# The transition to microservices based media processing architecture

Arnaud Caron, Head of Portfolio Core

Mediakind

Monday, September 16 from 2:30 – 3:00pm

**IP SHOWCASE THEATRE AT IBC2019 : 13–17 SEPT 2019**

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## Welcome to MediaKind…

### Who We Are

▶ *Global leader -* media processing, delivery, and TV service platforms for Broadcasters and Cable, Satellite, Telco, and OTT TV operators

▶ *Technology investor -* Approximately 1,000 HC in R&D

▶ *Innovation driver –* Media is our passion, Consumer experience drives us

### Key R+D Locations

USA · France · UK · Israel · India · China

Global footprint, diverse customer base

### What We Offer

| Media Platforms | Media Processing |
|---|---|
| ▶ MediaFirst | ▶ H/W Compression |
| ▶ Mediaroom | ▶ S/W Compression |

| Media Delivery | Additional value |
|---|---|
| ▶ Cloud DVR & Timeshift TV | ▶ Content Mgmt. Sys. (CMS) |
| ▶ Optimized AV | ▶ Advertising & Content Rights Distribution |
| | ▶ Support and Services |

### Segments We Serve

▶ *Media Platforms*
   — 75+ Telco & Cable Operators with 19M subscribers

▶ *Media Processing*
   — 2,000+ Broadcasters, Pay TV & OTT operators

▶ *Media Delivery*
   — 60+ Cable & Telco Pay TV operators

▶ *Product Delivery & Support Services*

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# Agenda

- Why are we here today?
- When Video Services become Micro...

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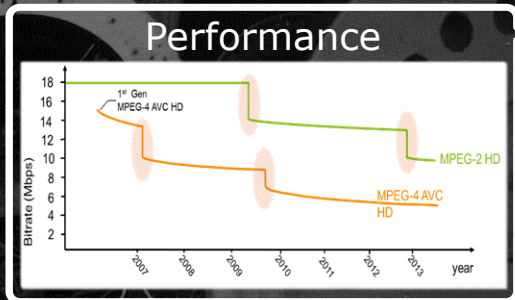
# Why are we here today?

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## Where the Media industry is coming from...

Performance vs Flexibility

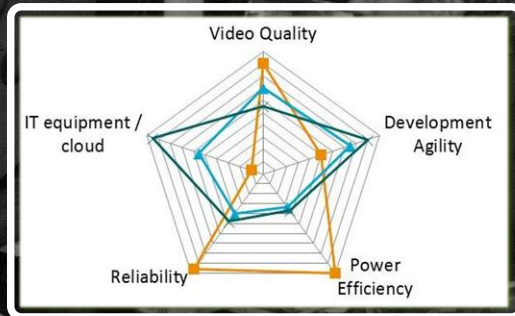### Performance



Processing Performance was judged by individual codec bandwidth savings
- More channels on same network (e.g. satellite...)
- Better quality of services



Flexibility was a trade-off against performance

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## Media Landscape is changing...



https://www.nabshow.com/thought-gallery-Tech-Talk/quality-control-monitoring-ott-workflow

