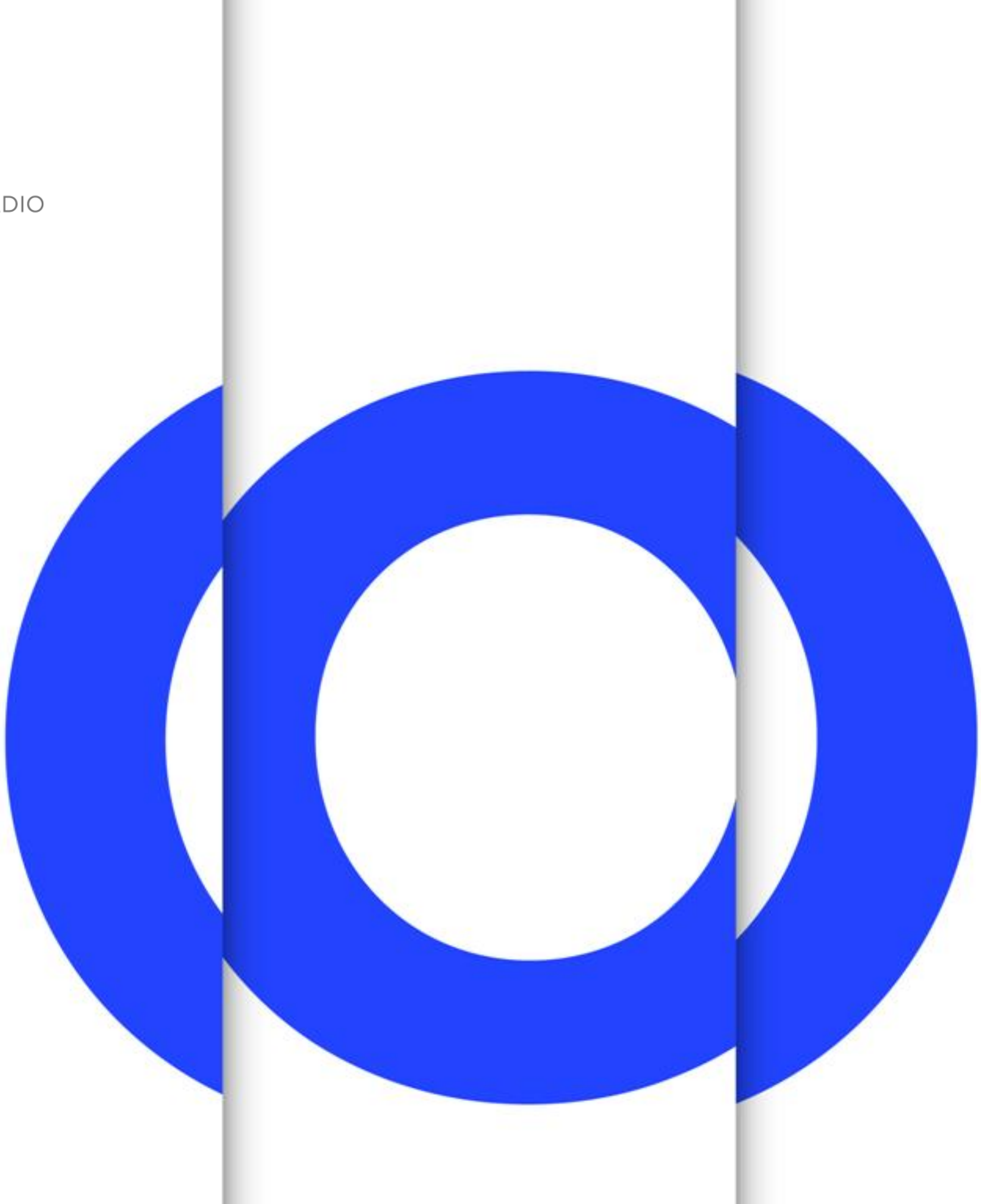
EBU

OPERATING EUROVISION AND EURORADIO



EBU

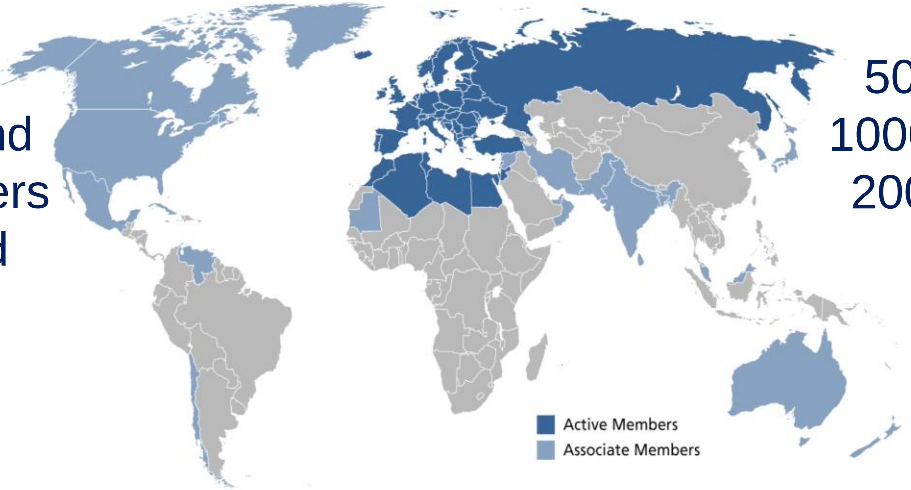
OPERATING EUROVISION AND EURORADIO

David Fischer and Bram Tullemans

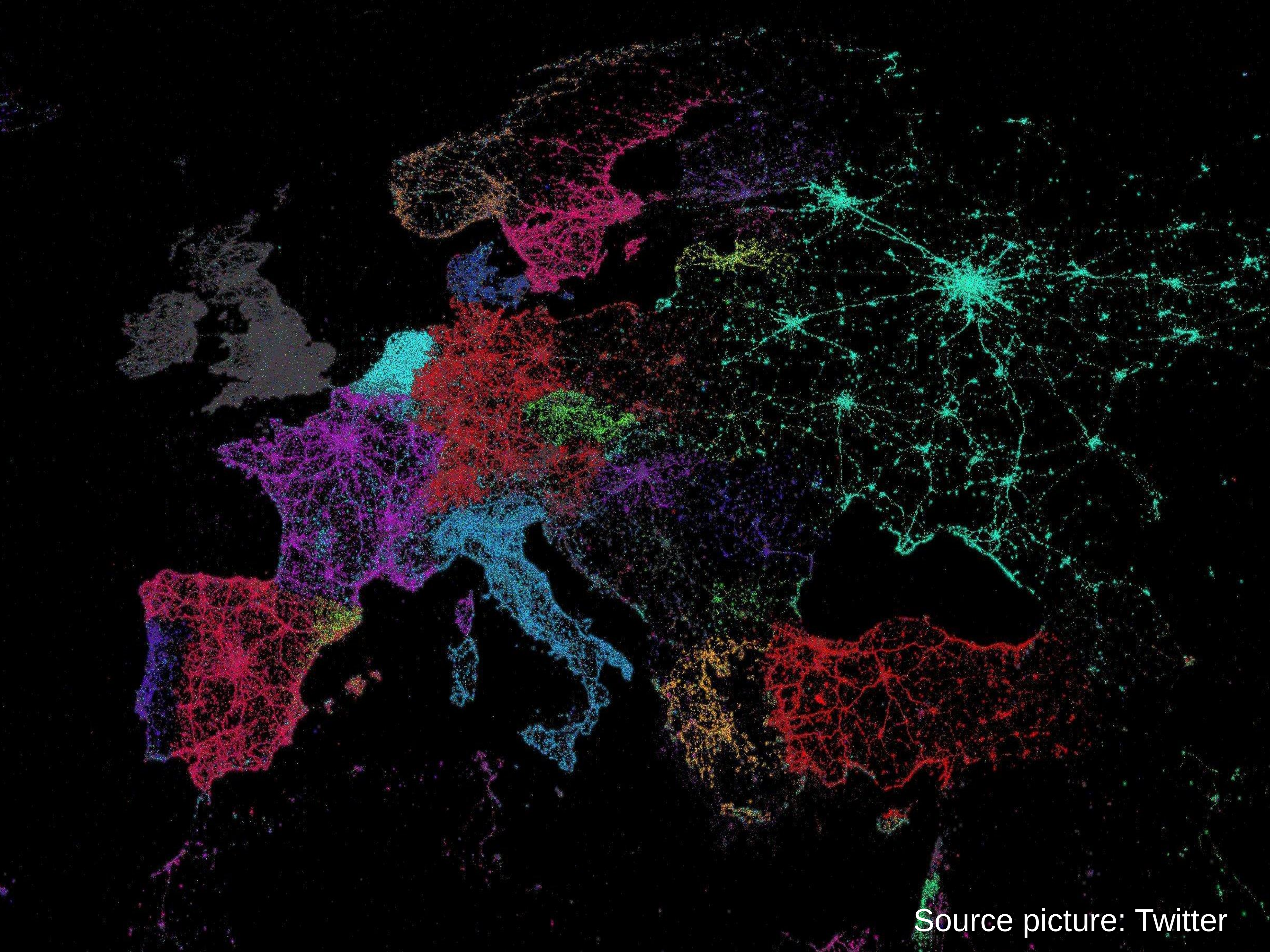
EBU MEDIA CLOUD ORCHESTRATING

OPEN SOURCE CLOUD INFRASTRUCTURE FOR ENCODING TO DISTRIBUTION

85 active members
in 56 countries and
35+ associate members
around the world



500+ TV channels
1000+ radio channels
200+ million TV HH



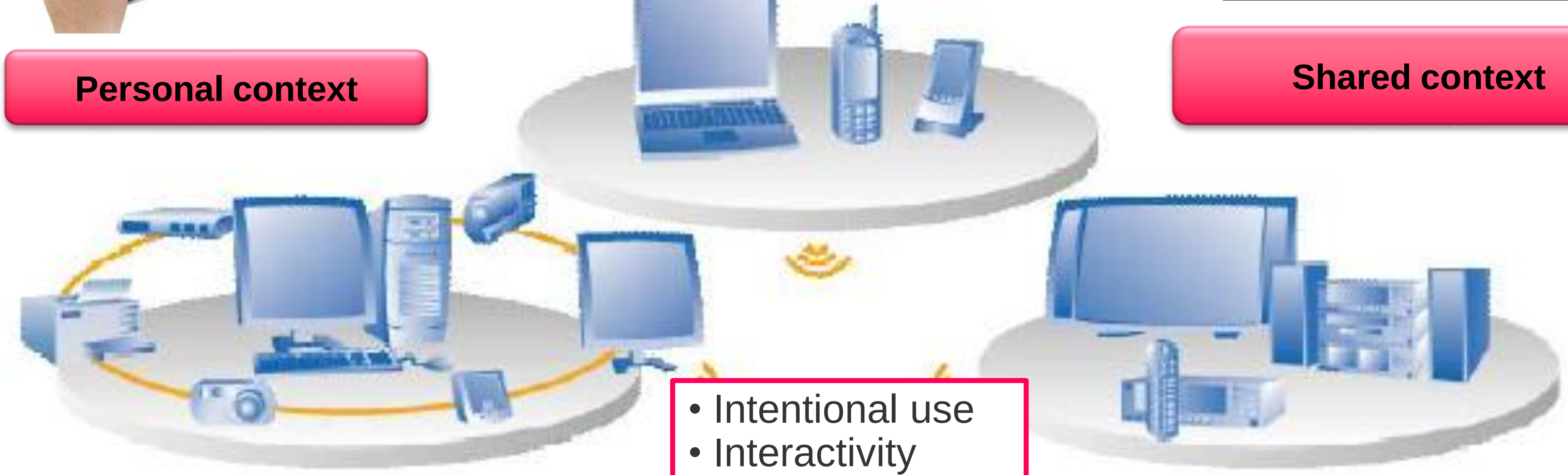
Source picture: Twitter

EBU MEDIA DRIVEN BY USER CONTEXT & USAGE

Personal context

Mobile context

Shared context



- Intentional use
- Interactivity
- Attention span
- Screen size
- Quality

MERGING LINEAR WITH ON DEMAND

Development of hybrid services allowing users to switch seamlessly between linear and on-demand services adding interactivity and personalisation while keeping universal coverage with high quality content by combining different distribution platforms and choice of access by end user.

Best of both worlds approach: Use broadcast techniques for massive high bitrate distribution of linear content and internet for personalisation, interaction and on-demand.

