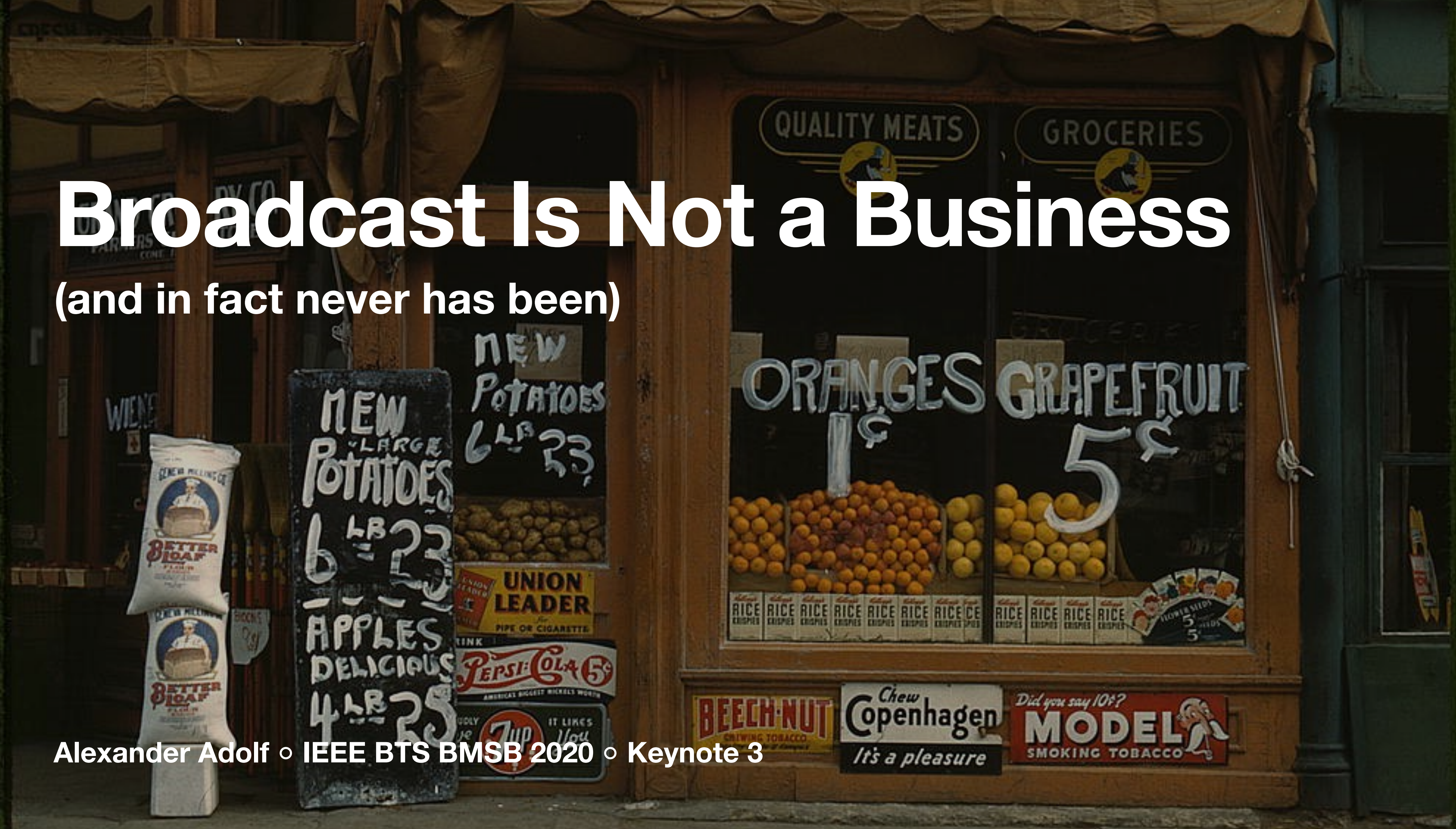


# Broadcast Is Not a Business

(and in fact never has been)

Alexander Adolf ◦ IEEE BTS BMSB 2020 ◦ Keynote 3





“

William T. “Bill” Hayes

2016 to 2018 President of the  
Broadcast Technology Society (BTS)  
of the Institute of Electrical and  
Electronics Engineers (IEEE)

My advice to anyone that is a member of the BTS, or working in the business called broadcasting, is to adjust your thinking.

**Broadcasting is not a business and in fact never has been.**  
**Broadcasting is a methodology for distributing content to audiences.**

In the early days, when there were fewer delivery methodologies, and the technology for receivers required the devices to be large and stationary, broadcasting as we know it was adopted. Since there were so few options for delivery, the business adopted the name of the distribution methodology.

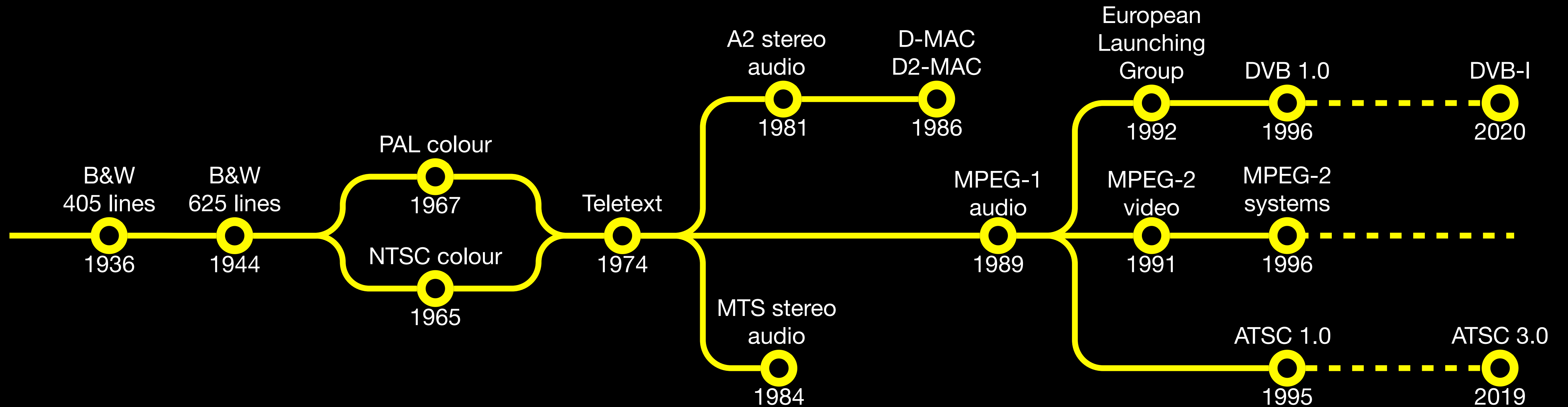
#SoTrue

”