https://blog.techahoo.com/blog/top-13-companies-in-the-over-the-top-ott-market

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# Broadcast Challenges

- Industry-specific interfaces
  - Impedes ability to scale and grow operation efficiently
  - Maintaining broadcast specificities: latency, reliability and uptime
- Separate Broadcast & IT infrastructures
  - Increases opex and inhibits flexibility
  - Removing technical and cost barriers for scaling and evolving
- New entrants able to offer compelling services, faster to market
  - How to leverage virtualization and other agile processes?
  - Enabling larger variety of commercial models
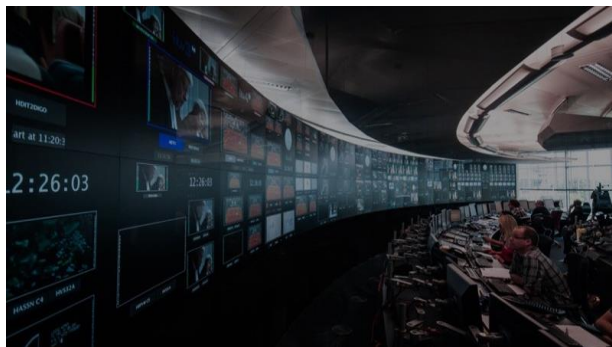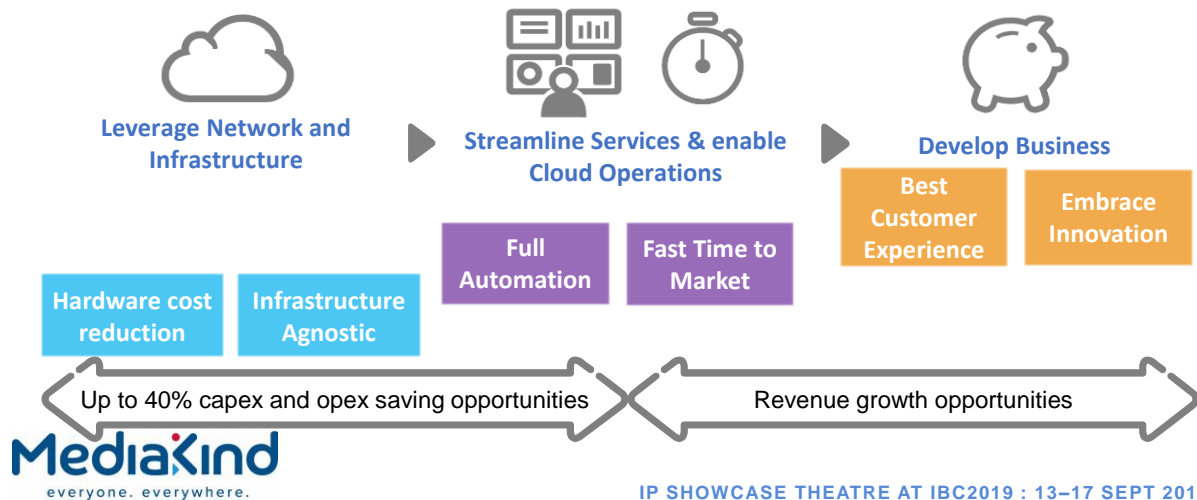
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# The answer: Media moving IP Cloud Native

**Infrastructure**  **Operations**  **Finance**

## The Value of Cloud Solutions

**Leverage Network and Infrastructure**

**Streamline Services & enable Cloud Operations**

**Develop Business**

| Best Customer Experience | Embrace Innovation |

| Full Automation | Fast Time to Market |

| Hardware cost reduction | Infrastructure Agnostic |

Up to 40% capex and opex saving opportunities

Revenue growth opportunities

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## What is so specific for Media?

▸ **Transactional**

▸ **Flow-oriented**

▸ **Storage-based**

- ▸ All TV and mobile **User Interfaces** available in the public cloud
- ▸ **Content** and **Subscriber** management
- ▸ **Personalized** experience
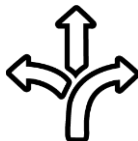
- ▸ **12GBps / live** stream with **few ms latency**
- ▸ "five nines": **5.26min downtime per year!**
- ▸ Peak traffic: **72 Tbps** (~10 million DVDs per hour) – Akamai 2018

- ▸ **100s of PBs** of storage for **TV show private copy**
- ▸ Stored **"in the Cloud"** & accessible from **anywhere** at **anytime**

**All these workloads have to work together!**

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# When Video Services become Micro...