Hybrid Broadband Broadcast

- HbbTV
- Hybrid Radio, Radio.DNS
- Second Screen Synchronisation
- The cloud / virtualised services

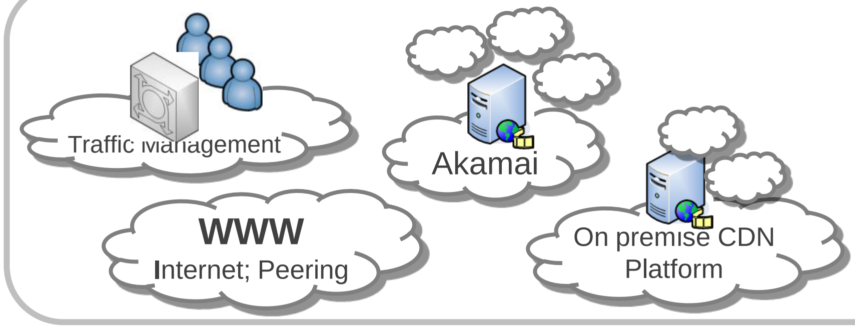
VIRTUALISATION MOTIVATORS

Production domain

- *File based production in decentralised but **networked** environment*
- *Specific recording and editing choices for **different screen sizes** and publication platforms*
- ***Communicating workflows**, for example decentralised production facilities*

Distribution domain

- *Fragmented payout capabilities payout devices and **fast changing technology** / standards*
- *To **improve user experience** all the content needs to be cached / processed deep into the network as close as possible to the end user*
- *Personalisation and **interactivity** needs*
- ***Fast scaling infrastructures** to adapt to sudden changing audience consumption patters*
- ***Digital fiber backbone** connecting gateways, caches and antennas*



Media Delivery:

- Self operated CDN platforms (caching, audio live streaming, HBB TV)
- Peerings / uplinks to swiss internet providers at two internet peering points in Switzerland
- Global loadbalancing / Trafficmanagement (dyn)
- Akamai
- www : 2x 9 Gbps (shared for all purposes of SRG)
- traffic forecast 2013: 29 PB Akamai / 23 PB self operated CDN

puppet labs

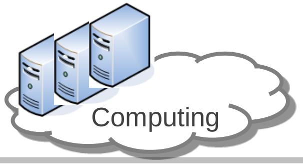
Automation: Common platformservice for all corporate units

- Puppet, Icinga, Graylog, HA-Proxy, Pakiti, shared repos, ...
- Dedicated application services according the different architecture of the SRG units

cloudstack
open source cloud computing

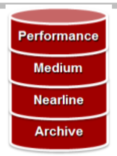
Cloud orchestration

- RESTful API ; Self service portal (web frontend)
- Usage based billing (on hourly basis)
- Completely seperated environments (test, integration, dev, prod)
- OS agnostic



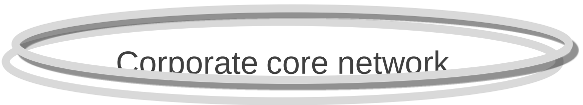
Computing

- Hypervisor: Vmware
- Servers: Cisco UCS blades (2 sites)
- All connections on 10 GE



Storage (VoD, shared Storage)

