

Delivering TV Everywhere

- With Cloud Native Solutions



• Arnaud Caron



• Jerome Champetier



KubeCon



CloudNativeCon

Europe 2019

Sit back and relax

MediaKind
everyone. everywhere.



Mediakind? We do TV!



Cloud Native... Media ?!!



Cloud Native... Challenges



Wants to see 360° in the Cloud?



KubeCon



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Europe 2019

Who are we?



▶ Jerome Champetier

- ▶ Joined TANDBERG Television in 2004
 - ▶ Software Engineer
 - ▶ Working on the first IPTV systems in the world
- ▶ Joined Ericsson in 2007
 - ▶ Via acquisition
 - ▶ Ported Linux 2.6.23 on custom appliances
 - ▶ Then wrote Linux drivers & apps for these appliances
- ▶ Joined MediaKind in 2019
 - ▶ Via divestment
- ▶ **Now: Senior Technology Architect at MediaKind**



▶ Arnaud Caron

- ▶ Joined Techicolor in 2003
 - ▶ Software Engineer, Software architect, Innovation
 - ▶ IPTV, OTT...
- ▶ Joined NSN / Accenture in 2010
 - ▶ Via acquisition
 - ▶ Solution Architect
 - ▶ Large customer solution for Broadcast, IPTV, OTT
- ▶ And Mediakind!
 - ▶ Joined Envivio in 2013 acquired by Ericsson and divested to Mediakind
- ▶ **Now: Head of Management, Orchestration & Cloud (Product Management)**



MediaKind Overview

Who We Are

- ▶ **Global leader** in providing media processing, delivery, and TV service platforms for Broadcasters and Cable, Satellite, Telco, and OTT TV operators
- ▶ **Approximately 1,000 HC in R&D**

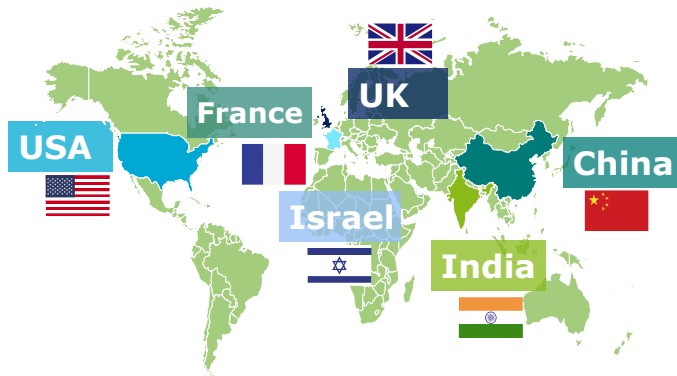
What We Offer

TV Platforms	Media Processing
<ul style="list-style-type: none">▶ MediaFirst▶ Mediaroom	<ul style="list-style-type: none">▶ H/W Compression (Tandberg)▶ S/W Encoding (Envivio)
Media Delivery	Other
<ul style="list-style-type: none">▶ VSPP (Fabrix)<ul style="list-style-type: none">- Adaptive bitrate delivery- Cloud DVR	<ul style="list-style-type: none">▶ Content Mgmt. Sys. (CMS)▶ Multiscreen Mgmt. Platform (MMP)

Segments We Serve

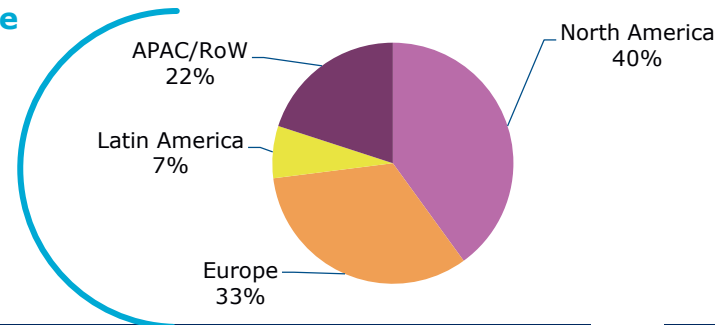
- ▶ **TV Platforms**
 - 75+ Telco & Cable Operators with 19M subscribers
- ▶ **Media Processing**
 - 2,000+ Broadcasters, Pay TV & OTT operators
- ▶ **Media Delivery**
 - 60+ Cable & Telco Pay TV operators
- ▶ **Product Delivery & Support Services**

Key R+D Locations



Global footprint, with diverse customer base

By Geography

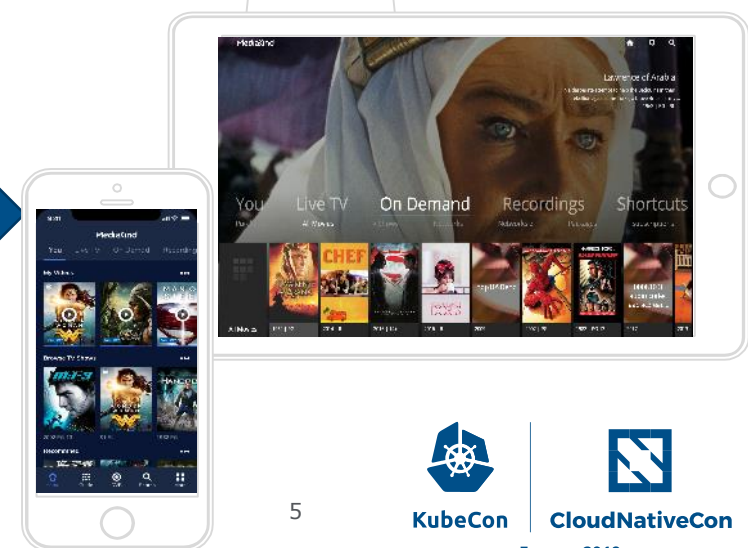
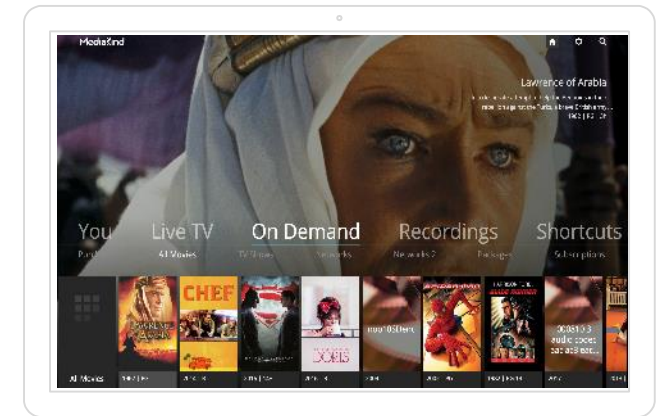