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## Cloud – a fog of terminology

Orchestration  Virtual Machines  PaaS
  Public Cloud
Containers  Openstack  Hypervisor

Virtual Private Cloud  AWS  Serverless
  Hybrid Cloud
Kubernetes  Unikernel  Docker
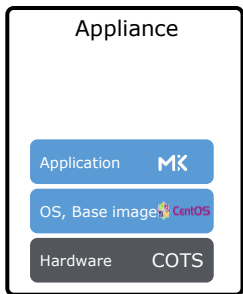
Elastic Compute  Azure
  Cluster  Private Cloud
Hypervisors  IaaS
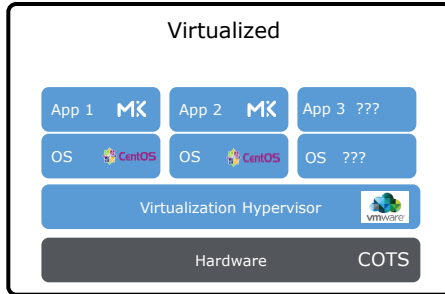  Microservices  NFV
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everyone. everywhere.  SDN  IP SHOWCASE THEATRE AT IBC2019 : 13–17 SEPT 2019  12

## Appliance vs VM vs Orchestrated Containers

### Appliance

| | |
|---|---|
| Application | MK |
| OS, Base image | CentOS |
| Hardware | COTS |

- Simple!
- Fixed & silo
- Difficult to scale
- HW + SW link

### Virtualized

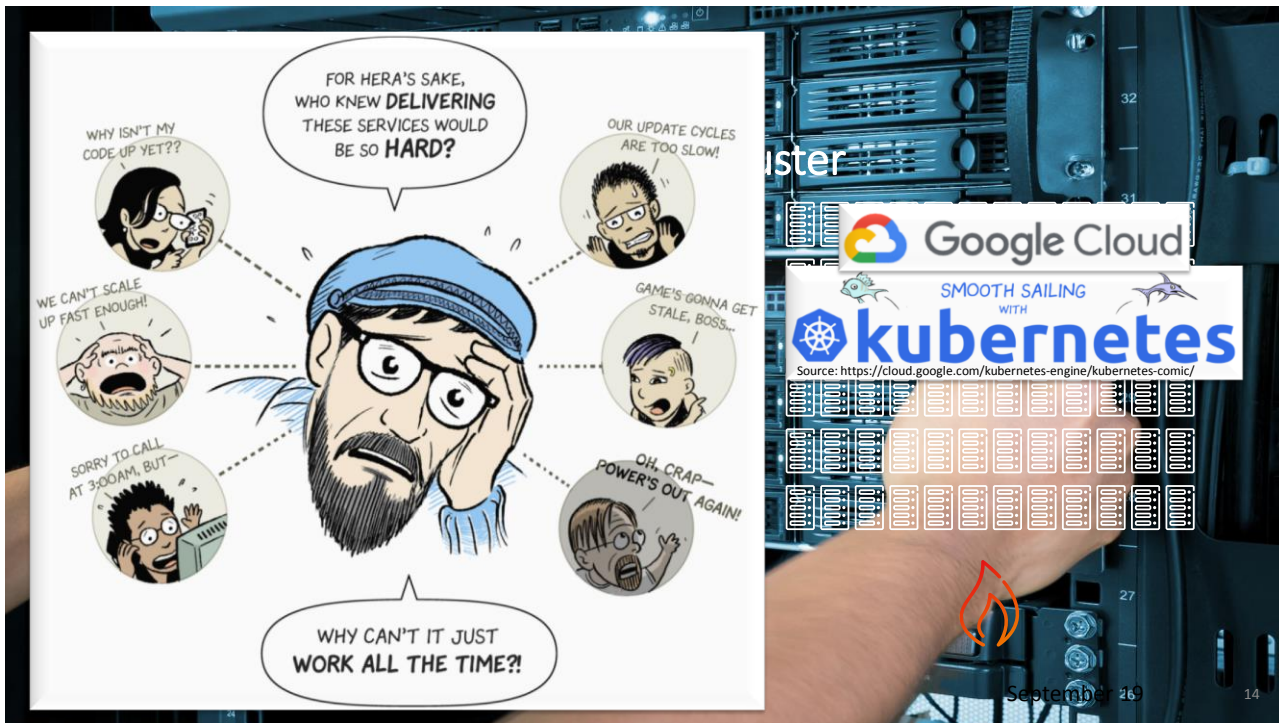| App 1 MK | App 2 MK | App 3 ??? |
|---|---|---|
| OS CentOS | OS CentOS | OS ??? |
| Virtualization Hypervisor | | vmware |
| Hardware | | COTS |