- EMC, 5 different tiers
- Block level replicated over 2 sites
- NFS, CIFS

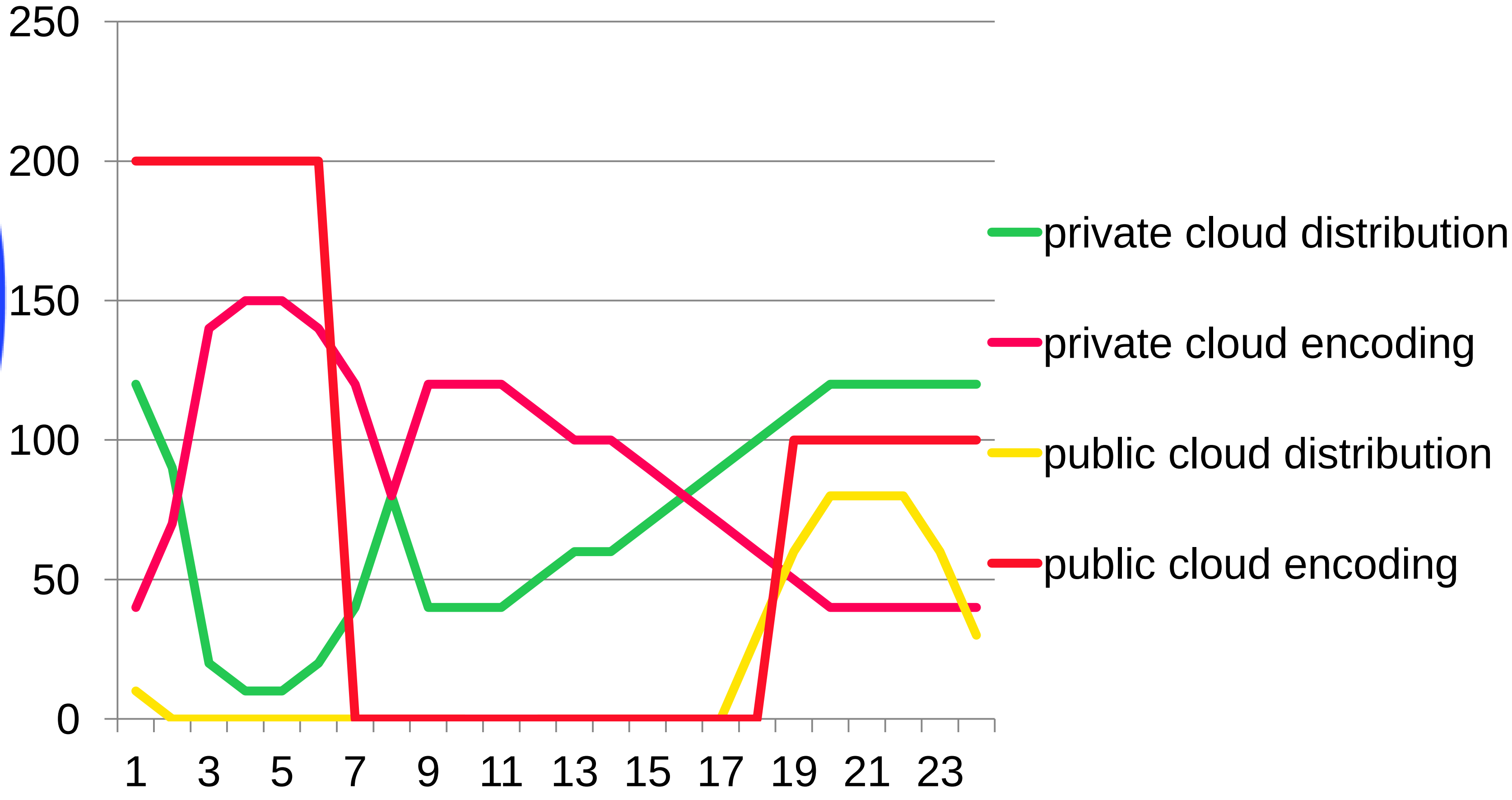


WAN / Core network

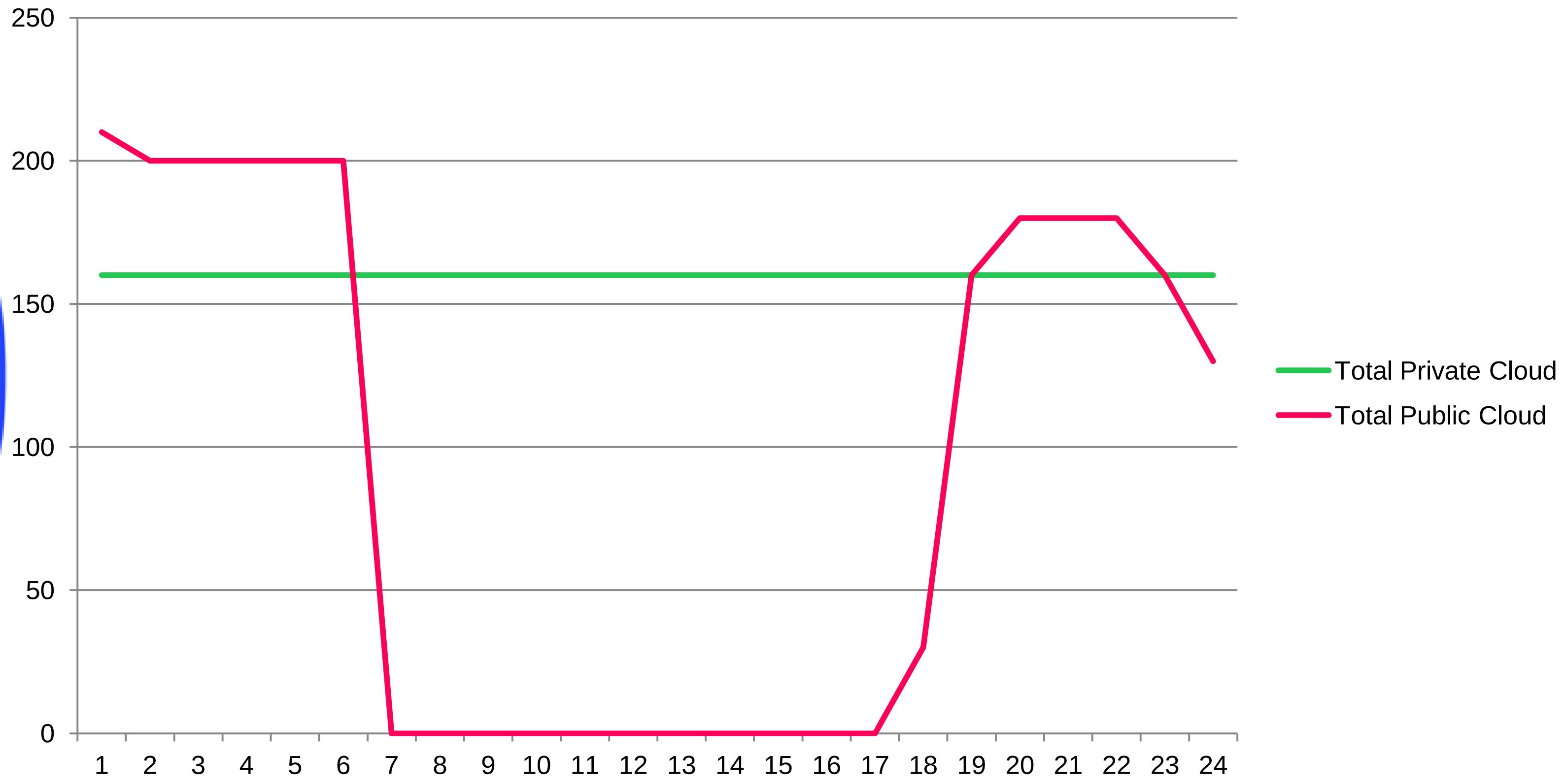
- Dark fibre ring around Switzerland
- Mulitple 10 GE
- Connecting all corporate units (offices, encoding stations, datacenters, archives, ...)

EBU
OPERATING EUROVISION AND EURORADIO

A SPECIFIC HYBRID CLOUD USE CASE



A SPECIFIC HYBRID CLOUD USE CASE



The total constant capacity of the private cloud can be used by different virtualised services during the day. The public cloud is only used for offloading distribution peaks or cost efficient upscaling of transcoding jobs.

CLOUD INFRASTRUCTURE FOR BROADCASTERS

Management layer for **hybrid cloud**

- *Allow professional users to **manipulate** setting of the storage nodes, virtual encoders and distribution machines*
- *Management of **recourses** in private and public cloud*
- ***Real-time monitoring** of running processes*
- *Management layer consists of **Orchestrator** and Web-basd User interface (Web UI)*

Virtual services in **private cloud**

- *Use of **local machines** that run virtual services*
- *Scaling on **full constant capacity***
- *Bridge to cloud services to **optimise latency and costs***

Virtual services in **public cloud**

- *Encoding of **libraries***
- ***Fast scaling infrastructure** for peak offload*
- *Optimisation of **decentralised processes***

OSCIED BASICS

- **Scalable cloud infrastructure**
  - *Virtualisation of storage, encoding and distribution*
  - *Elasticity: Fast up-/down-scaling in private and public cloud*
- **Manageable services**
  - *Controlled automatic scaling of virtual services in hybrid cloud*
  - *Manage settings and control costs*
- **All components are open source**
  - *Library of code embedded in functional service*
  - *Fast interchange of knowledge*
  - *Availability of development communities*
- **Modular development**
  - *Use of interchangeable modules*
  - *Decentralised parallel development*
  - *Separate interface layer using control API*
  - *All internal modules communicate via APIs*
  - *SOA compatibility investigated (also looking at SDN/OpenFlow)*