IEEE Broadcast Technology Magazine, second quarter 2018 issue, p.2 (line breaks & bold added)

# How TV Went Digital

## A Fairly Subjective History of Technology



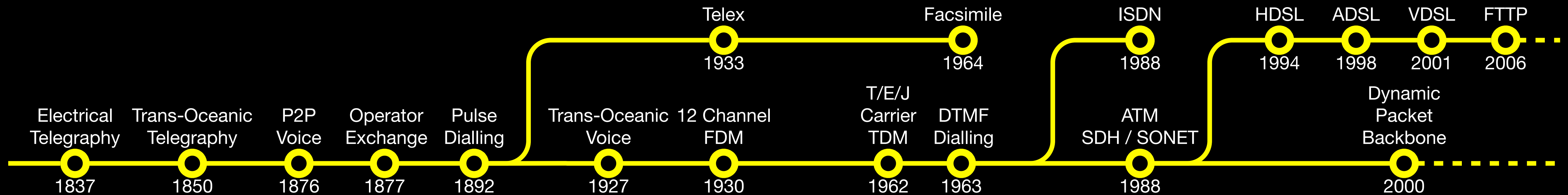
Analogue

MPEG2-TS

IP

# How PSTN Went Digital

## Yet Another Fairly Subjective History of Technology



Twisted Pair

Coax  
Analogue

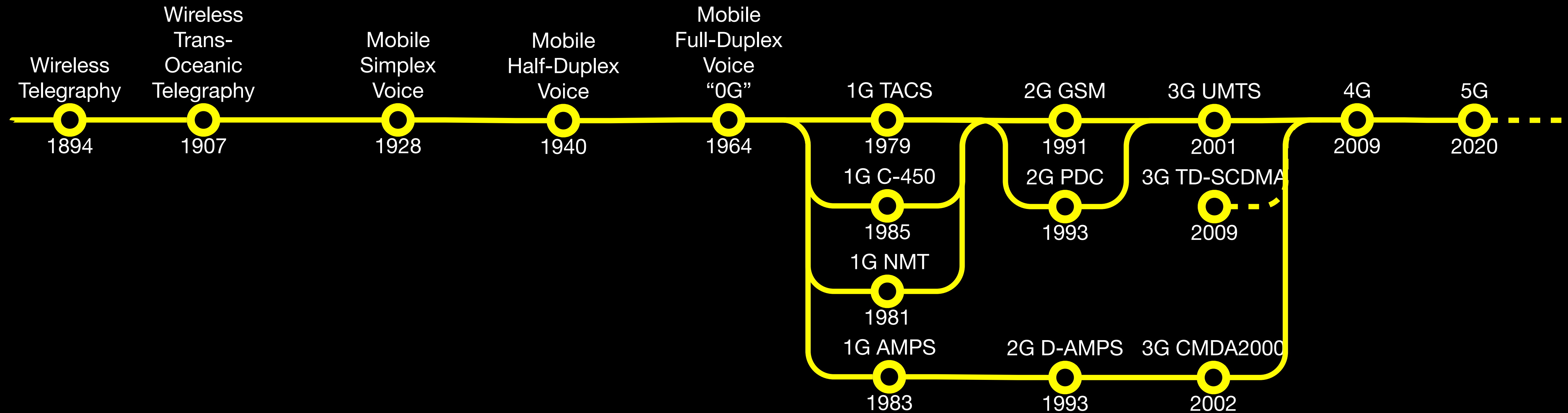
Coax  
Digital

Optical

IP

# How Mobile Comms Went Digital

## Yet Another Fairly Subjective History of Technology



AM

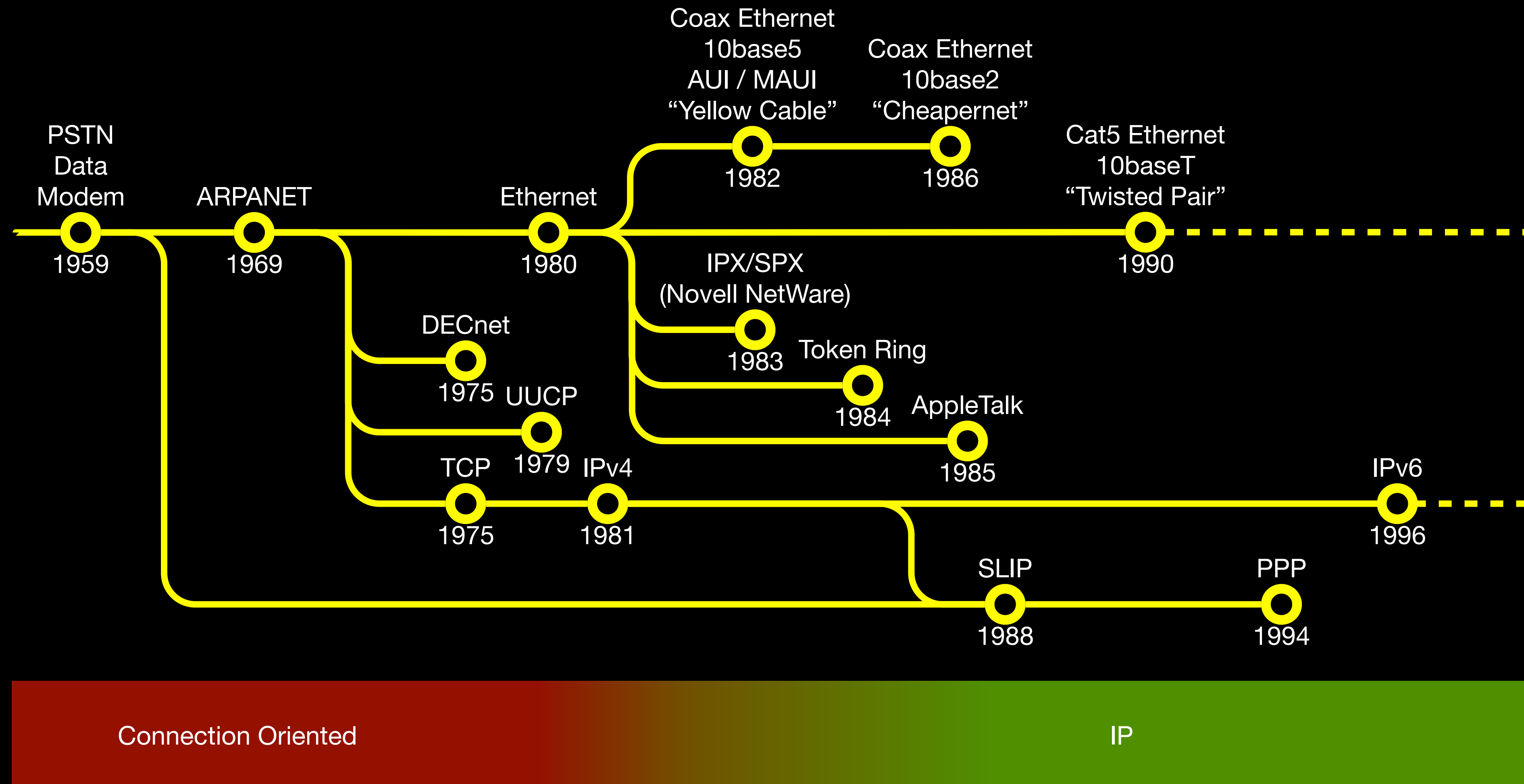
FM

Digital

IP

# Computer Networking

## Yet Another Fairly Subjective History of Technology



**In all communications sectors we have  
looked at, the technology evolution has  