- Decouple HW & SW
- Scripted deployment
- Easy to replicate
- Challenge to scale
- Loss of performance
- Inefficient deployment

### Orchestrated (Pods of) Containers

| App 1 MK | App 2 MK | App 3 ??? | Orchestration | Application Registry |
|---|---|---|---|---|
| Kubelet Cont. runtime docker | OS, Base image | CentOS | | |
| Hardware | | COTS | | |
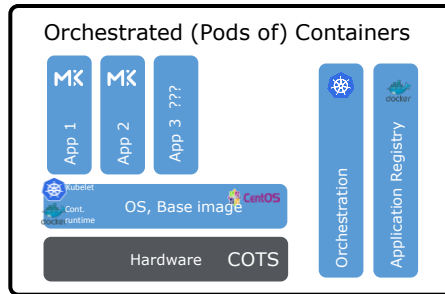
- Built to scale
- Complete flexibility
- Zero loss of performance
- Infrastructure agnostic
- Virtualization optional
- New & unfamiliar

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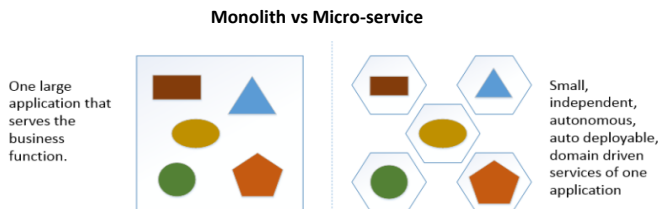Source: https://cloud.google.com/kubernetes-engine/kubernetes-comic/

# Microservice applications =
## Separated SW components as deployable units

Contrast microservices with monolithic applications

- Design philosophy: Break application into a series of smaller, separately deployable units

Offer natively, enables flexibility, fast technology deployment & up-to-date media operations...

- More options for solution **scalability**
- More options for service **implementation**
- More options for containing **failures** and improving **operational resilience**
- More options for **incremental development and deployment**

**Monolith vs Micro-service**

One large application that serves the business function.

Small, independent, autonomous, auto deployable, domain driven services of one application

> **"Micro" means as small as it should be but no smaller**

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*Source: Forester*

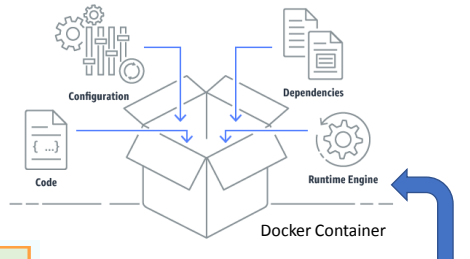**IP SHOWCASE THEATRE AT IBC2019 : 13–17 SEPT 2019**

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# Container =
## Self-contained Microservices SW packaging isolated from host

- Container is an operating-system-level virtualization method for running multiple isolated systems / applications (containers) on a single control host

- Characteristic
    - Light weight (vs Hypervisor overhead)
    - Shared Kernel and libraries
    - Isolation
    - Self contained

- Challenges
    - How to run and manage it at scale
    - Security level for isolation

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Configuration          Dependencies

Code          Runtime Engine

| Virtual Machines | | Docker Container |
|---|---|---|
| App A | App B | |
| Bins/Libs | Bins/Libs | |
| Guest OS | Guest OS | App A / App B |
| | | Bins/Libs / Bins/Libs |
| Hypervisor | | Docker Engine |
| Host OS | | Host OS |
| Server | | Server |

SE THEATRE A

## Kubernetes = deploy - scale – failover of containers
## Dynamic Orchestration of containers on infrastructure resources

The name is from Greek for "Helmsman" or "Pilot"; Nickname "K8s"
Kubernetes is an open-source system for automating deployment, scaling, and management of containerized applications
It dynamically manages resources availability, container allocation and scheduling ensuring reliability.