OSCIED DEVELOPMENT CYCLES

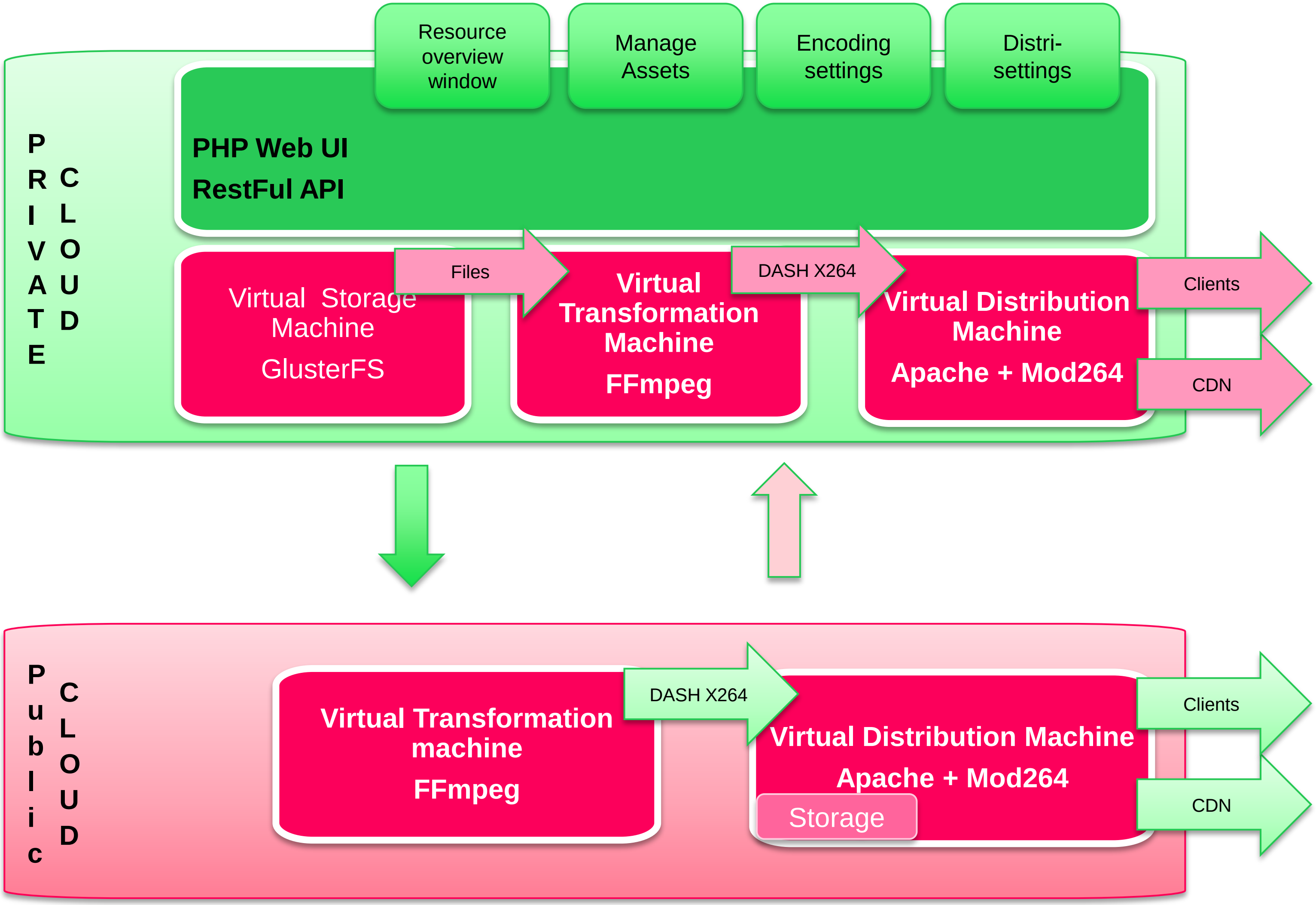
Basic code (current / first development cycle)

- Scalable **transcoding** (FFmpeg)
- Flexible HA **storage** (GlusterFS)
- Elastic **distribution** (Apache + Unified Streaming Mod264).
- **Deployment** made easy by Canonical's Juju services orchestrator
- Strong **plug-and-play design** of interconnected services (e.g. with reverse proxies, NGINX, databases, ...)

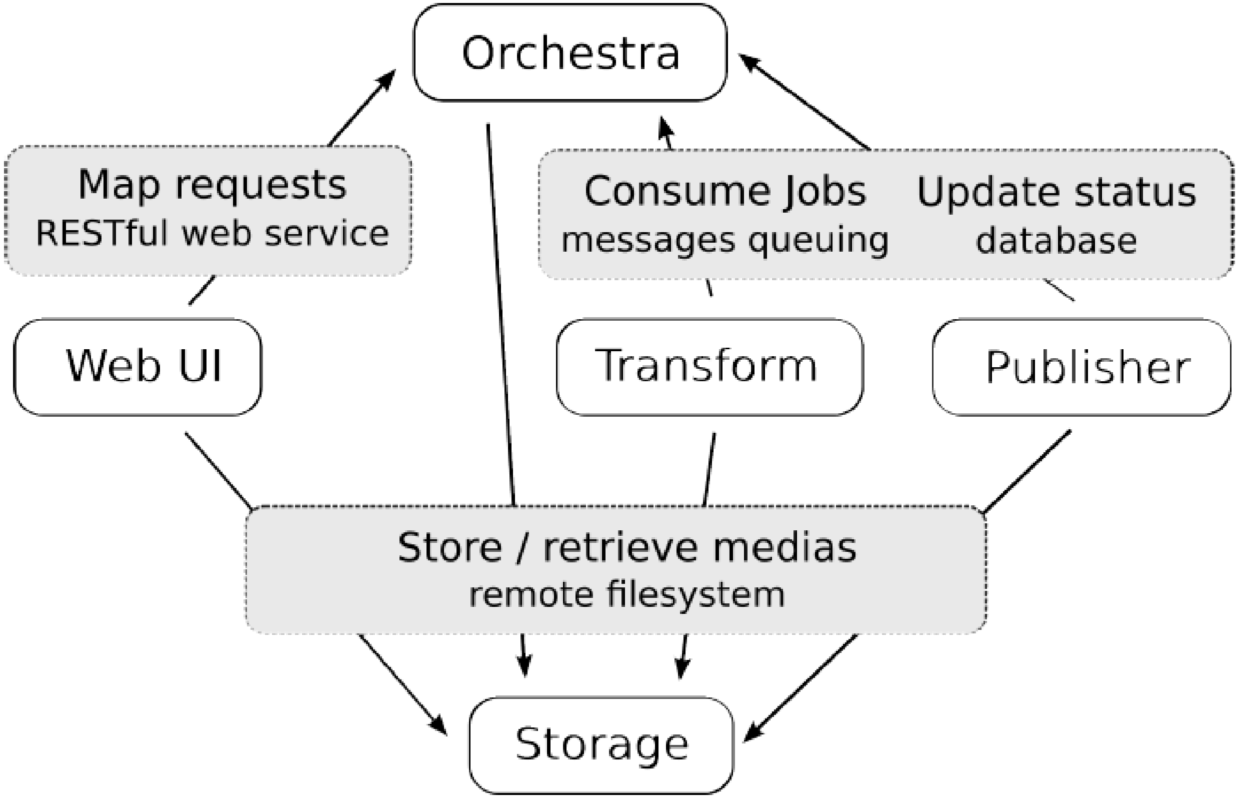
Current developments

- *A professional **management** layer for the system as a whole will be at the core of this system.*
- ***MPEG DASH**, both for Live and VOD and play out to different devices (laptop, HbbTV, Tablet and Smartphone both for Android and iOS).*
- *Optimisation of distribution by adding **automated** management of **data flows***
- *Automation of **broadcast processes***