followed a recurring pattern:**

**With some detours, and dead-ends along the way, they all made  
the transition from analogue to digital. As soon as things get digital,  
the innovation pace accelerates, and in the end...**

**IP wins.**

Is it  
**surprising**  
that “IP wins”?

**No.**

*Compared to the other sectors.*

Computer networking  
started late\*, and it was a  
new sector without legacy.

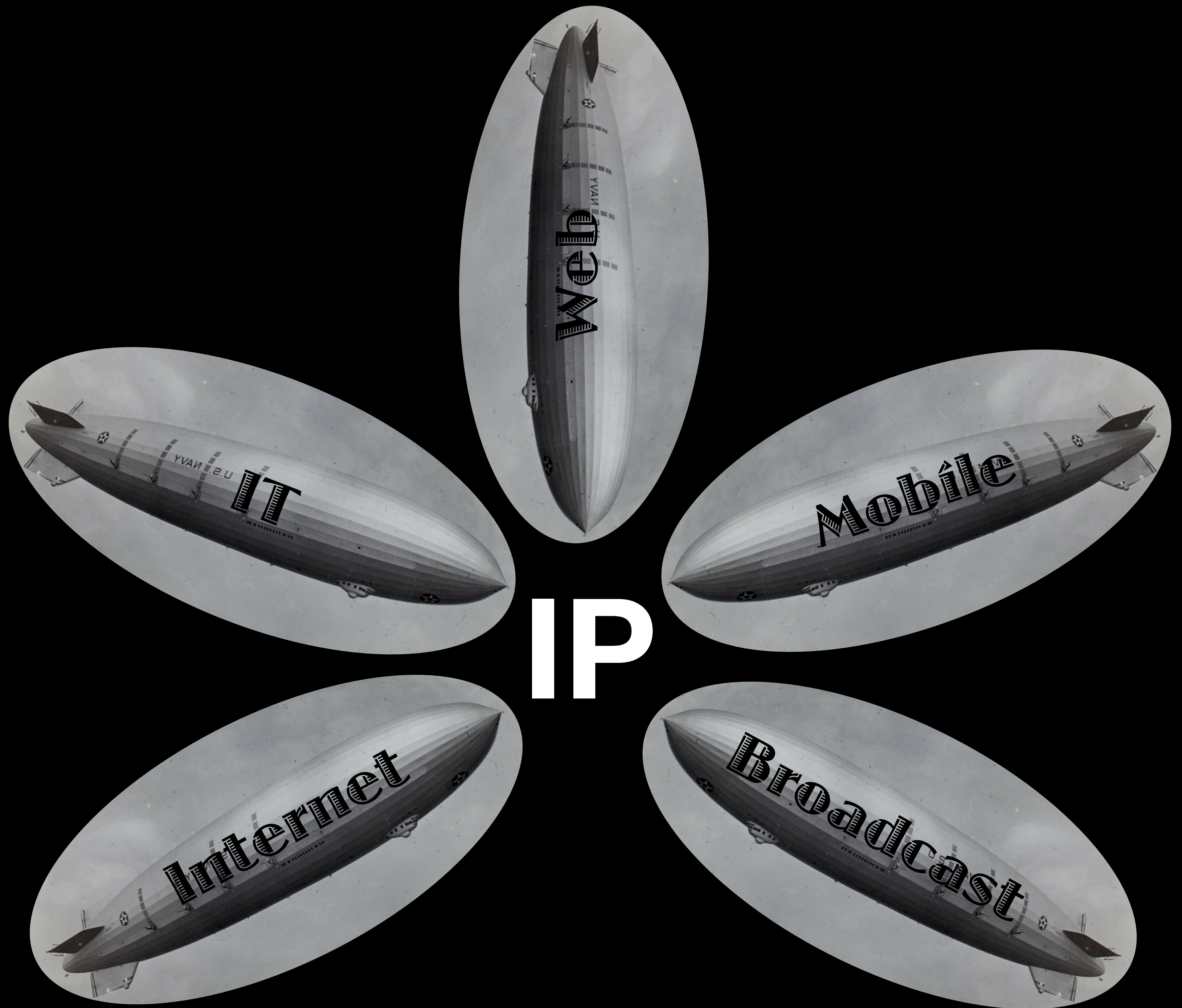
Hence, IP was designed  
without constraints of  
compatibility with existing  
systems, existing infrastructure,  
and on a military budget.\*

*Read: “Money doesn’t matter; time matters.”*

Those who designed IP, had the freedom to do  
what was “the right thing” from a pure  
engineering & technology standpoint.