Ca. **\$350M** revenue in 2017 with growth in 2018

A Global Leader in Media Technology

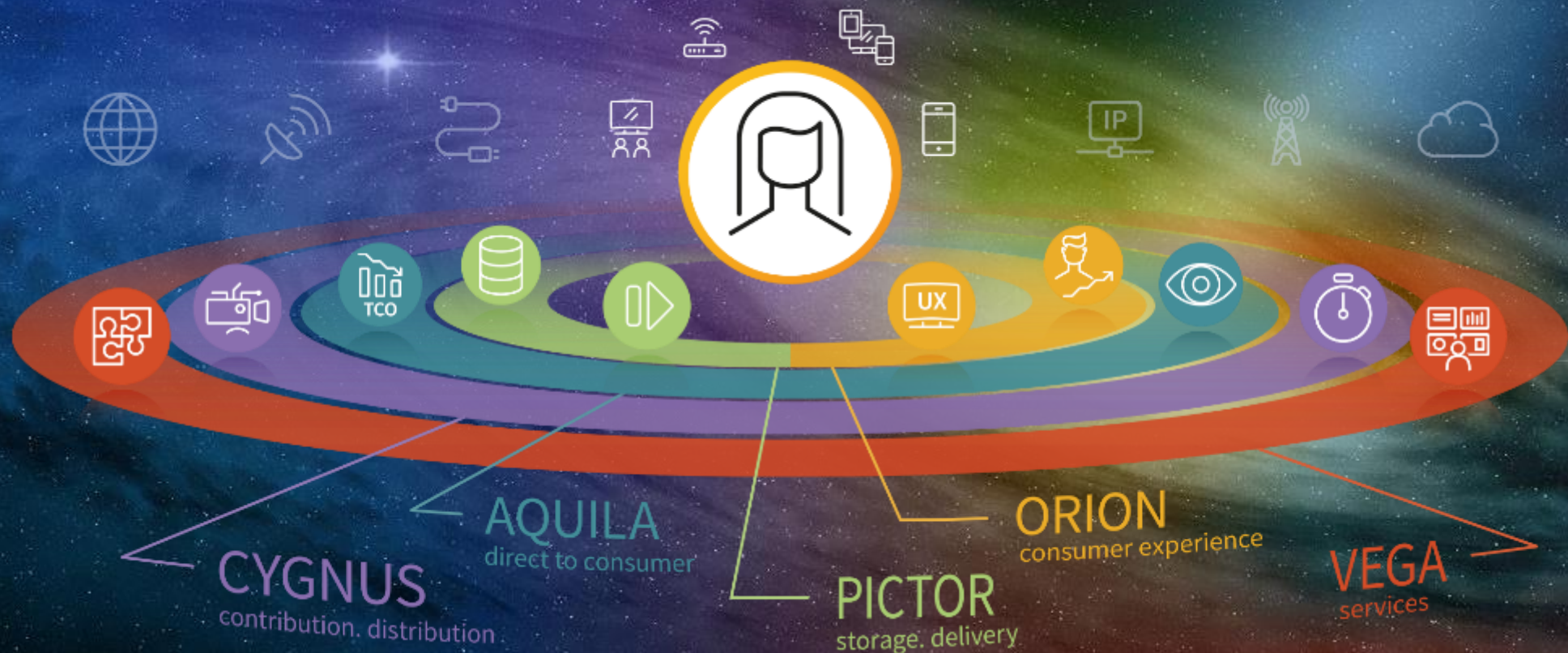
What we do? Media & Entertainment 😊

- ▶ <https://www.dailymotion.com/video/x6nwaw4>
- ▶ **Processing, Delivery and Platforms Technology & Services for enabling high quality media!**
 - ▶ Cable & Broadcast TV solutions
 - ▶ Live Streaming solutions
 - ▶ Replay TV & Network DVR solutions
 - ▶ On Demand solutions
 - ▶ Advertising & experience solutions...
- ▶ **For TV operators:**
 - ▶ Cable, Satellite, Telcos, Content providers, Broadcasters...



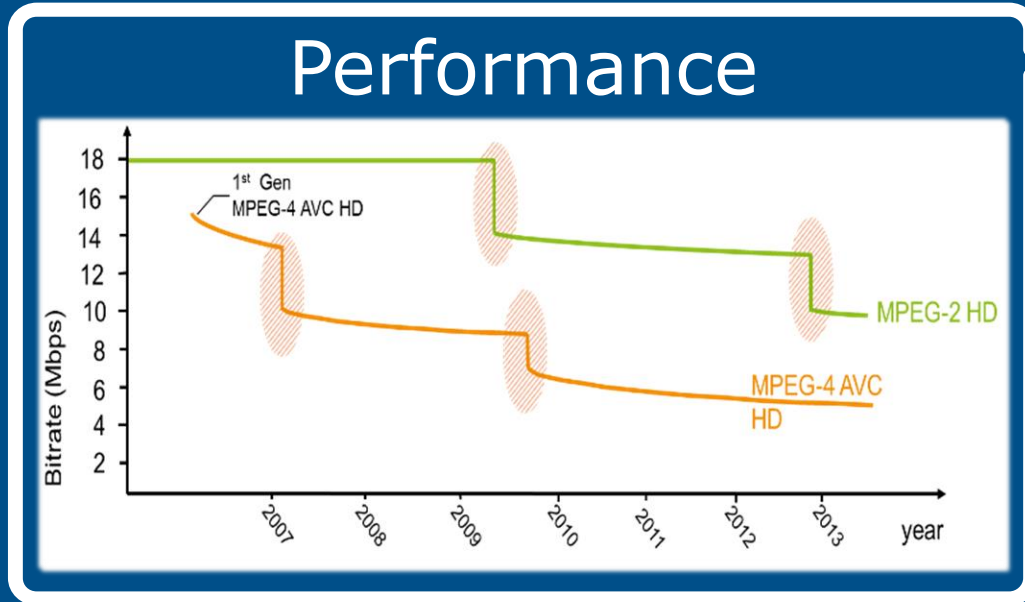
MediaKind portfolio

▶ MediaKind Universe



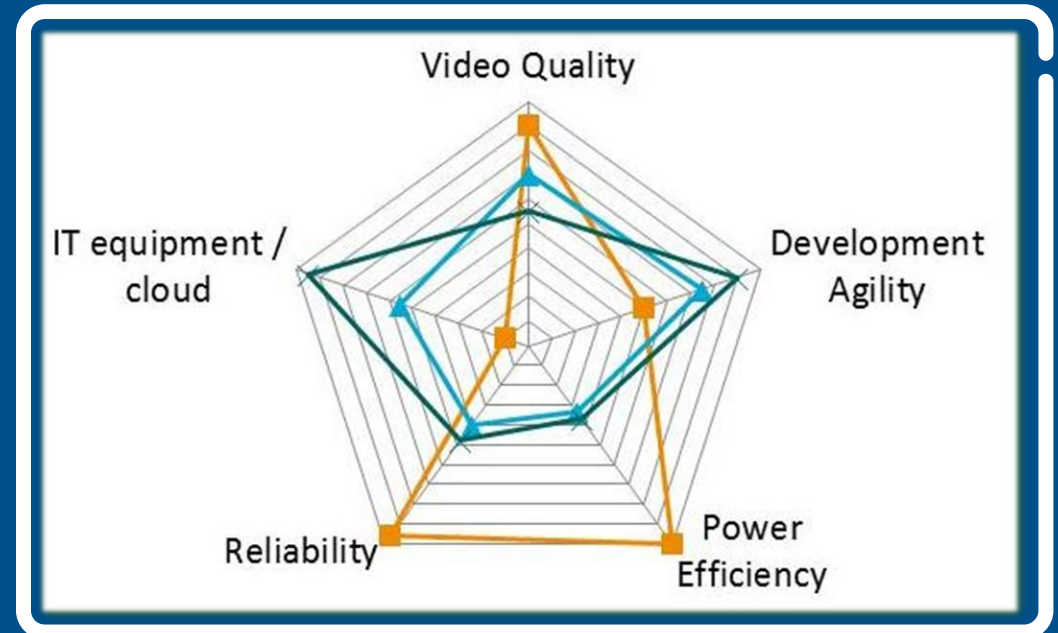
Where the Media industry is coming from...

