

Object-based audio production

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BBC | Research & Development



Structure

- Challenges in Radio
- ORPHEUS project
- Impact on production workflow
- Production tool demo

What is 'object-based audio'?

'Object-based' ≠ immersive

'Object-based' = audio + metadata

Challenges in Radio

Challenges

Personalisation

Non-linear listening

Metadata

Challenges - Personalisation

- People listen on a variety of devices in different environments and are interested in different things



Challenges - Non-linear listening

- BBC is set up for linear broadcast in an increasingly non-linear world



Challenges - Metadata

- Information is lost at every stage of production
- Only broadcast material is routinely archived
- Public-facing data doesn't go beyond programme-level
- Lost opportunities to generate additional metadata



Data policy

Collect

as much data
as possible

Enhance

the data with
content analysis

Retain

data throughout
the broadcast chain

Translate

the data into
higher level concepts

Demands

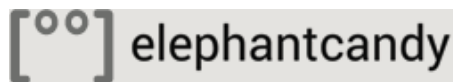
- Remains relevant in ten years
- Is flexible enough to handle new workflows and audience experiences
- Reduces the cost of installation and operation
- Doesn't give anyone extra work to do
- Doesn't significantly change the existing workflow
- Provide a more creative and collaborative environment



ORPHEUS project

- EU-funded Horizon 2020 project
- December 2015 to June 2018 (2.5 years)
- 10 partners:

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ORPHEUS vision statement

“ORPHEUS will:

- develop
- implement
- validate

...a completely new end-to-end object-based media chain for audio content”