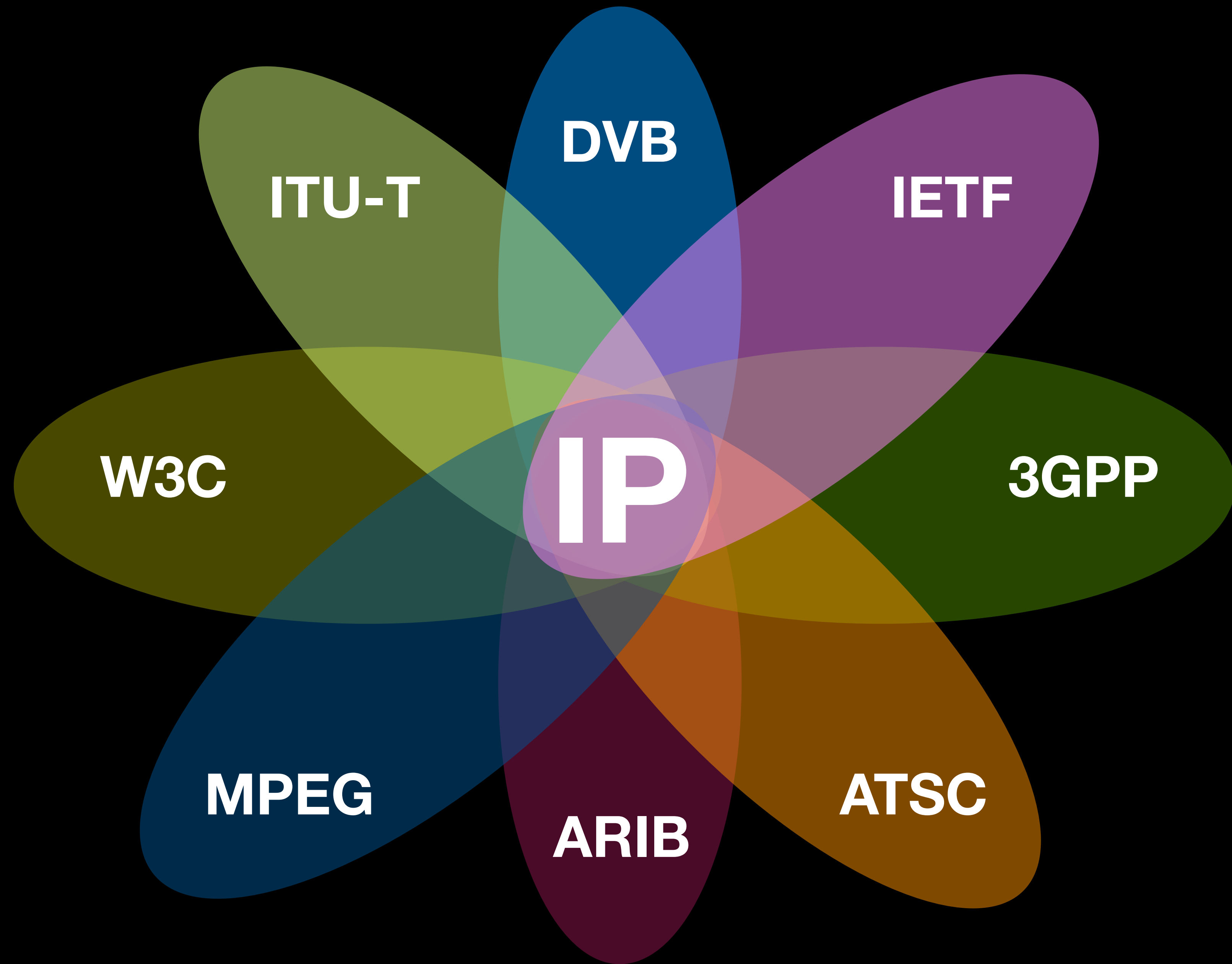


# “IP Wins” – Industry Sector Perspective





# “IP Wins” – Standards Making Perspective





This means that IP now plays a very important role across all communications sectors, and we hence need to change the way how we **picture** it.

# Traditional Visualisation

**Bad** - Do not use this any more

*"Brick Wall Diagram"*

Application  
Layer

DNS

SSH

SMTP

IMAP

HTTP

...

Transport  
Layer

TCP

UDP

...

Network  
Layer

IPv4

IGMP

ICMP

IPv6

MLD

ICMP6

Link  
Layer

Ethernet

LTE

WiFi

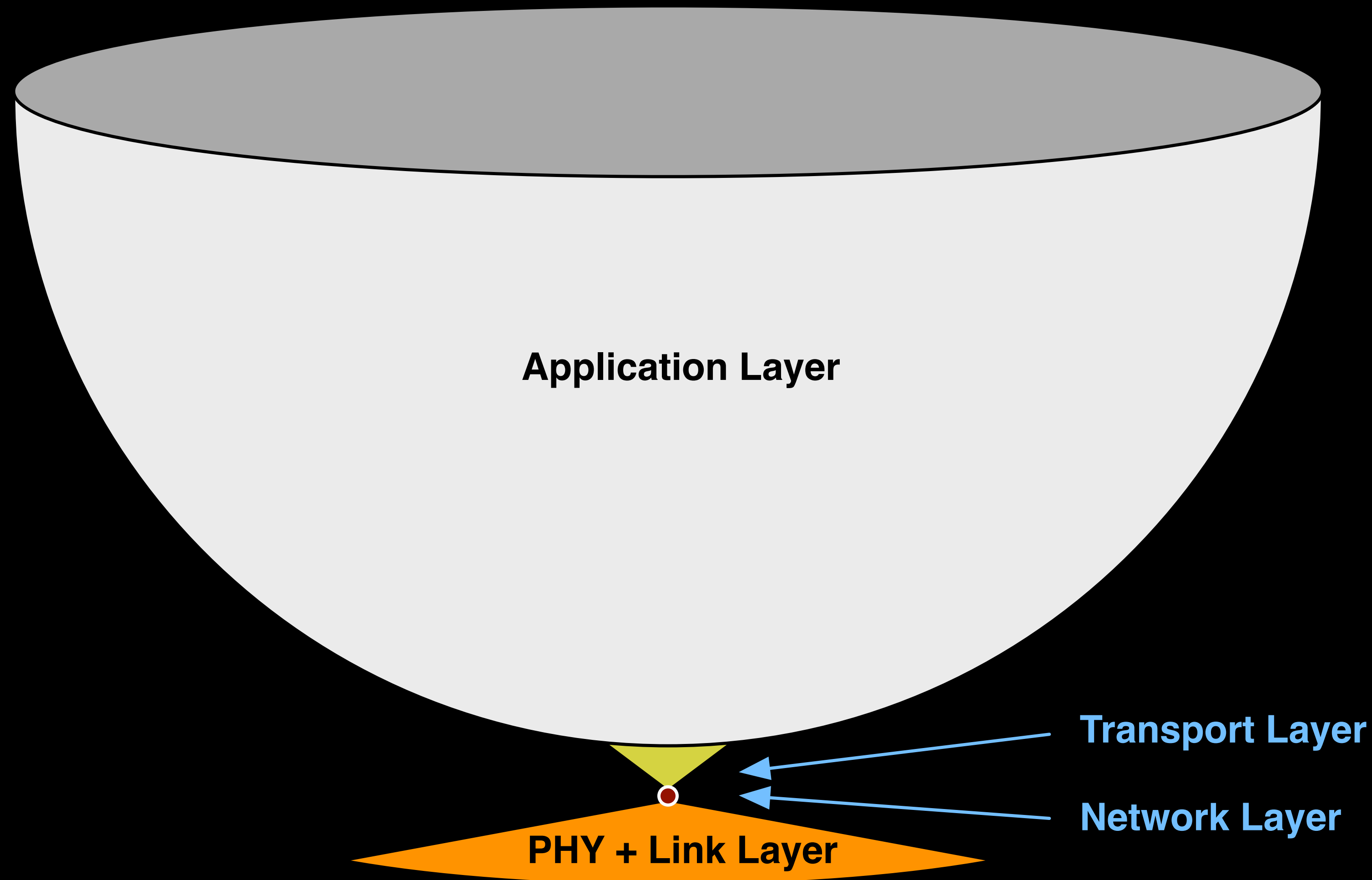
...