Performance vs Flexibility



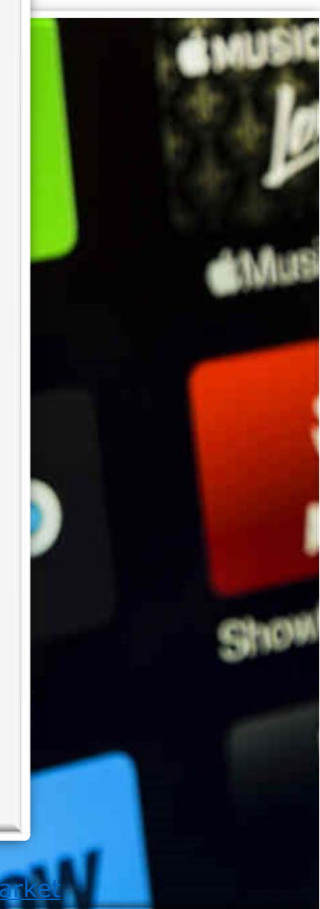
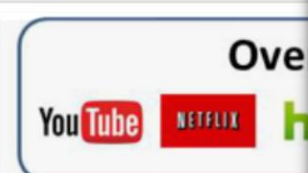
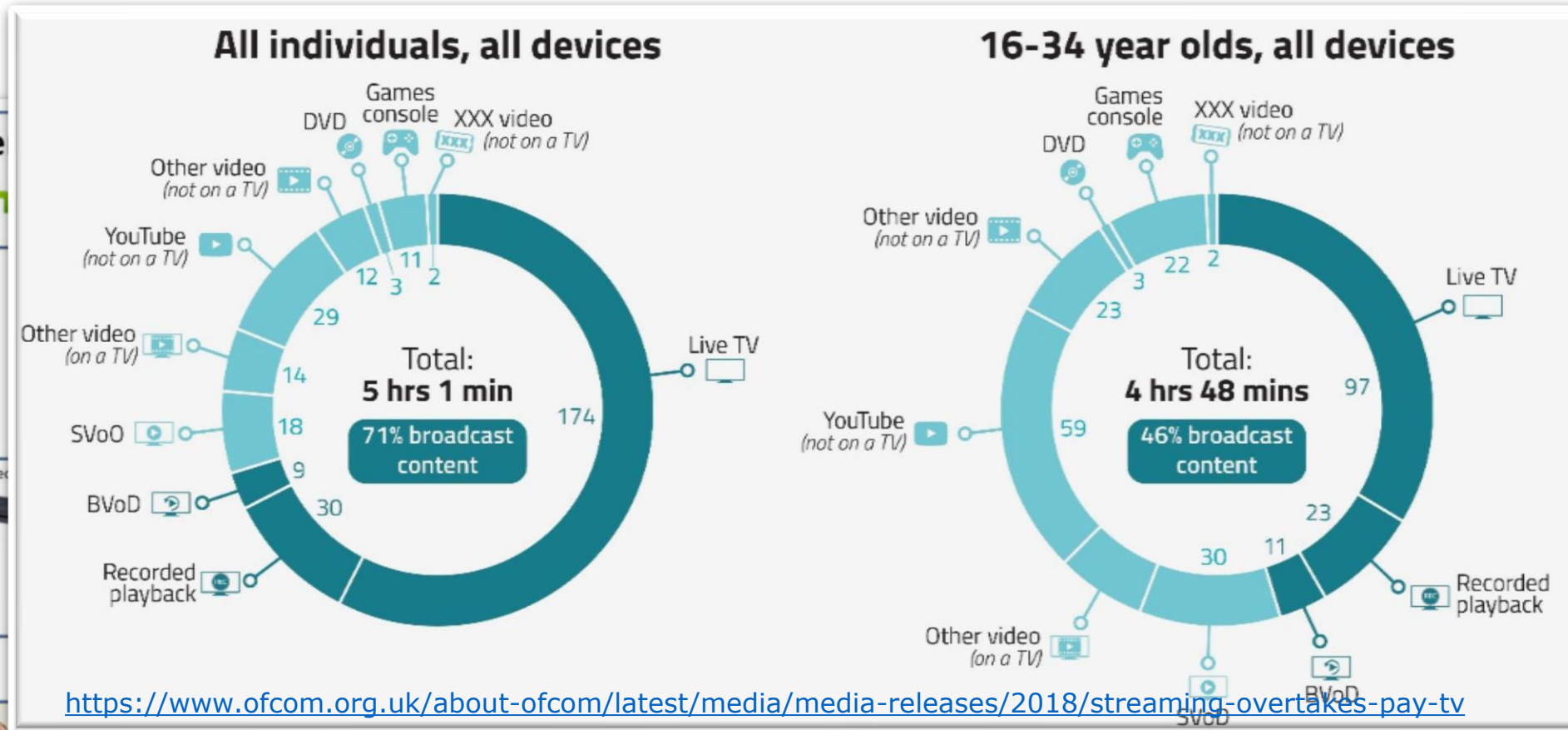
Processing Performance was judged by individual codec bandwidth savings

Flexibility was a trade-off against performance



Network & PayTV operators are under pressure

- ▶ OTT (Over-The-Top) remove the physical link (cable, DSL...) between Pay TV / network operators & access to TV services!
- ▶ New ways of doing & consuming TV: THERE and NOW with awesome personal EXPERIENCE!



<https://blog.technavio.com/blog/top-13-companies-in-the-over-the-top-ott-market>

Why Media moving to Cloud Native?