- In collaboration with BBC Radio Technology team

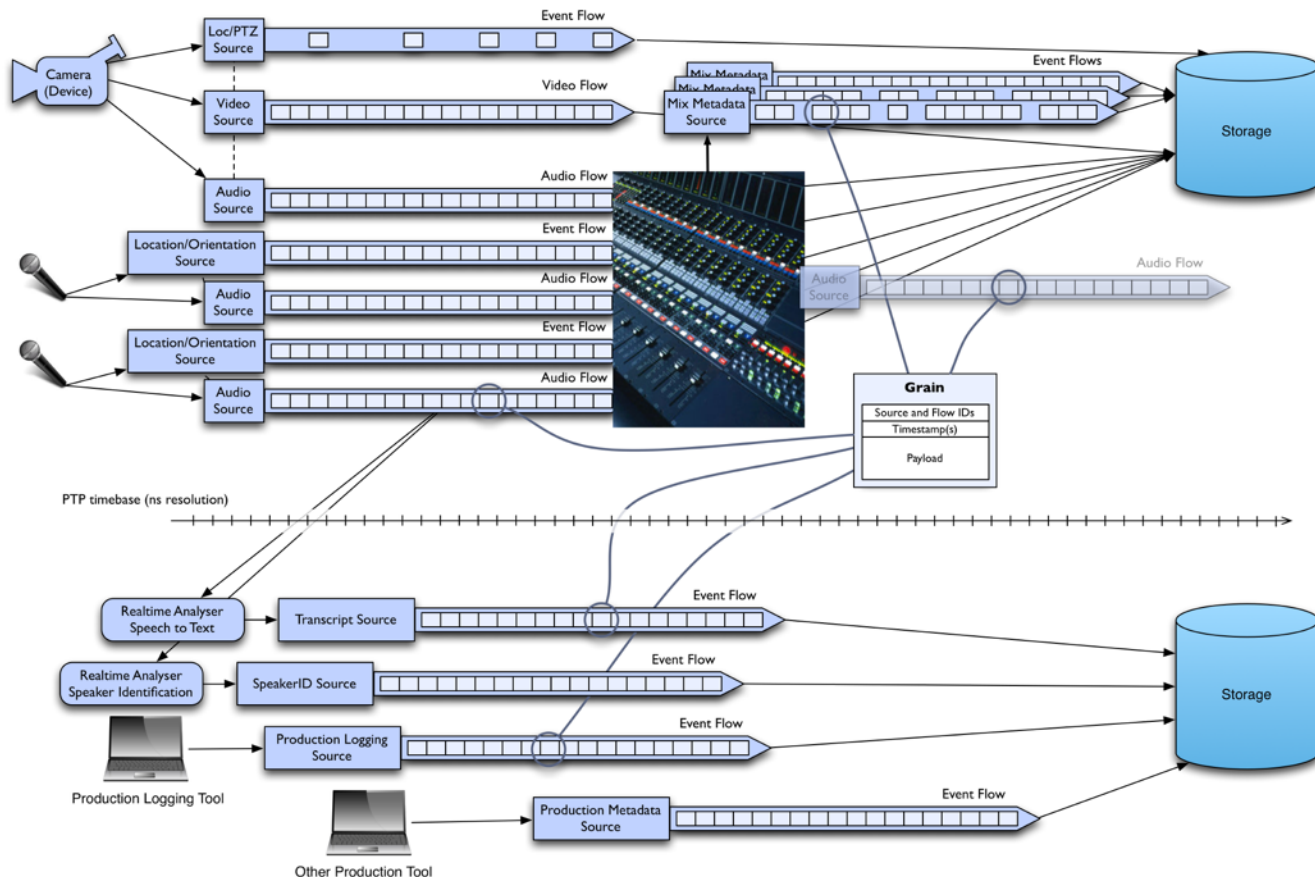
Additional objectives

- Develop a concept for the **transition of existing infrastructure**, systems and software/tools to a regular operational service of object-based audio
- Demonstrate a **new, prodigious user experience** through the creation of a workflow application for the use of object-based audio as an emerging future broadcast technology
- Create a **reference architecture and guidelines** on how to implement an end-to-end broadcasting chain for object-based audio

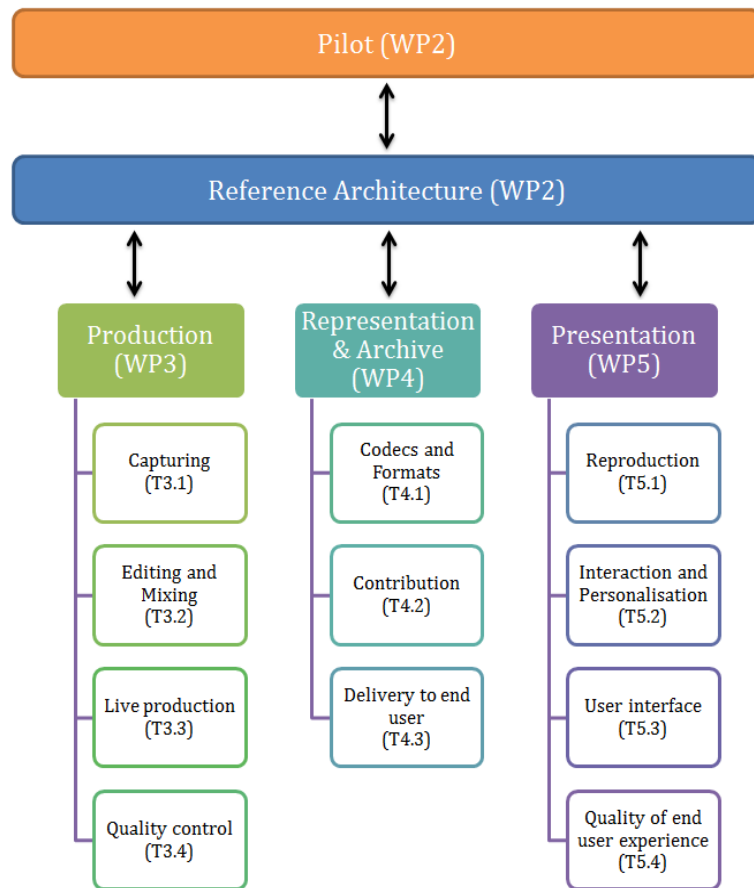
What is IP Studio?

- Production platform that uses IP networks and commodity hardware
- Everything uniquely identified – sources, flows, devices etc. (UUIDs)
- Flows are sequences of Grains, timestamped at source from common clock
- Grains are agnostic to their payload – just time-related lumps of “stuff”
- Timestamps are perpetuated throughout the production chain, into storage
- Capture everything
- Accumulate metadata

What is IP Studio?