# Visualisation By Significance

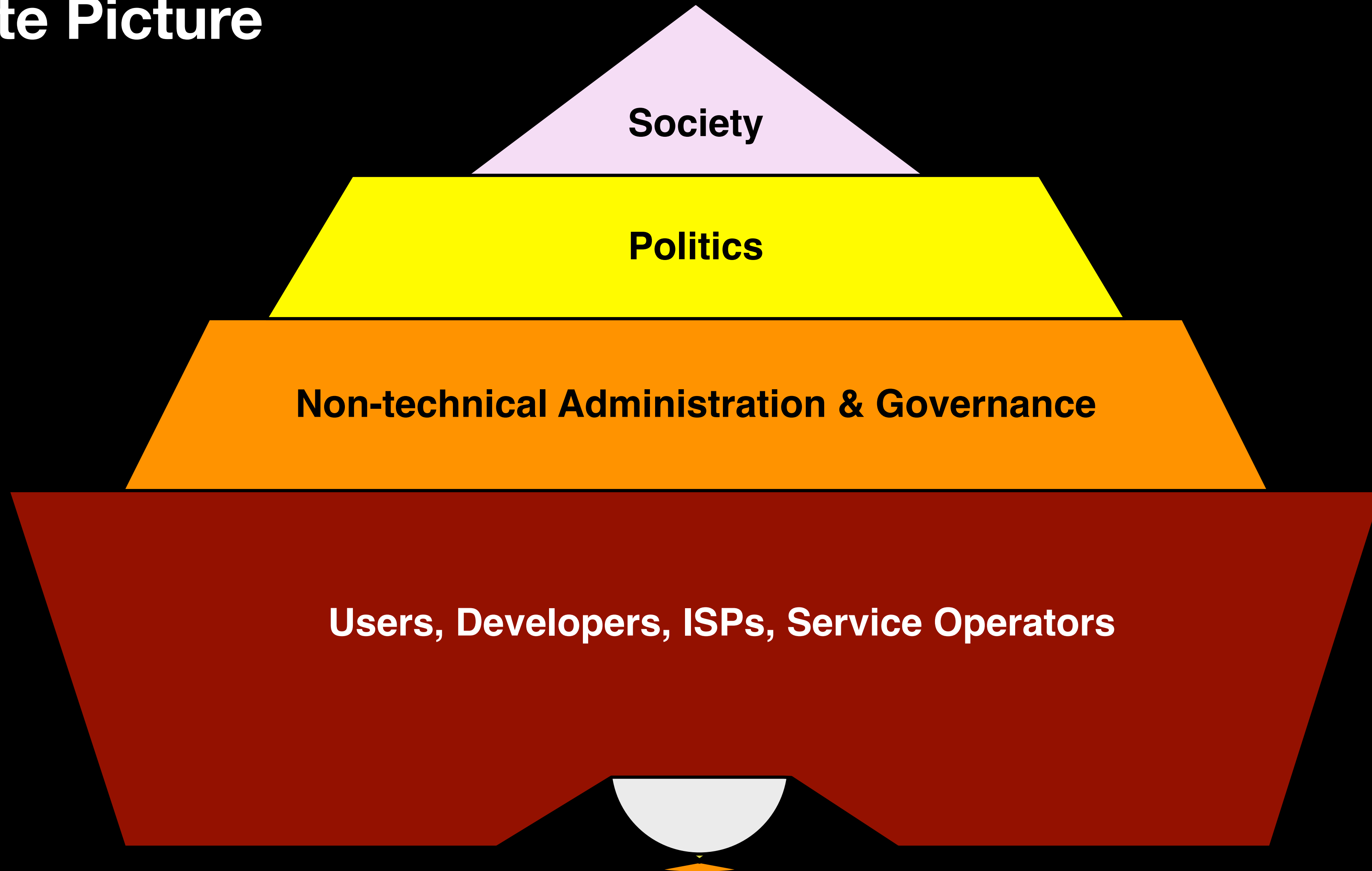
## Detail View

*"Egg-Cup  
Diagram"*



# Visualisation By Significance

Complete Picture







← Right Decision  
Wrong Decision →

*What does  
all this mean for the  
broadcast sector?*



Around 1995, by “going digital” we became part of a (much) larger IT industry.

But we preferred not to notice.

This has not bitten us in the past,  
but only recently...