- Schedules, runs, and manages containers on virtual and physical machines
- Supports "Planet Scale" without increasing your ops team
- Supports more container runtimes than just Docker
- 100% Open source, written in Go language
- Inspired and informed by Google's experiences and internal large scale cluster system (Borg)

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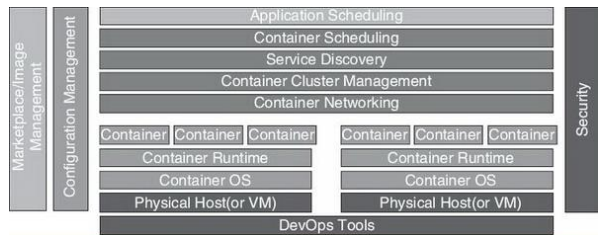
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## Everything as code

```
apiVersion: extensions/v1beta1
kind: Deployment
metadata:
  name: deployment-myname
spec:
  replicas: 2                          replicas sets the number desired
  template:
    metadata:
      labels:                          labels allow matching
        app: app2
        location: sou
      annotations:
        prometheus.io/scrape: "true"
        prometheus.io/port: "9102"
    spec:
      nodeSelector:          spec defines contents of each pod
        location: sou
      containers:
      - name: some-name                each container def starts with its name
        image: busybox:1.28.1
        command: ['sh', '-c', './busybox -f /var/tmp/dcc/component-config.yaml -pre encoder']
        ports:
        - containerPort: 80            ports exposed by the container
        volumeMounts:
        - name: config-volume
          mountPath: /var/tmp/dcc
        resources:                     image, version and resources needed
          requests:
            cpu: "500m"
      volumes:
      - name: config-volume
        configMap:
          name: cfg-RELEASE-NAME-sou-0
```

app2.yml
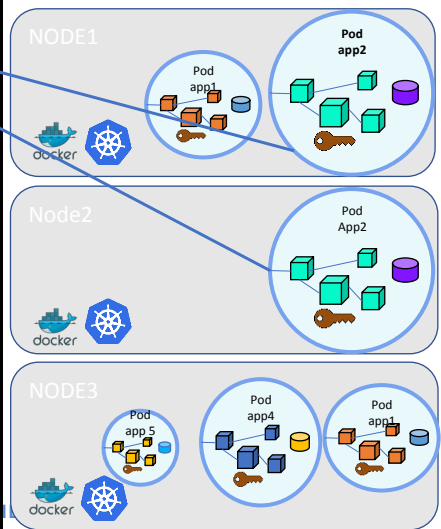
## Containers shipping, not a 1-container ship