Infrastructure

- ▶ Variety of approaches:
 - ▶ Public Cloud
 - ▶ Private Cloud
 - ▶ Hybrid Cloud
- ▶ Scalable model
- ▶ Immediate access to resources
- ▶ Common frameworks

Operations

- ▶ Launch faster
- ▶ Improve agility
- ▶ Focus on applications and not on infrastructure
- ▶ DevOps approach

Business

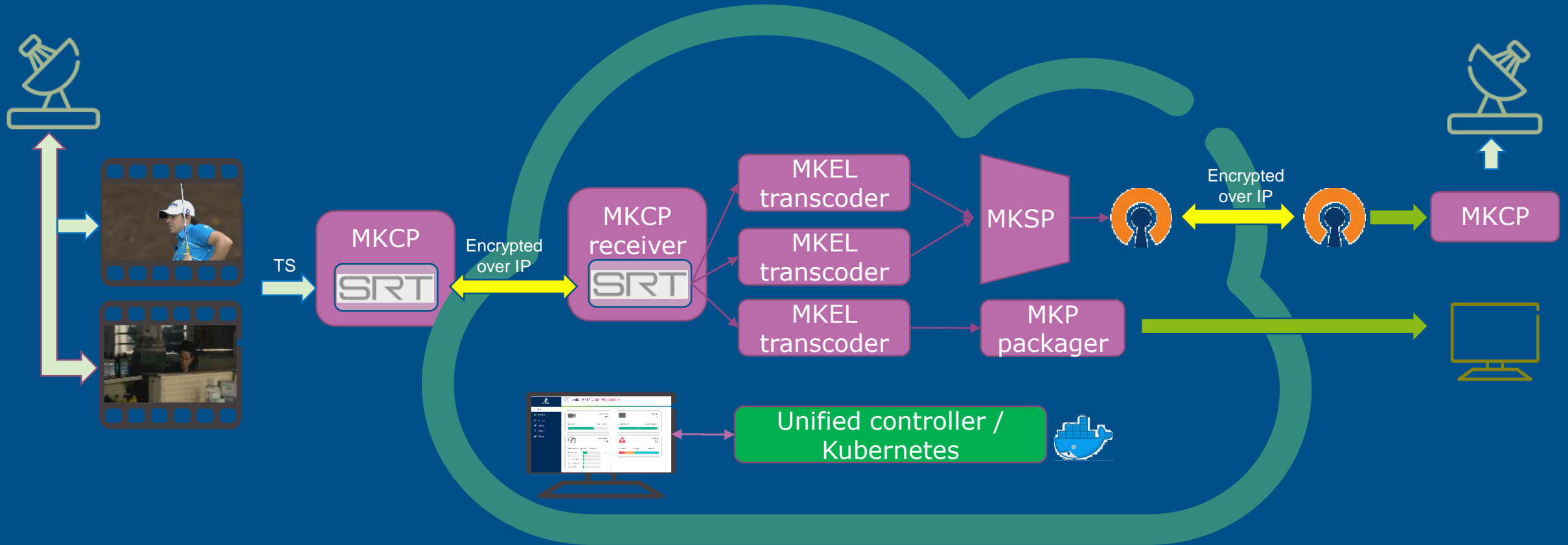
- ▶ Larger variety of commercial models
 - ▶ CAPEX
 - ▶ Term-based
 - ▶ As A Service
- ▶ Standardized operations across applications

Live TV Evolution 2018 - 2020

Cloud Uplink

Public cloud

Cloud Downlink



Why sharing this case study?

- ▶ Why moving to containers?
 - ▶ TV (Broadcast or Internet) is merging into IT, and IT is still adapting to TV.



Dedicated Appliances
Connected via Ethernet



Integrated into servers
E.g: PCIe option card



Deployed into Clouds
E.g: AWS, Google Cloud

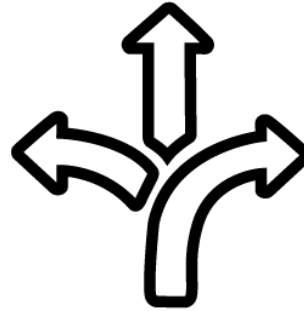
What architecture for TV?

▶ Transactional



- ▶ **Orion**
 - ▶ Consumer Experience
- ▶ **Aquila**
 - ▶ On-demand

▶ Flow-oriented



- ▶ **Aquila**
 - ▶ Live TV
- ▶ **Cygnus**
 - ▶ Contribution & Distribution

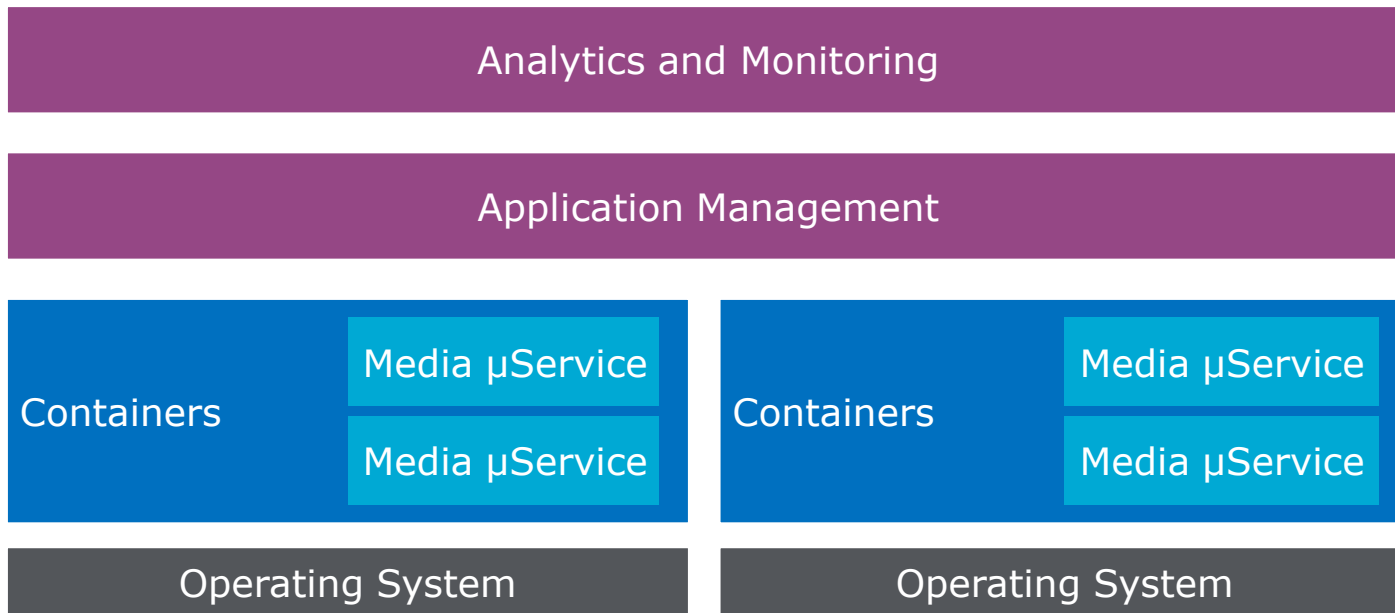
▶ Storage-based



- ▶ **Pictor**
 - ▶ Storage

All these architectures have to work together!