IP

IP

IP

IP

IP

IP

IP

IP

IP

IP

IP

IP

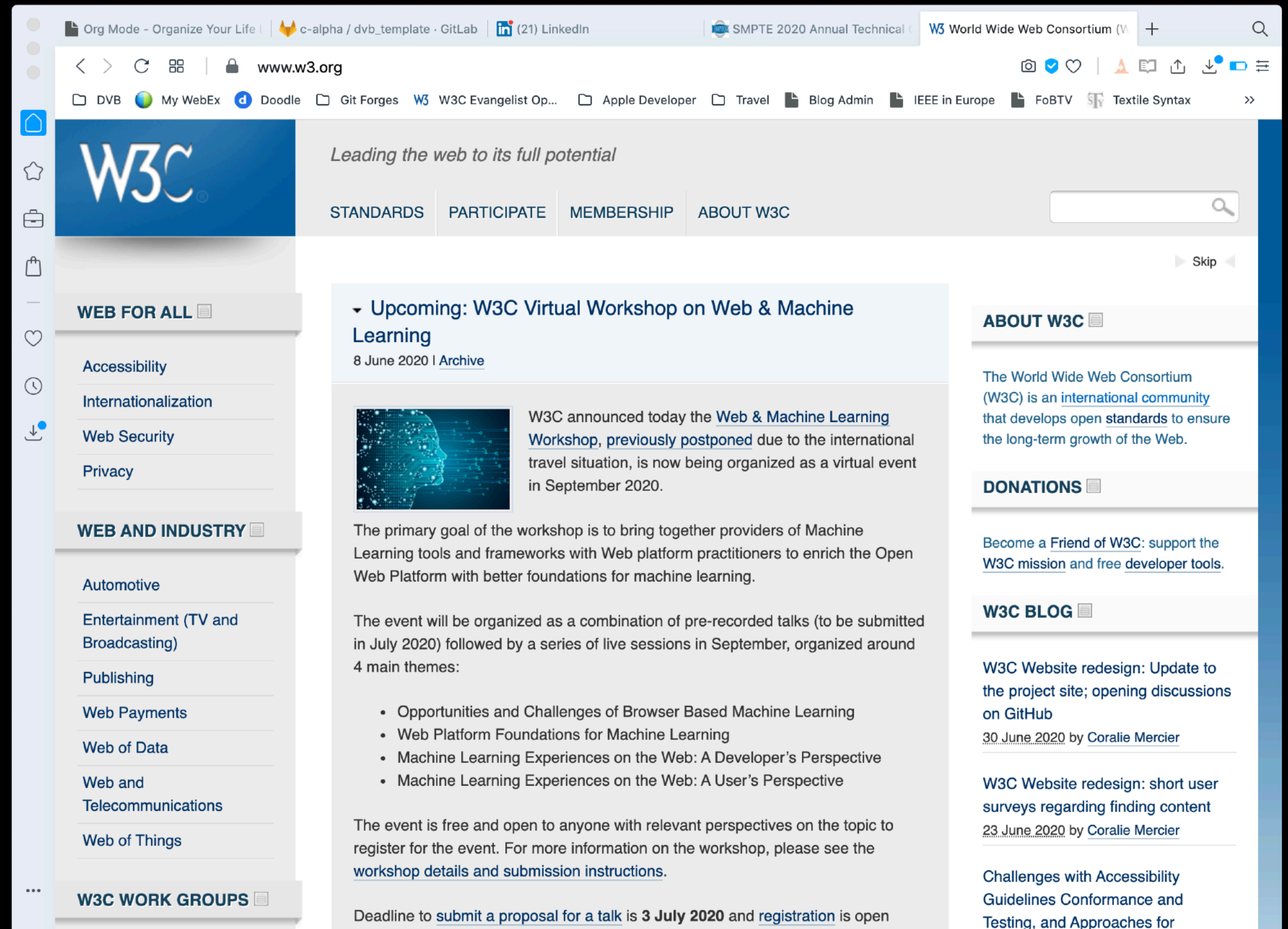
Broadcast Motel



# Strategy Element #1

## W3C

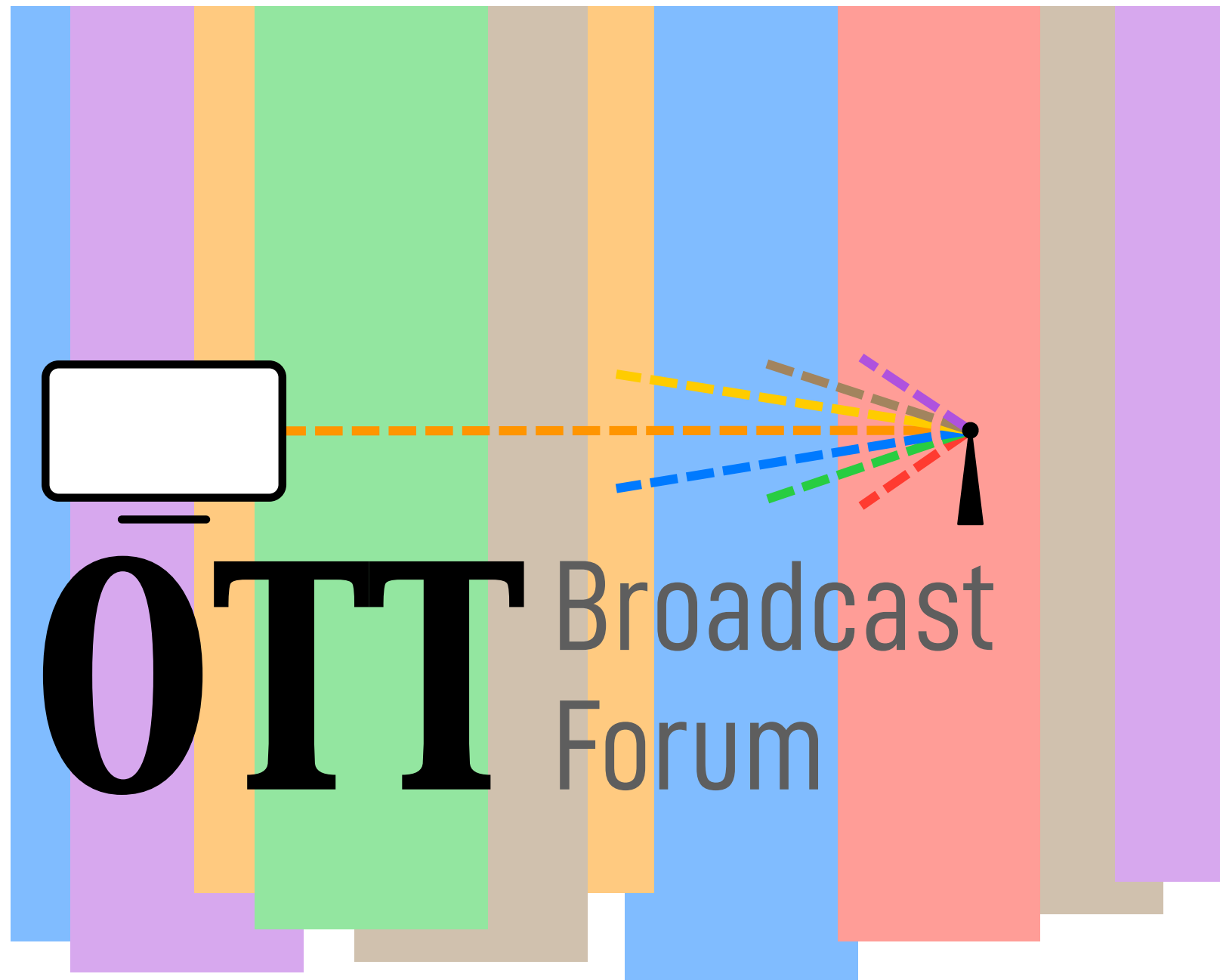
- If it's not part of the browser, HbbTV will need to reinvent it, and the feature will be restricted to HbbTV platforms and scenarios only.
- The web's big whigs are pressing hard for A/V features in W3C, but broadcasters shy away from the web ("tell us what you'd like to get, or you'll have to like what you get").