IBC 2013 VERSION OF OSCIED



CURRENT COMPONENTS OF OSCIED



Orchestra

Map requests
RESTful web service

Consume Jobs
messages queuing

Update status
database

Web UI

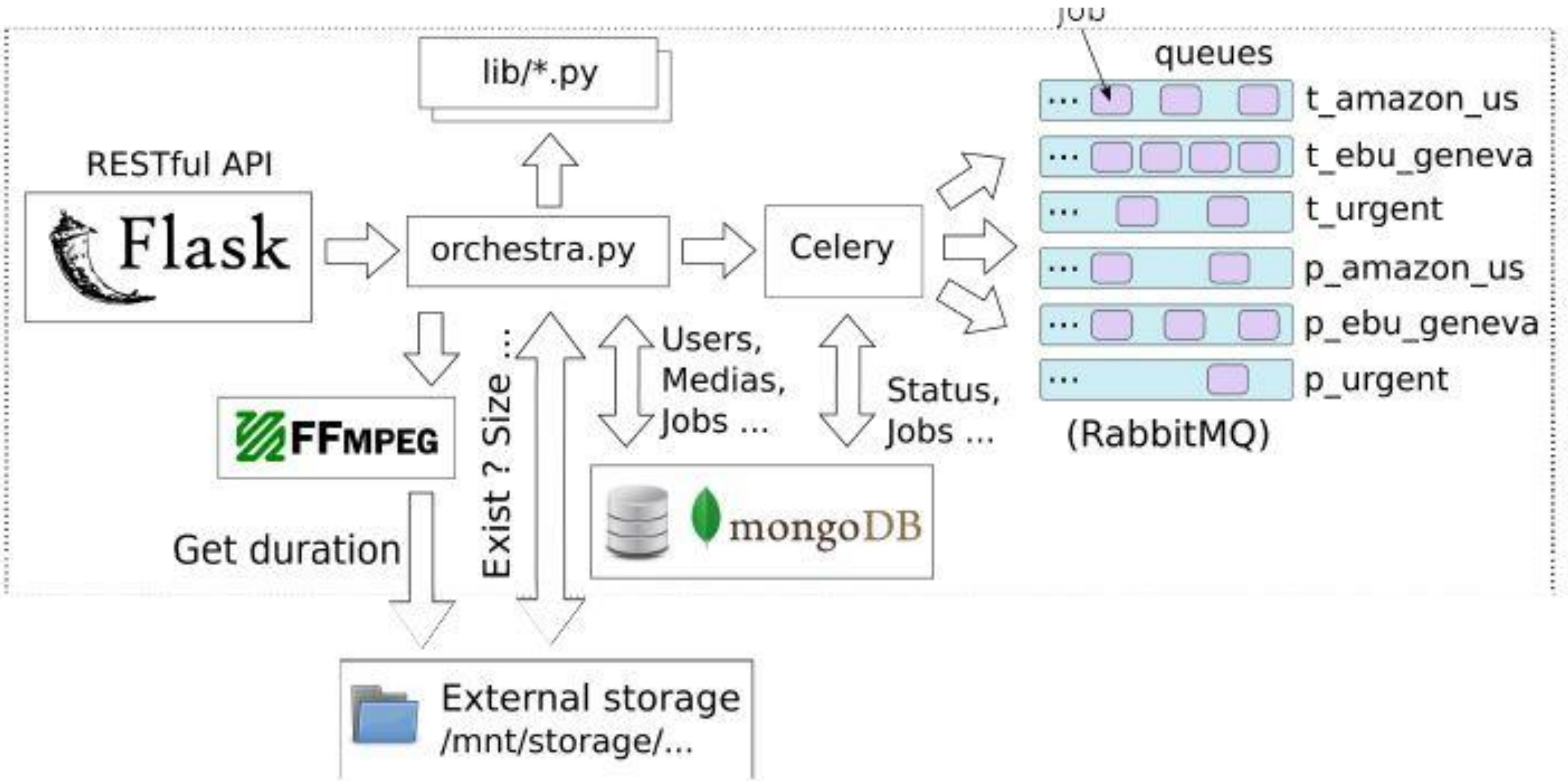
Transform

Publisher

Store / retrieve medias
remote filesystem

Storage

ORCHESTRATOR



ORCHESTRATOR BUILD

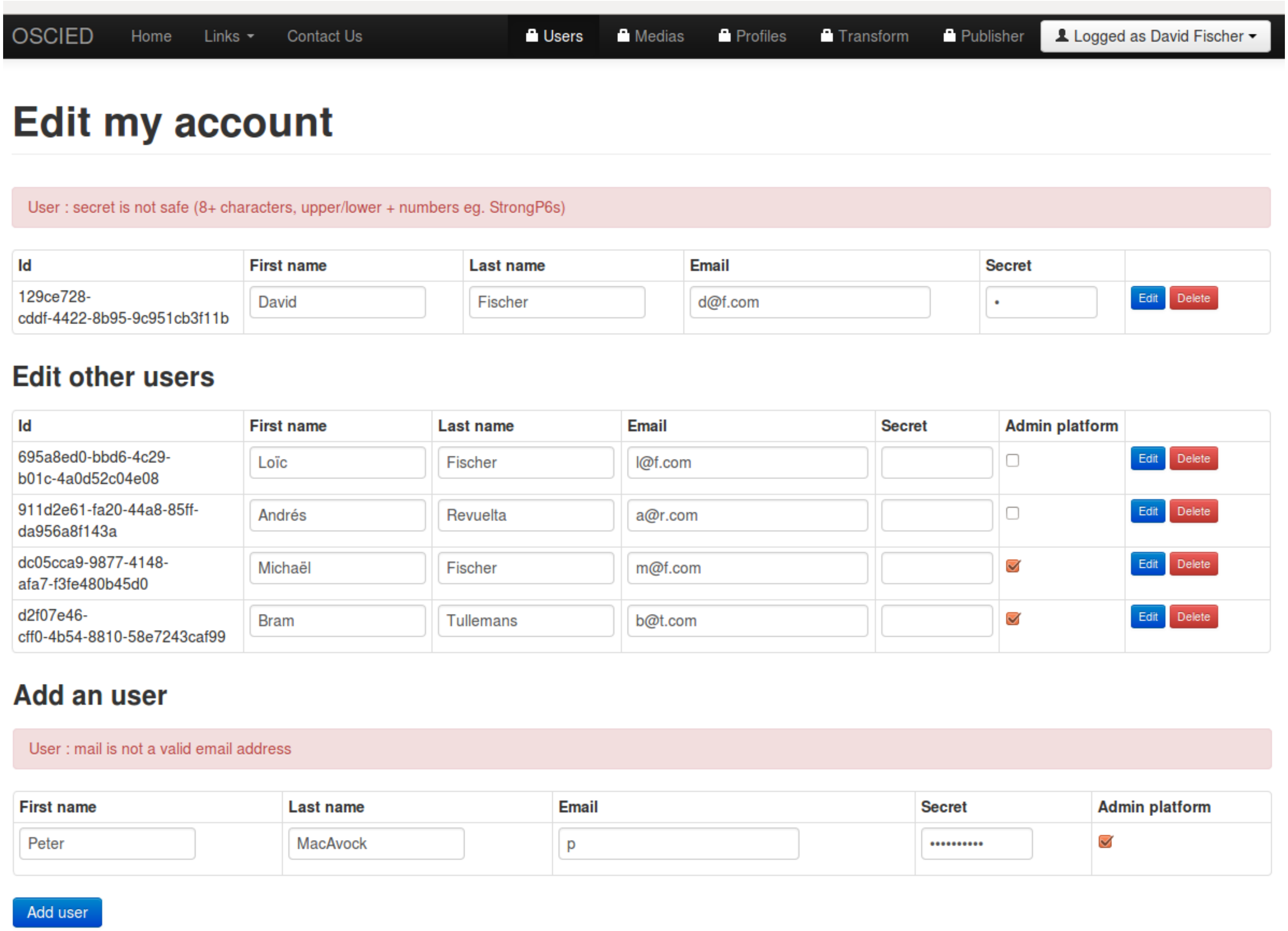
- **OSS Tools**
- • Flask Python Micro Web Framework
- • PyMongo Python module for working with MongoDB
- • MongoDB Scalable, High Performance NoSQL Database from 10gen
- • RabbitMQ AMQP Message Broker from VMware
- • Celery Distributed Task Queue
- • JuJu Cloud Orchestrator from Canonical

Orchestrator manages all actions in OSCIED via:

- • the RESTful API, to expose application's functionalities to user
- • the database, to store application's data (users, profiles, jobs, ...)
- • the message broker, to communicate with workers (transform & publisher)

EBU
OPERATING EUROVISION AND EURORADIO

ACCOUNT SETTINGS



Edit my account

User : secret is not safe (8+ characters, upper/lower + numbers eg. StrongP6s)

Id	First name	Last name	Email	Secret	
129ce728-cddf-4422-8b95-9c951cb3f11b	David	Fischer	d@f.com	•	Edit Delete

Edit other users

Id	First name	Last name	Email	Secret	Admin platform	
695a8ed0-bbd6-4c29-b01c-4a0d52c04e08	Loïc	Fischer	l@f.com		☐	Edit Delete
911d2e61-fa20-44a8-85ff-da956a8f143a	Andrés	Revuelta	a@r.com		☐	Edit Delete
dc05cca9-9877-4148-afa7-f3fe480b45d0	Michaël	Fischer	m@f.com		☑	Edit Delete
d2f07e46-cff0-4b54-8810-58e7243caf99	Bram	Tullemans	b@t.com		☑	Edit Delete