Architecture Evolution



High-Level Management

Micro-services, Containers and Networking



Application Management & Monitoring



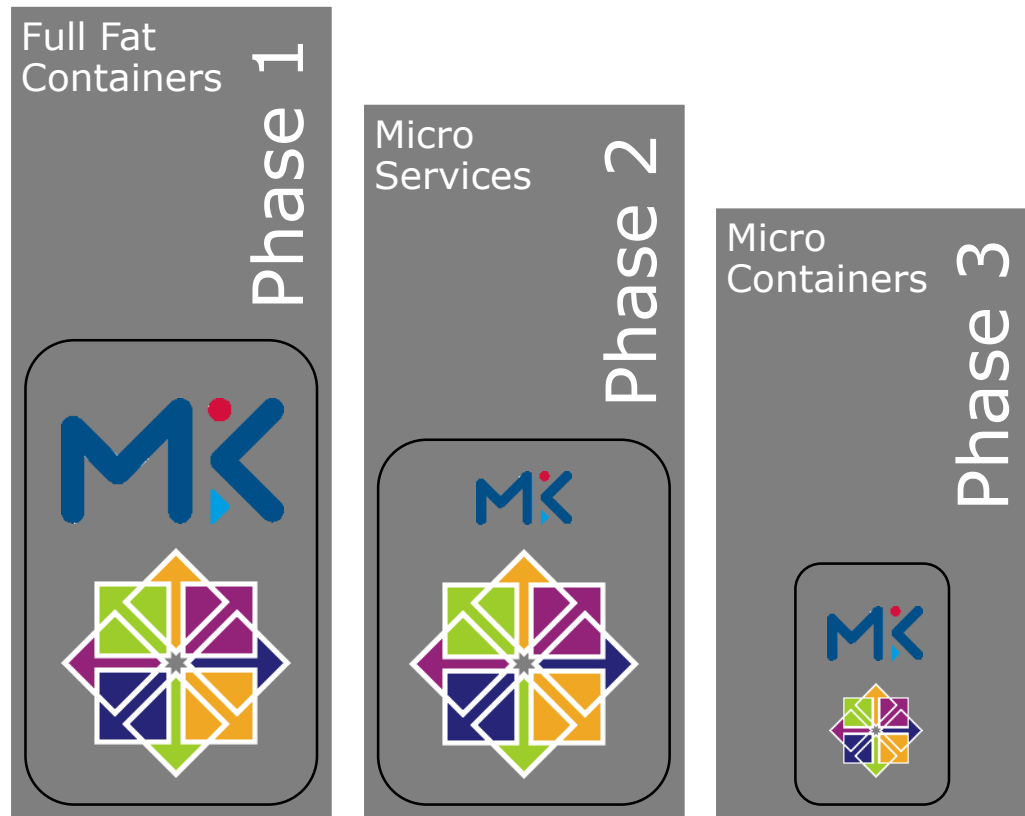
Infrastructure

Seamless interface to private and public cloud



Building Linux containers

▶ Evolution was...



▶ ... In phases

- ▶ Phase 1
 - ▶ Deliver containers
 - ▶ Enabled orchestration (Kubernetes)
 - ▶ Based on full products
 - ▶ And full container OS!
- ▶ Phase 2
 - ▶ Micro-services replacing full products
 - ▶ Common container layers
 - ▶ But still a full container OS!
- ▶ Phase 3
 - ▶ Containers were shrunk even further
 - ▶ Using multi-stage Dockerfiles
 - ▶ While still enabling security / traceability

What about networking?

▶ TV is migrating from ASI/SDI



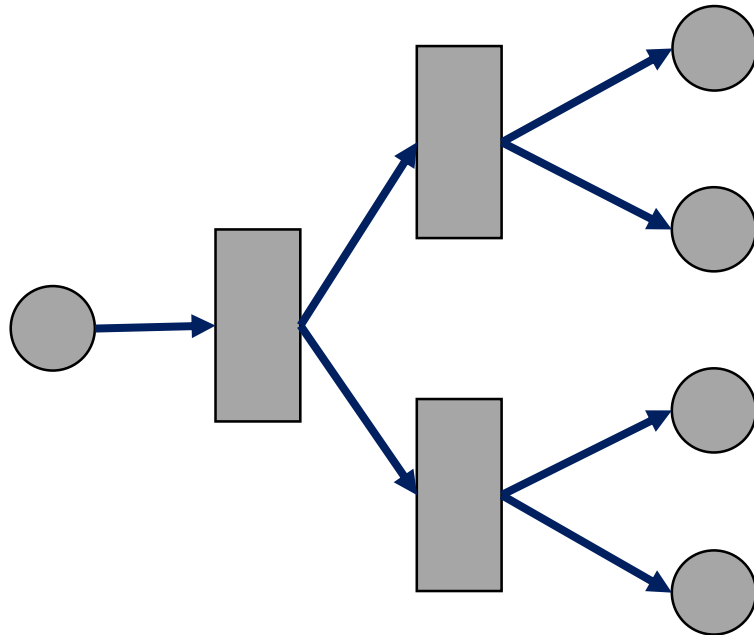
▶ ... To IP



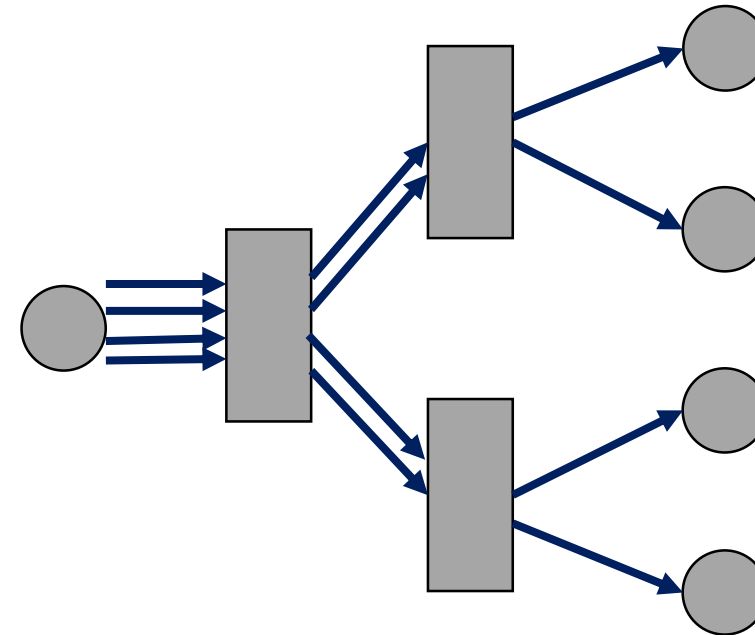
But progressively

Live TV and Container Networking

▶ Live TV is often Multicast



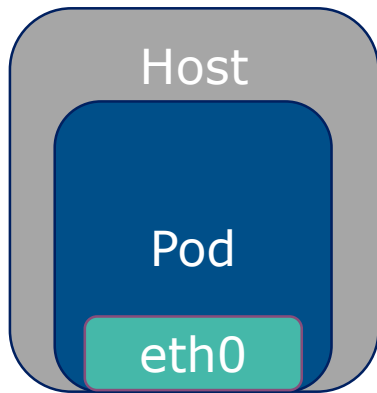
▶ Container Networks are Unicast



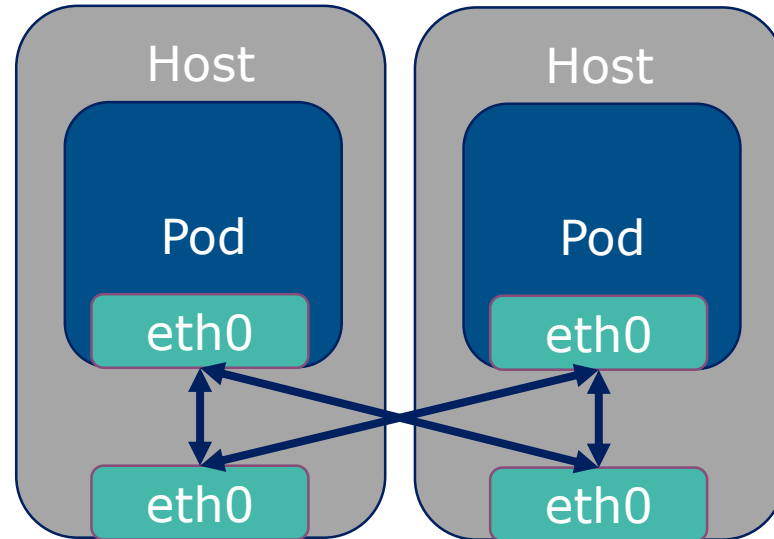
So we have to convert flows!