# Strategy Element #2

## Implementers' Club

- Traditional broadcast standardisation is dominated by manufacturers
- “The next wave” of broadcast innovation will be driven from non-traditional forums and actors
- Thus, the standards strategy is changing from one-stop-shopping (DVB, ATSC, ARIB, NERC) to a patchwork approach
- The next big goal is: **a global broadcast standard on top of IP**



**OTT Broadcast Forum**

**Why and What?**  
An operational executive guidance to the ongoing convergence of global OTT and broadcast technologies

Too many have believed for too long that the convergence of broadcast technologies would happen at the PHY layer. As we know now, this is not the case and the convergence is happening at the IP layer instead. Transmitting IP natively over broadcast bearers has long been anticipated by technologists, but is gaining wider traction only very recently. ATSC have put the topic on everybody's agenda, and DVB's multicast adaptive bitrate (mABR) solution finally puts commercial deployments of this concept within commercial reach. But neither ATSC nor DVB, nor any other SDO from the broadcast space, seems to currently have the momentum to “get it right”. Players from the Web and Internet spaces have yet to realise that there is a technological convergence waiting to be technically and commercially capitalised.

We are therefore convinced that a new forum is needed to define service operators' requirements for carrying OTT-type audio-visual services on IP natively over broadcast bearers. This is to complement the carriage of such

services over the (bidirectional) Internet on land-line and 5G mobile infrastructures.

Consequently, we call this new forum the **OTT Broadcast Forum (OTTBF)**, and envisage its mission to be to make sure that technologies exist both, on top of and below the IP layer, to enable service operators to freely switch the delivery path of their OTT services between land-line ISP, 5G mobile, ATSC 3.0, and DVB-x2, without the need of any processing above the IP layer.

The forum may not need to develop those technologies itself, and will primarily strive to liaise with other organisations such as for example (but not limited to) DVB, ATSC, DASH-IF, W3C, and IETF where such technologies could be developed. Hence, we envisage the forum to be an “implementer's club” that primarily defines and communicates requirements, orchestrates work in other organisations, and develops Open Source “glue technologies” and conformance tools.

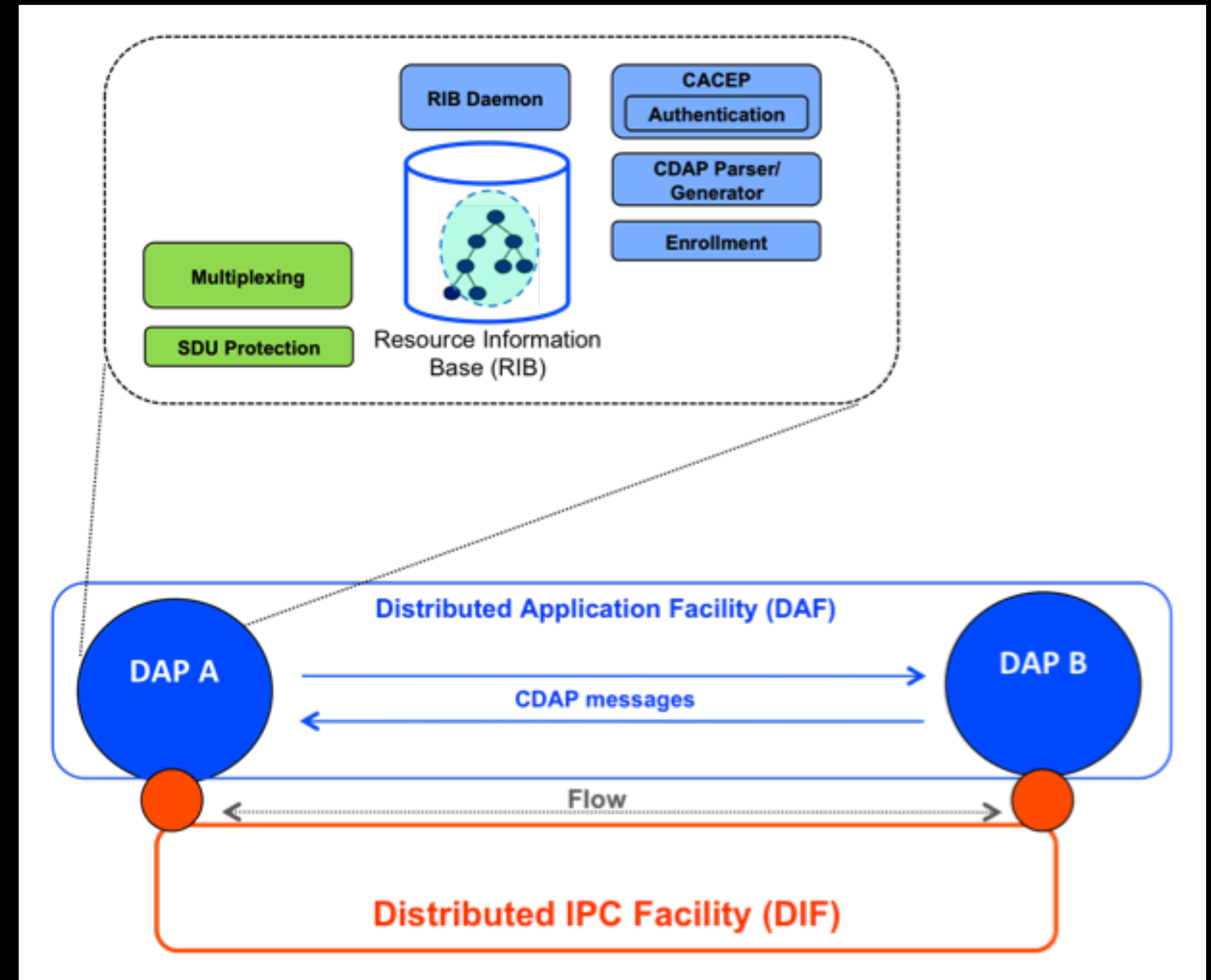
Be a founding member!



