPTE in 2011. He received the B.S. and M.S. degrees in Electrical Engineering from UCLA in 2001 and 2004 respectively.

#### 15:15 – 15:40 EBU MCMA and its use at Bloomberg

Whether they're hosted in the cloud or on-premise, microservices are key for the broadcast business. But the degree to which an organization can benefit from these services depends on how well they're integrated into operational workflows. This is where the open Media Cloud and Microservice Architecture (MCMA) comes in.

MCMA consists of a lightweight high-level REST service interface, plus complimentary code libraries for adaptation to the cloud AI platforms and their respective protocols and data structures. It is an open-source project publicly available on Github.

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The MCMA framework is built on proven libraries to let the developers focusing on the construction of high added value workflows in a serverless cloud computing environment. Bloomberg extensively deploys MCMA services in production to softly handle a vast palette of Media application.

Therefore the first part of the presentation will be an introduction to the MCMA framework. Then the presentation will provide an overview of the usage of MCMA in production within Bloomberg.

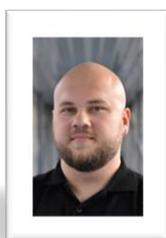
**Loic Barbou** (Bloomberg) is the chief architect for Bloomberg Media. He is a renown pioneer in the media world and has led to the creation of new industry standards and concepts. His activities include designing new media technologies to optimize media production and distribution, or to create media platforms expanding market type and reach. Prior as the founder and leader of the Triskel organization, he has assembled a consulting group composed of the best experts in the field of media technology services. A technologist at heart, he has mentored and made best of breed system implementation accessible to teams across

many organizations. His background spans several area including AI, system architecture, software design and implementation.

**Alexandre Rouxel** (EBU) see above

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15:40 – 16:10 **Wrap-up**



**Ievgen Kostiukevych** is a member of the EBU Technology & Innovation team. He has gained more than a decade of experience in the broadcasting and sound production industry, including experience in change management, solutions architecture and AoIP integration. He is working on topics of IP networks, media over IP, PTP, networks programmability and automation, etc. Ievgen is a member of SMPTE and AES."