Container Networking: What a journey!

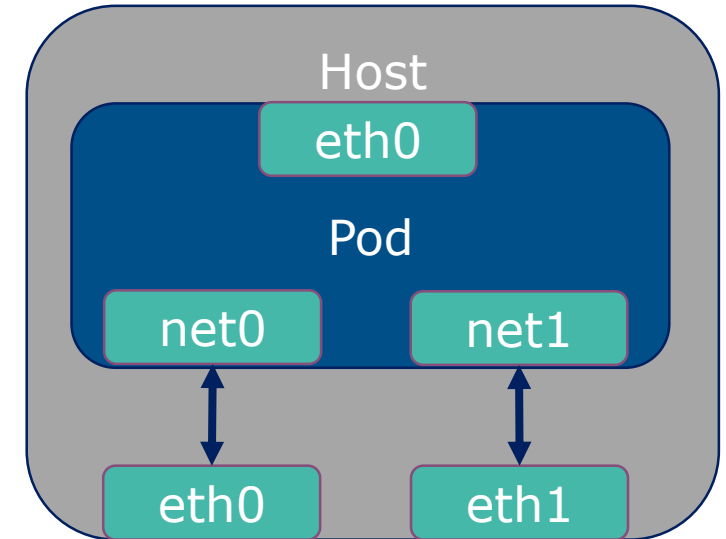
▶ Host networking



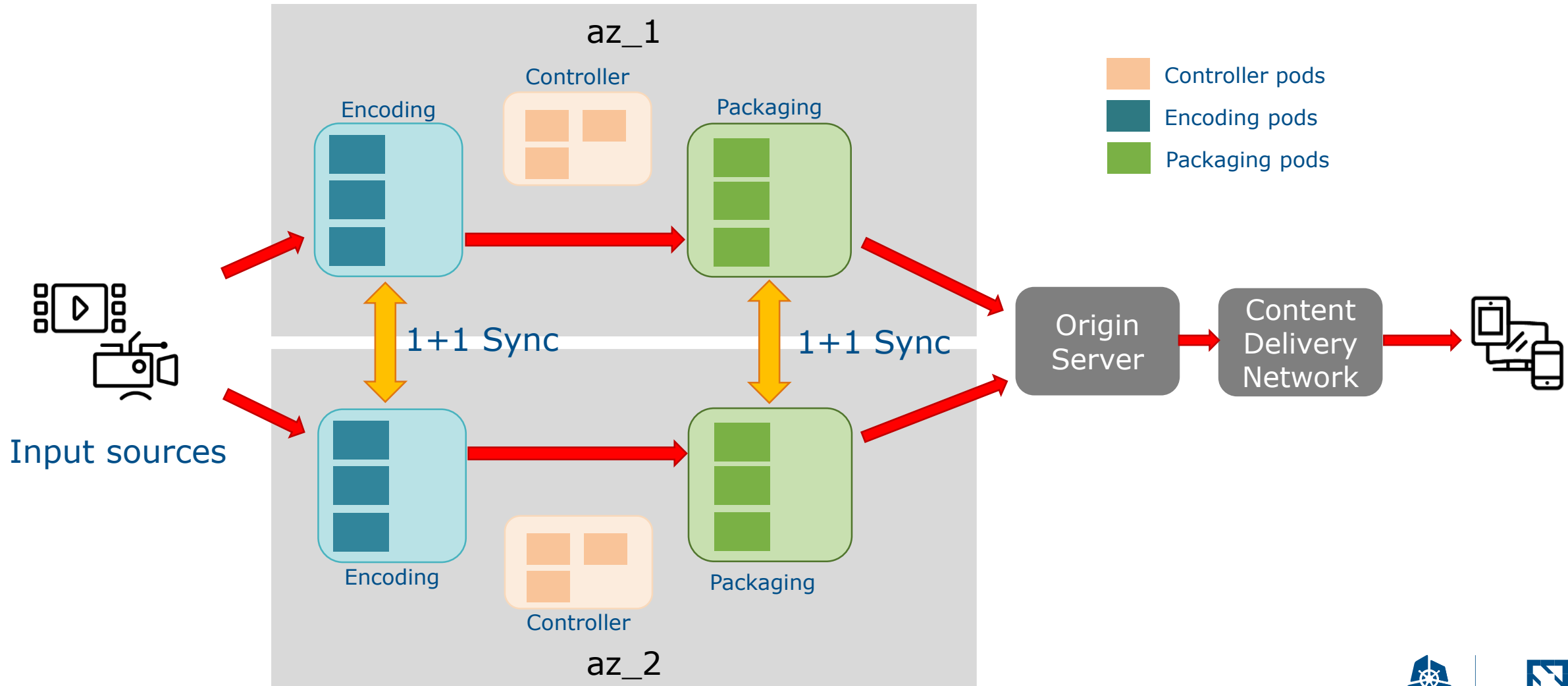
▶ NodePort Services



▶ Multiple NICs



Example of OTT Live TV on Kubernetes



Application deployment

From Containers to Solutions

Collection of containerized micro-services



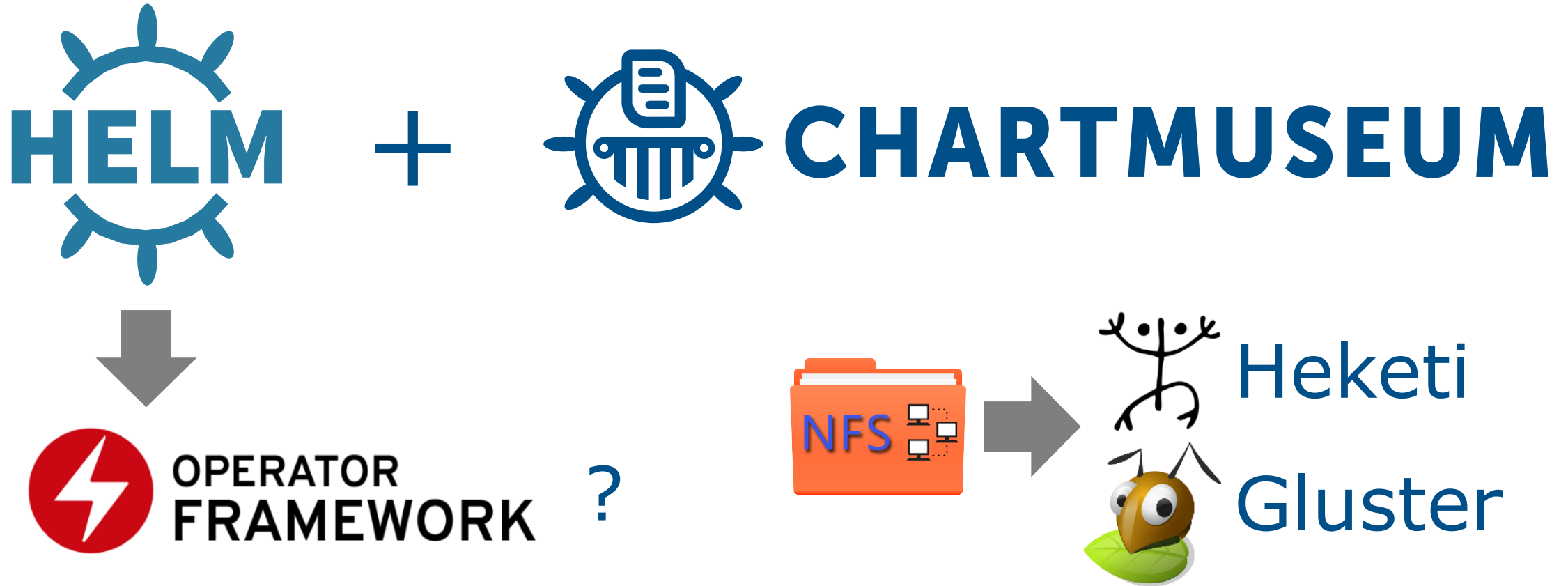
Versioned Charts with documented parameters



Common solution blueprints



Evolution of application deployment