# Strategy Element #3

## RINA

- IP is great, but it has design flaws
  - Multi-homing (not)
  - TCP separated from IP (complexity, performance)
  - Application mobility (not)
  - Address management = broke
  - Security = an afterthought
- **Recursive Internetwork Architecture (RINA)**
  - Addresses all of IP's flaws, and adds further goodies
  - Is currently in ISO standardisation (ISO/IEC 21559, currently CD status)
  - We need to make sure it suits our needs for content distribution
  - IMO, it will be the “big bang” for computer networking





# Your Takeaway from this Presentation

- **Adjust your thinking** (say good bye to brick wall, and say hello to egg-cup)
- **The web is not your enemy** - make W3C an integral part of broadcast standardisation
  - bring broadcasters to the W3C table
- **The PHY layer is a detail** - join me at the OTT-Broadcast Forum to orchestrate existing broadcast standards so they are a solid base for a new, global content distribution system on top of IP
  - bring broadcasters to the OTT-Broadcast Forum table
- Explore and define a **roadmap from IP to RINA** - it's the next big thing (in 10 years time, nobody will be talking about IP)
- Make sure **RINA** will be usable for **point-to-multipoint A/V content distribution**



We're doomed!  
They're using  
DVB-I over multicast  
ABR on DVB-T2!

How could  
they manage?

Everything's  
impossible until  
somebody does it.





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<https://condition-alpha.com>



[@c\\_alpha](https://twitter.com/c_alpha)



**Thank you very much  
for your attention!**

# Further Reading

## W3C

- Media and Entertainment Activity
- Overview of Media Technologies for the Web (roadmap auto-generated from working groups' status pages)
- WebTransport draft (for media; includes uni-directional transport)
- BBC makes the case for multicast distribution



# Further Reading

## OTT-Broadcast

- NOTE: in the reserach community, this is oft referred to as CABS (Convergent Architecture for Broadcast, Broadband and Cellular services)
- [Heiko Föllscher: “Transmission of Media Content on IP-based Digital Broadcast Platforms”](#)
- [J. Montalban, G. Muntean and P. Angueira, "A Utility-Based Framework for Performance and Energy-Aware Convergence in 5G Heterogeneous Network Environments"](#)
- [ETSI TS 102 606-1: “Digital Video Broadcasting \(DVB\); Generic Stream Encapsulation \(GSE\); Part 1: Protocol”](#)
- [ETSI TS 102 606-2: “Digital Video Broadcasting \(DVB\); Generic Stream Encapsulation \(GSE\); Part 2: Logical Link Control \(LLC\)”](#)
- [ETSI TS 102 606-3: “Digital Video Broadcasting \(DVB\); Generic Stream Encapsulation \(GSE\); Part 3: Robust Header Compression \(ROHC\) for IP”](#)
- [ETSI TS 102 771: “Digital Video Broadcasting \(DVB\); Generic Stream Encapsulation \(GSE\) implementation guidelines”](#)
- [ATSC A/330: “Link-Layer Protocol”](#)
- [ATSC A/350: “Guide to the Link-Layer Protocol”](#)
- [DVB BlueBook A177r1: “Service Discovery and Programme Metadata for DVB-I “ \(aka. DVB-I\)](#)
- [DVB: “Service Discovery and Programme Metadata for DVB-I – schema and examples”](#)
- [DVB BlueBook A176: “Adaptive media streaming over IP multicast” \(aka. DVB-MABR\)](#)
- [ETSI TS 103 285: “Digital Video Broadcasting \(DVB\); MPEG-DASH Profile for Transport of ISO BMFF Based DVB Services over IP Based Networks” \(aka. DVB-DASH\)](#)
- [DVB-DASH XML Files](#)

# Further Reading

## RINA

- [ETSI ISG NIN \(formerly NGP\)](#)
- [ETSI GR NGP 009 report](#)
- [European Commission's blog post on RINA](#)
- [i2CAT promotes the standardization of the Recursive InterNetwork Architecture \(RINA\)](#)
- [ISO/IEC JTC 1/SC 6/WG 7](#)
- [ISO/IEC CD 21559-1: "Telecommunications and information exchange between systems — Future network protocols and mechanisms — Part 1: Recursive inter-network architecture error and flow control protocol"](#)
- [ISO/IEC CD 21559-2: "Telecommunications and information exchange between systems — Future network protocols and mechanisms — Part 2: Recursive inter-network architecture flow allocator"](#)
- [ISO/IEC CD 21559-3: "Telecommunications and information exchange between systems — Future network protocols and mechanisms — Part 3: Recursive inter-network architecture common application connection establishment"](#)
- [ISO/IEC CD 21559-4: "Telecommunications and information exchange between systems — Future network protocols and mechanisms — Part 4: Recursive inter-network architecture common distributed application"](#)
- [ISO/IEC CD 21559-5: "Telecommunications and information exchange between systems — Future network protocols and mechanisms — Part 5: Switching and routing"](#)
- [ISO/IEC CD 21559-6: "Telecommunications and information exchange between systems — Future network protocols and mechanisms — Part 6: Proxy based quality of service"](#)
- [ISO/IEC CD 21559-7: "Telecommunications and information exchange between systems — Future network protocols and mechanisms — Part 7: Networking of everything"](#)