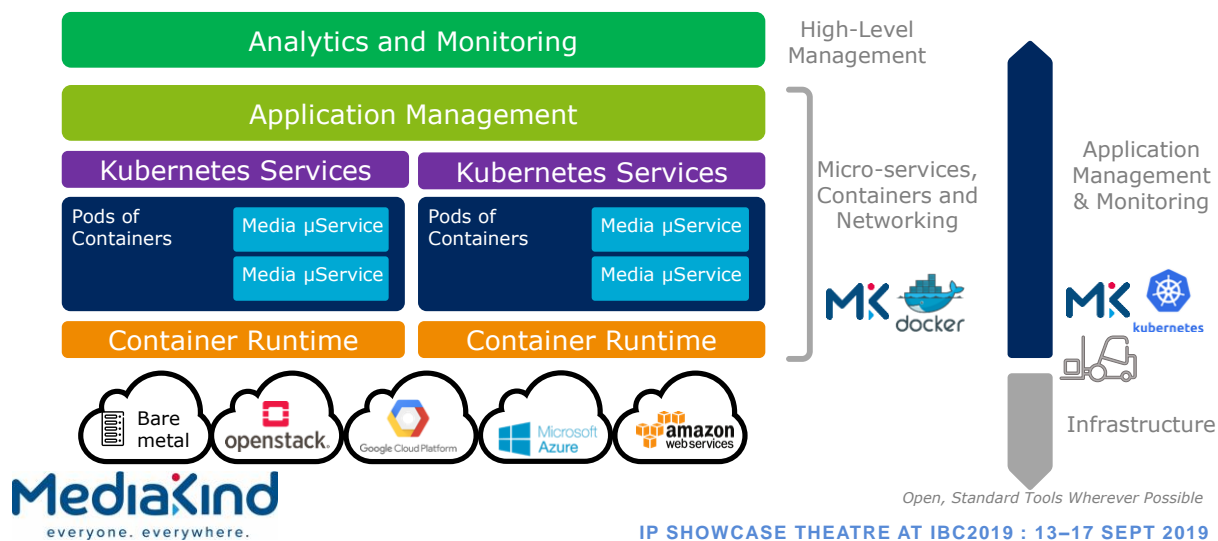- Built the right way

  - Application executable and files
  - Requires OS libraries
  - Nothing else
  - Minimal storage
  - Fast deployment

- Built the wrong way

  - Application executable and files
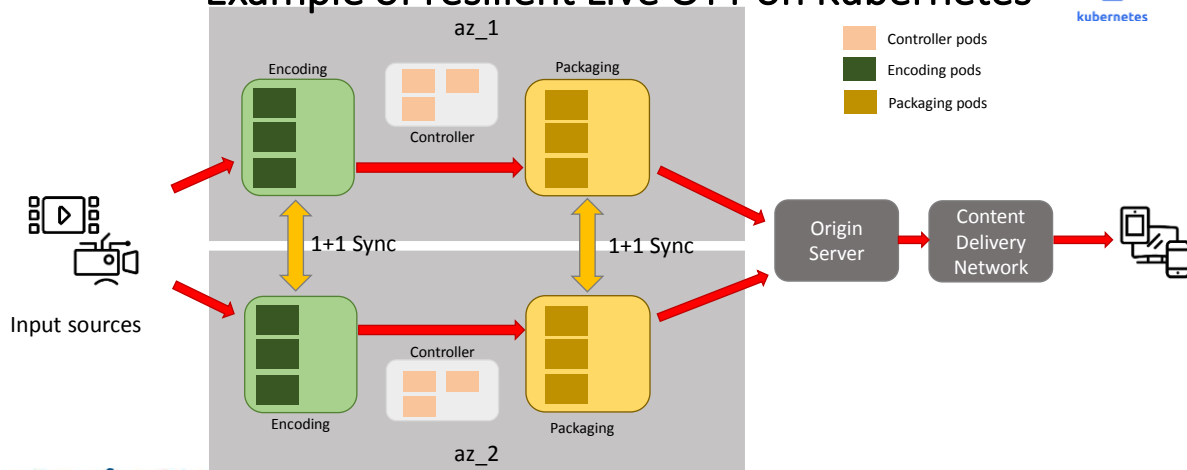  - All OS libraries
  - Bloat makes it large and slow to deploy



## Cloud Native Architecture



| Analytics and Monitoring | High-Level Management |
| Application Management | |
| Kubernetes Services | Kubernetes Services | Micro-services, Containers and Networking |

Pods of Containers — Media µService, Media µService
Pods of Containers — Media µService, Media µService

Container Runtime | Container Runtime

Bare metal | openstack | Google Cloud Platform | Microsoft Azure | amazon web services

Application Management & Monitoring

Infrastructure

*Open, Standard Tools Wherever Possible*

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## Example of resilient Live OTT on Kubernetes

## Journey? There is More Than One Way

- Cloud is one key concept BUT **multiple ways to enable it**
- **IT flexibility** is required BUT with **Media & Broadcast attributes**
- **Operational excellence blended with Best quality & Innovation** is the new standard
- Select carefully **PARTNERS** in this journey!
- **Transformation journey** is not only on vendors or technologies but also on **Operators mindset and organization**

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# Thank you

### Arnaud Caron, Mediakind
Arnaud.caron@mediakind.com

Thank you to our Media Partners

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