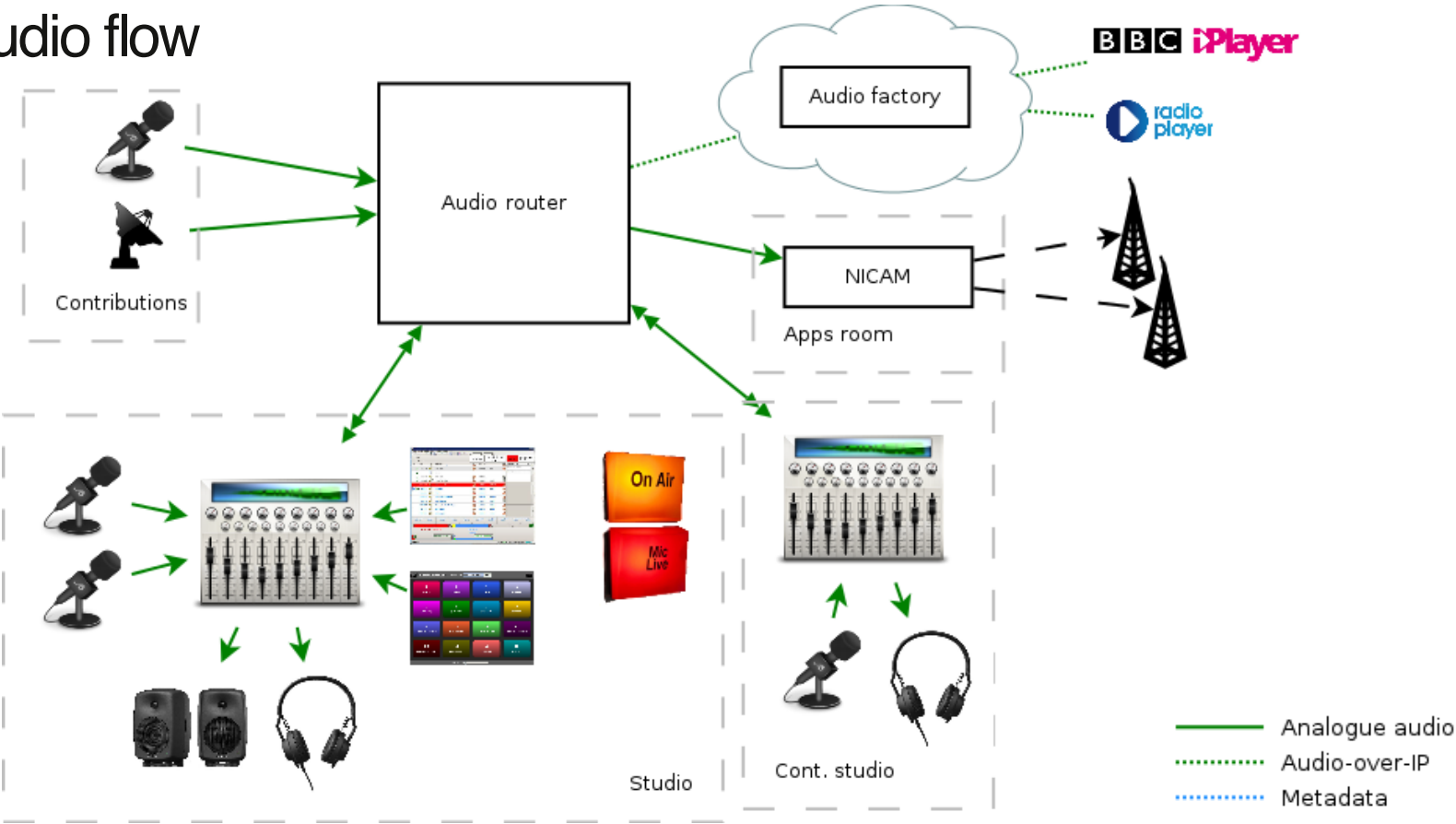
Project structure



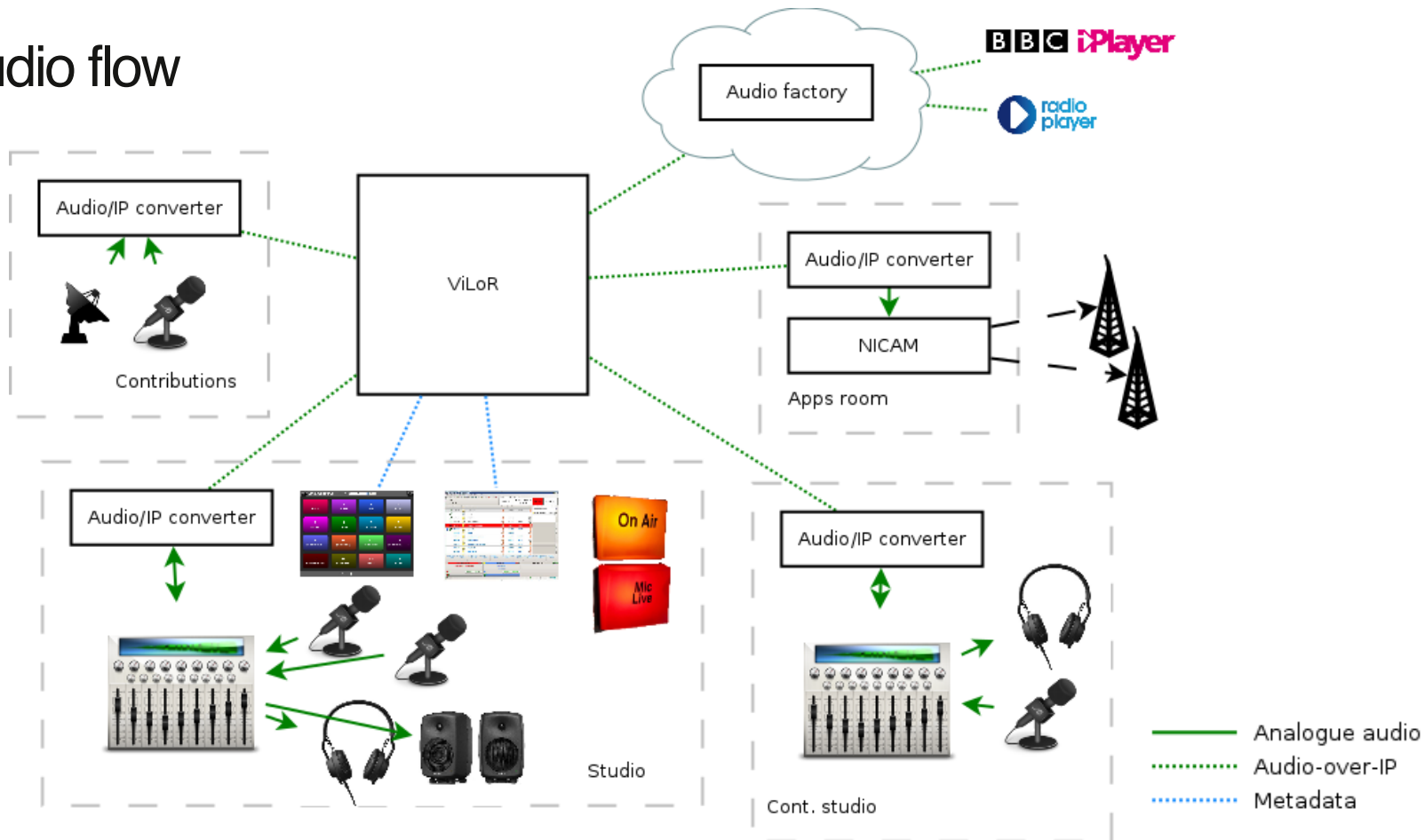
 @Orpheus_Audio

Impact on production workflow

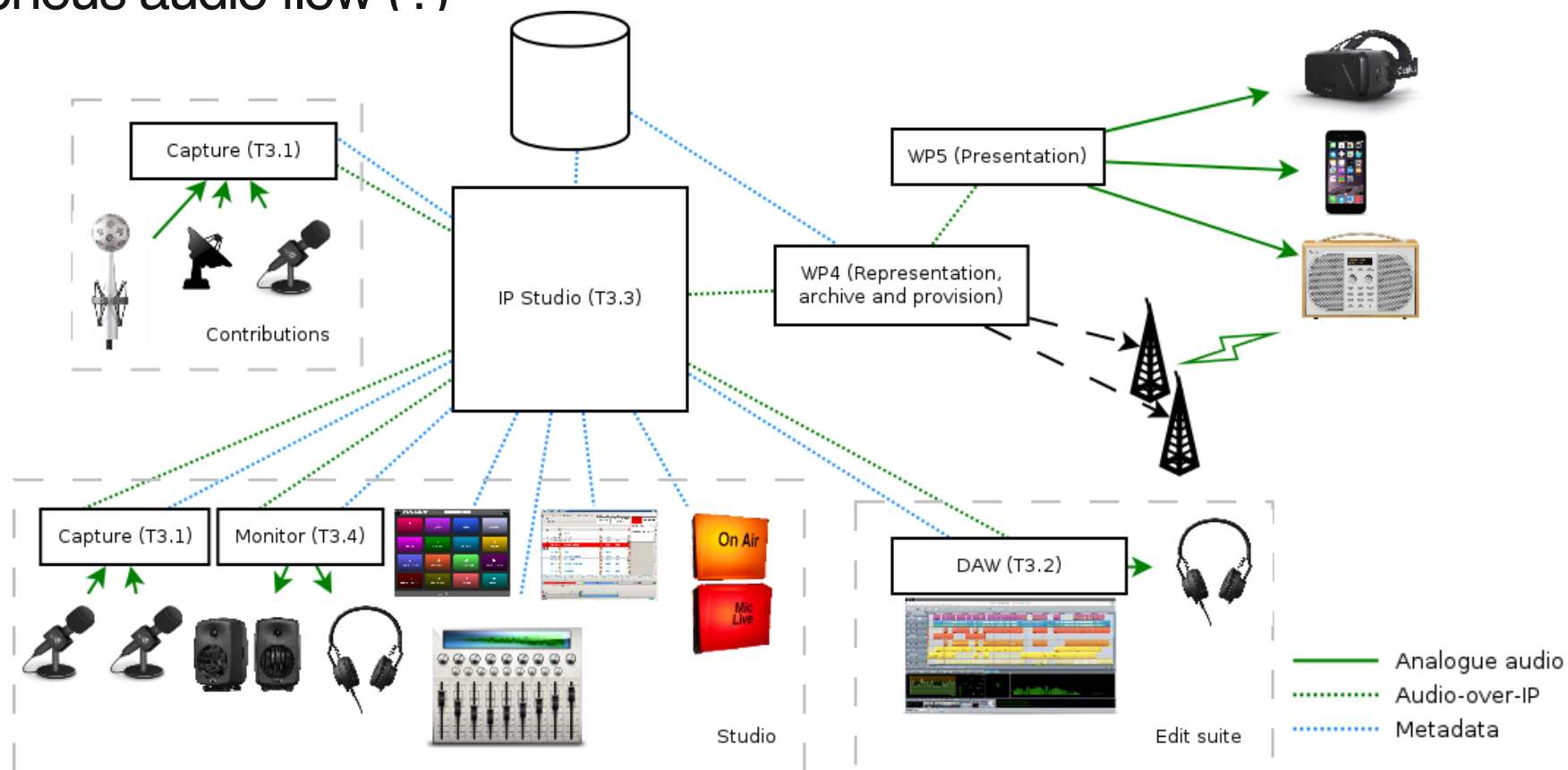
Current audio flow



ViLoR audio flow



Orpheus audio flow (?)



Impact on production workflow

Collect > Enhance > Retain > Translate

- Names of presenters, contributors, producers, characters
- Running order, script
- Music played
- Equipment used
- Locations
- Languages spoken (e.g. overdubs)

Impact on production workflow

Collect > **Enhance** > Retain > Translate

- Segmentation
 - Speech/music
 - Speaker diarization
 - Speaker identification
- Speech-to-text
- Music
 - Fingerprinting
 - Genre/Key/Tempo/Danceability...

Impact on production workflow

Collect > Enhance > **Retain** > Translate

- Audio channels are kept separate
- Mixing and effects are applied at user end (e.g. reverb)
- Metadata is sent to audience (except for sensitive content)
- Everything is saved for later

Impact on production workflow

Collect > Enhance > Retain > **Translate**

- Identities => Biography/discography/other programmes
- Running order => Segmentation/content swapping
- Transcript => Topic identification
- Music => Recommendations/Swap tracks

Impact on production workflow

- Immersive audio
 - Rendering
 - Quality monitoring
 - Panning techniques
 - Reverberation
- Non-linear storytelling
 - Variable length/depth
 - Branching stories

Nobody likes change

...except when they benefit

Production tool demo

Thanks for listening!

Questions / comments / ideas welcome

www.bbc.co.uk/rd/audio