What about resource requests?

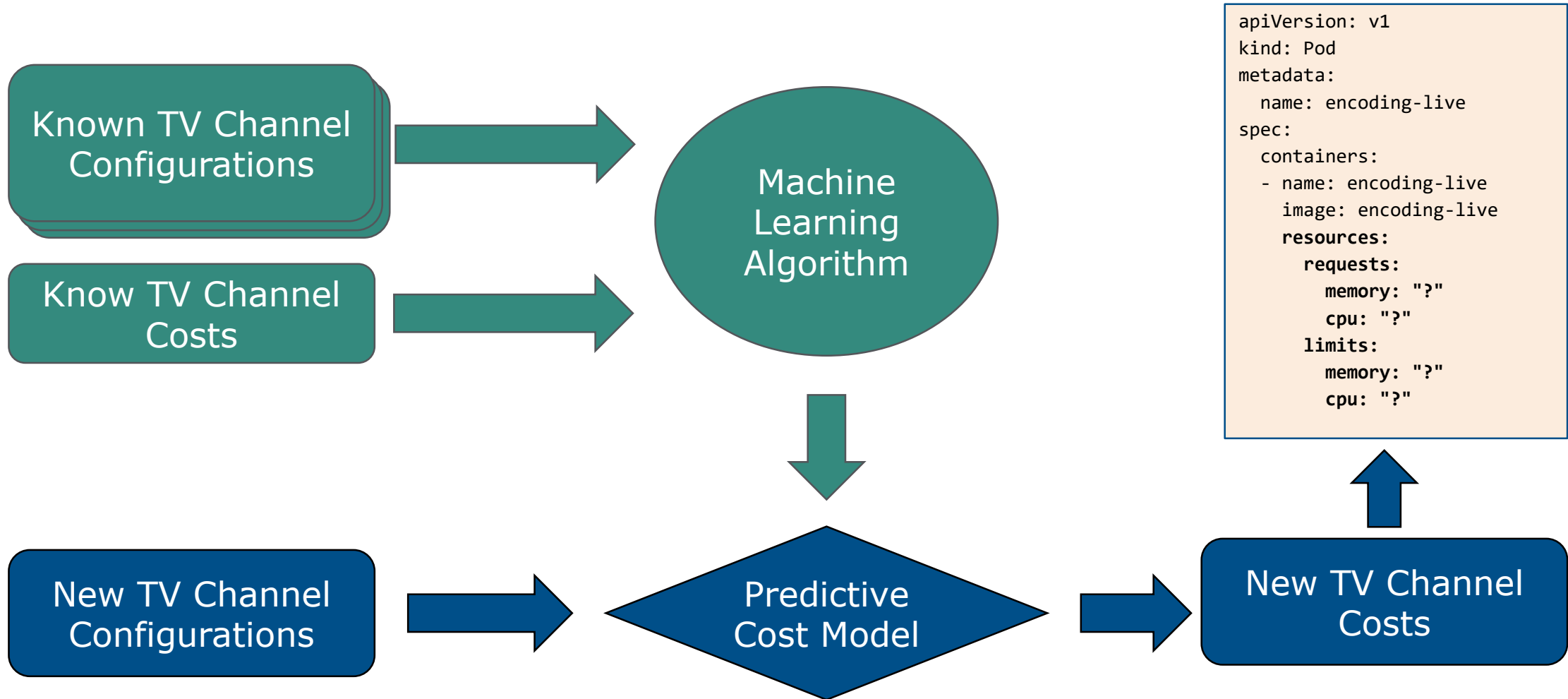
- ▶ **Appliances are sized for TV**
- ▶ Resource requirements per TV channel is function of many parameters
 - ▶ Resolution: SD, HD, 4K
 - ▶ Coding standard: H264, HEVC
 - ▶ Frame rate (fps): 25, 29.97, 50, 59.94
 - ▶ And dozens of other ones!
- ▶ Appliances are sold based on a number of SD, HD, UHD channels.
- ▶ **But underlying consumption varies based on configuration!**



- ▶ **Containers are more flexible**

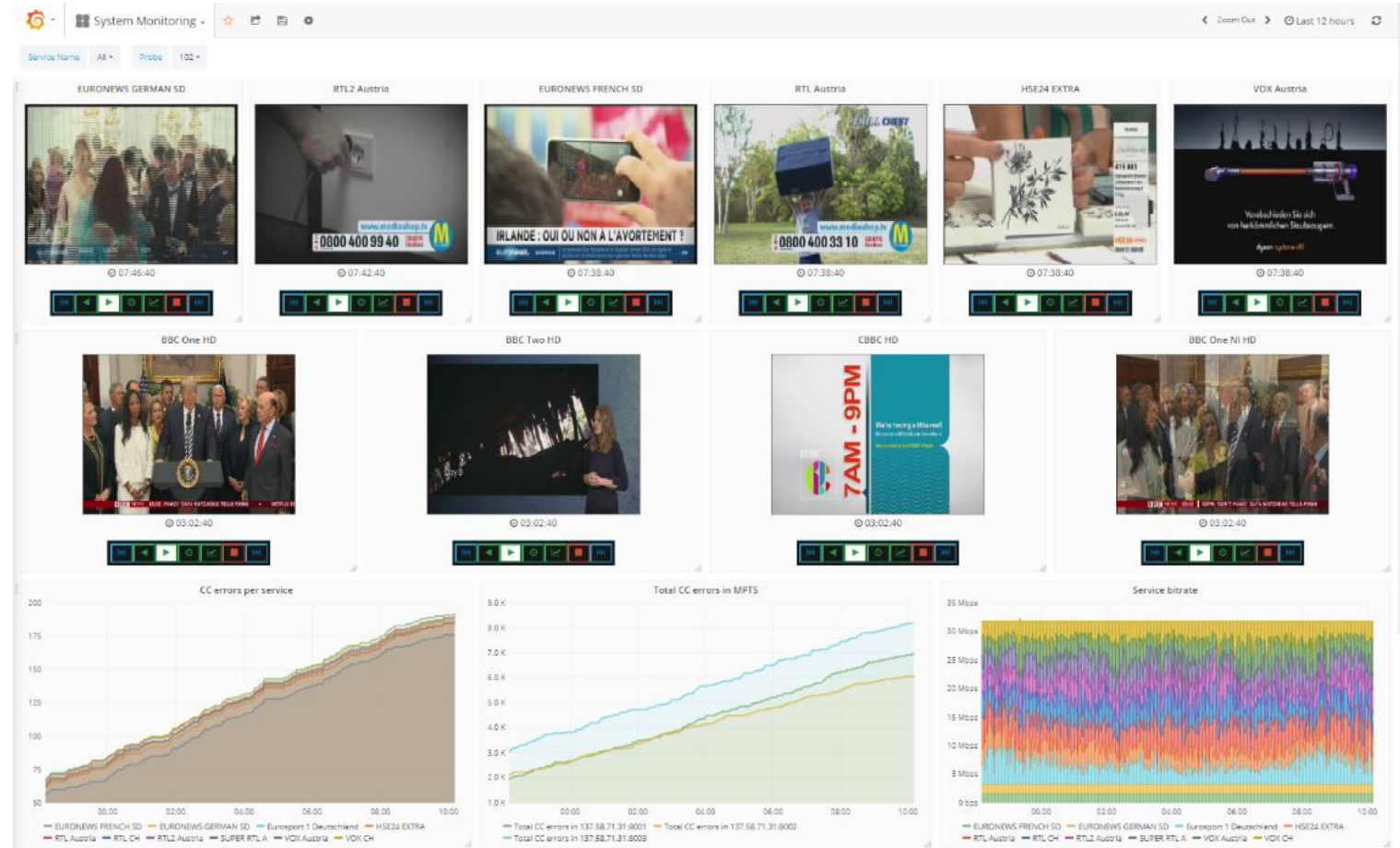
```
apiVersion: v1
kind: Pod
metadata:
  name: encoding-live
spec:
  containers:
  - name: encoding-live
    image: encoding-live
    resources:
      requests:
        memory: "?"
        cpu: "?"
      limits:
        memory: "?"
        cpu: "?"
```

Getting resource requests right



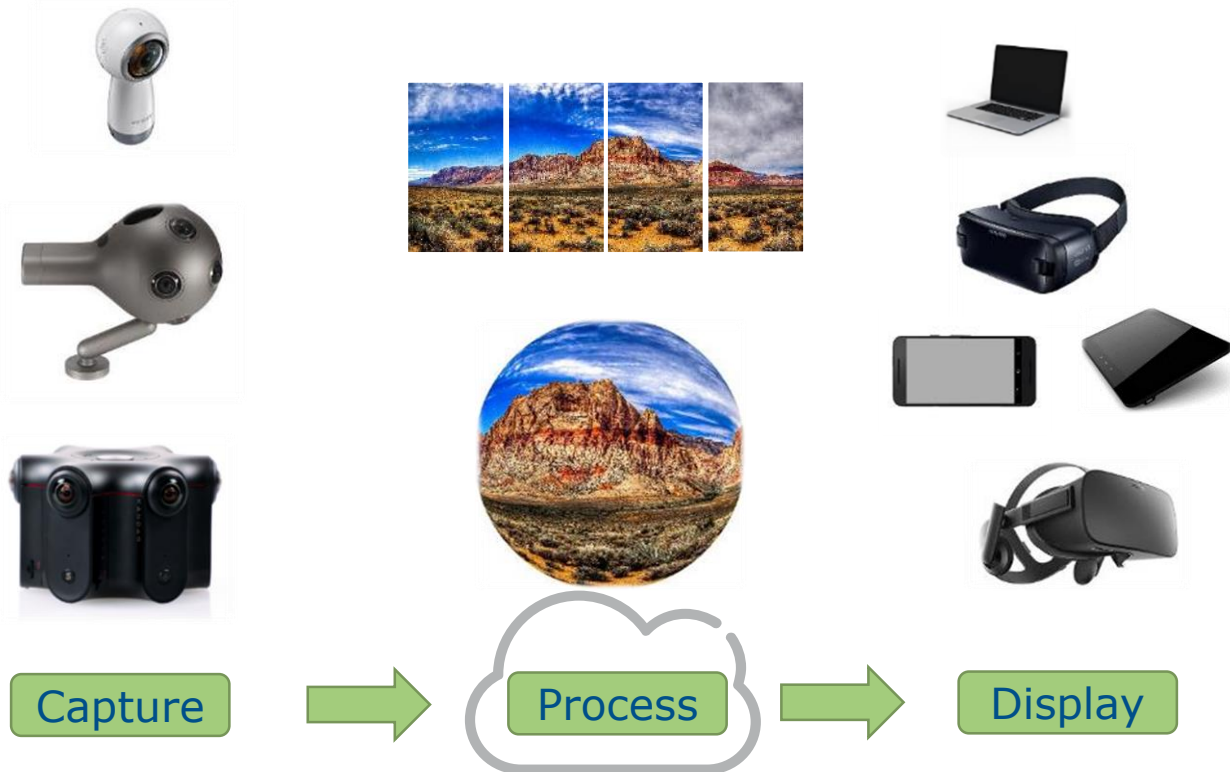
Monitoring TV Operations

- Monitoring and Analytics frameworks are the same as general IT
 - TV-aware service monitoring is needed
 - TV control applications are simplified
- TV and IT operations converge



360° augmented **viewing experience**

- Transport the viewer immediately into the live action
- Deliver a perspective that would not be possible, even from the most expensive seat in the house
- VR experience but also social and personalized on handset devices



Live Sport

Live Music
Concerts

eSports



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How to achieve that?

Challenges

- **Very high resolution**
360° views at tolerable bitrates
 - 6K x 3K quality video in 10-15 Mbps
- **High compute and network resources** required for short time periods
- **Parallelize tile HEVC** encoding Processing at any resolution



Solution

- Build up **Cloud Native Software**
- Split in **Microservices** packaged as **Containers**
- **Spin up / down** required infrastructure in Public cloud
- **Orchestrate** processing dynamically with **Kubernetes / GKE**
- **Scale up / down** automatically video deliveries based on usage

Will you watch TV differently?

- ▶ Arnaud Caron – arnaud.caron@mediakind.com
- ▶ Jerome Champetier – jerome.champetier@mediakind.com