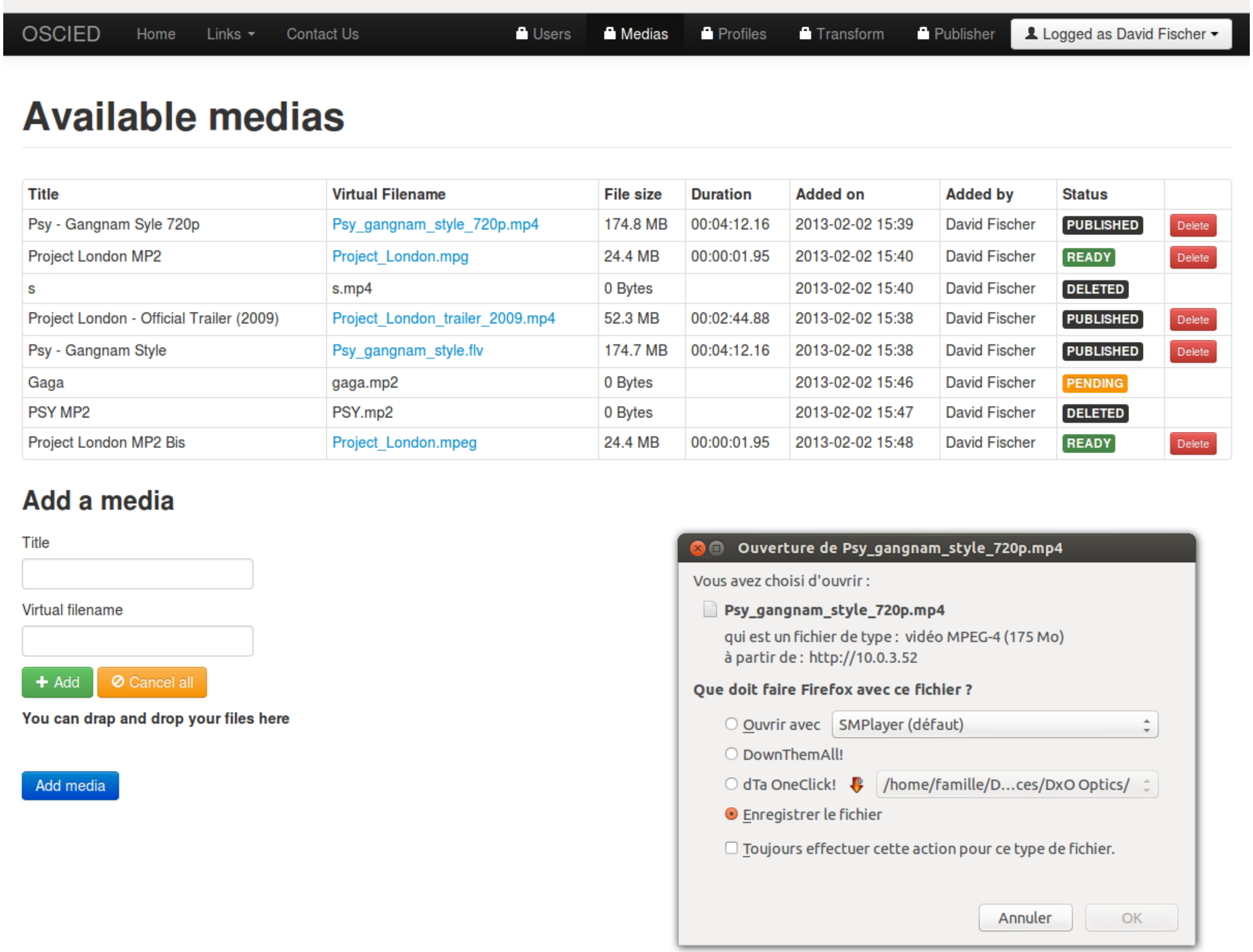
Add an user

User : mail is not a valid email address

First name	Last name	Email	Secret	Admin platform
Peter	MacAvock	p	••••••••••	☑

Add user

IMPORTED MEDIA



Available medias

Title	Virtual Filename	File size	Duration	Added on	Added by	Status	
Psy - Gangnam Syle 720p	Psy_gangnam_style_720p.mp4	174.8 MB	00:04:12.16	2013-02-02 15:39	David Fischer	PUBLISHED	Delete
Project London MP2	Project_London.mpg	24.4 MB	00:00:01.95	2013-02-02 15:40	David Fischer	READY	Delete
s	s.mp4	0 Bytes		2013-02-02 15:40	David Fischer	DELETED	
Project London - Official Trailer (2009)	Project_London_trailer_2009.mp4	52.3 MB	00:02:44.88	2013-02-02 15:38	David Fischer	PUBLISHED	Delete
Psy - Gangnam Style	Psy_gangnam_style.flv	174.7 MB	00:04:12.16	2013-02-02 15:38	David Fischer	PUBLISHED	Delete
Gaga	gaga.mp2	0 Bytes		2013-02-02 15:46	David Fischer	PENDING	
PSY MP2	PSY.mp2	0 Bytes		2013-02-02 15:47	David Fischer	DELETED	
Project London MP2 Bis	Project_London.mpeg	24.4 MB	00:00:01.95	2013-02-02 15:48	David Fischer	READY	Delete

Add a media

Title

Virtual filename

You can drap and drop your files here

Ouverture de Psy_gangnam_style_720p.mp4

Vous avez choisi d'ouvrir :

Psy_gangnam_style_720p.mp4

qui est un fichier de type : vidéo MPEG-4 (175 Mo)
à partir de : http://10.0.3.52

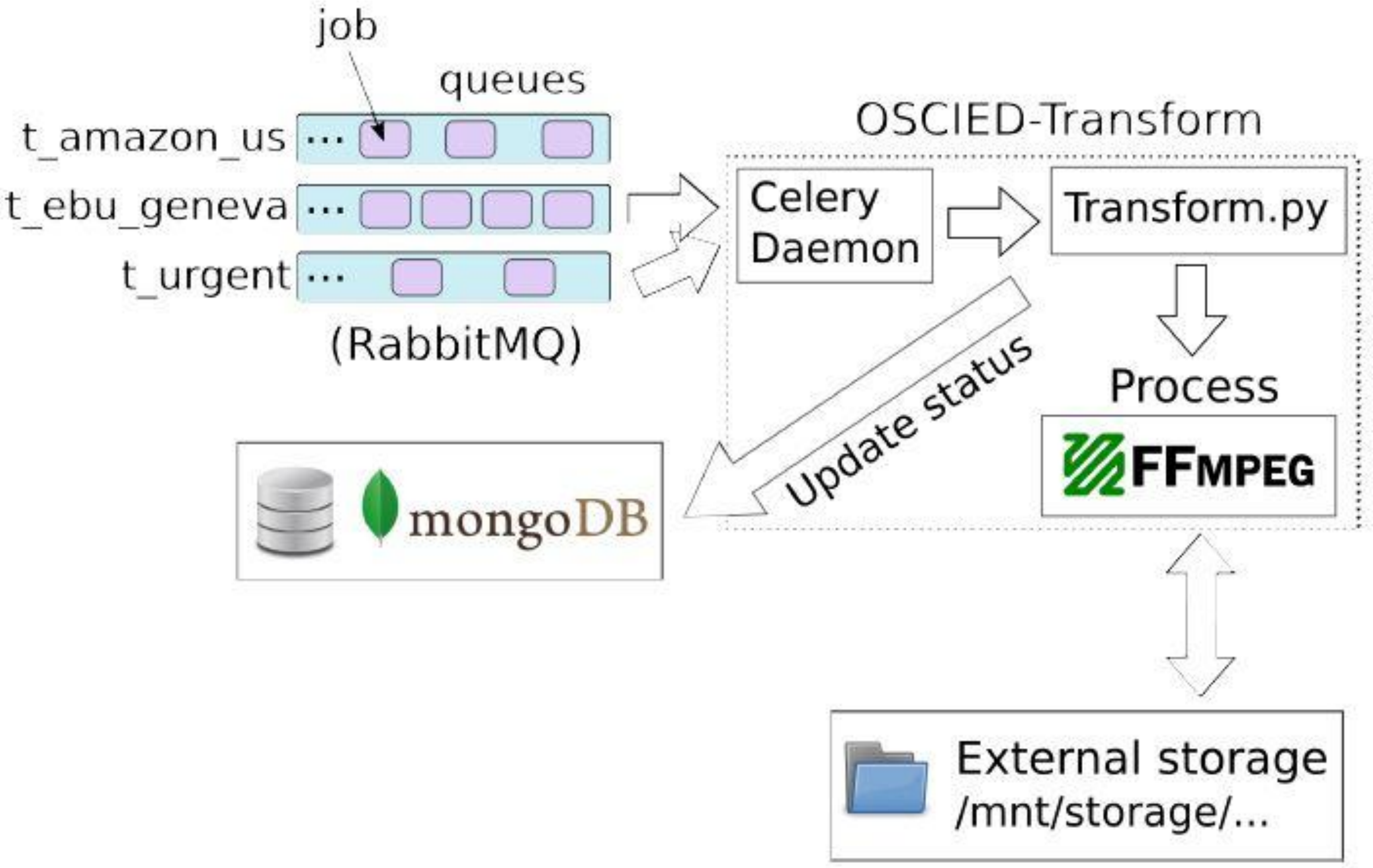
Que doit faire Firefox avec ce fichier ?

○ Ouvrir avec SMPlayer (défaut)
○ DownThemAll!
○ dTa OneClick! /home/famille/D...ces/DxO Optics/
● Enregistrer le fichier

□ Toujours effectuer cette action pour ce type de fichier.

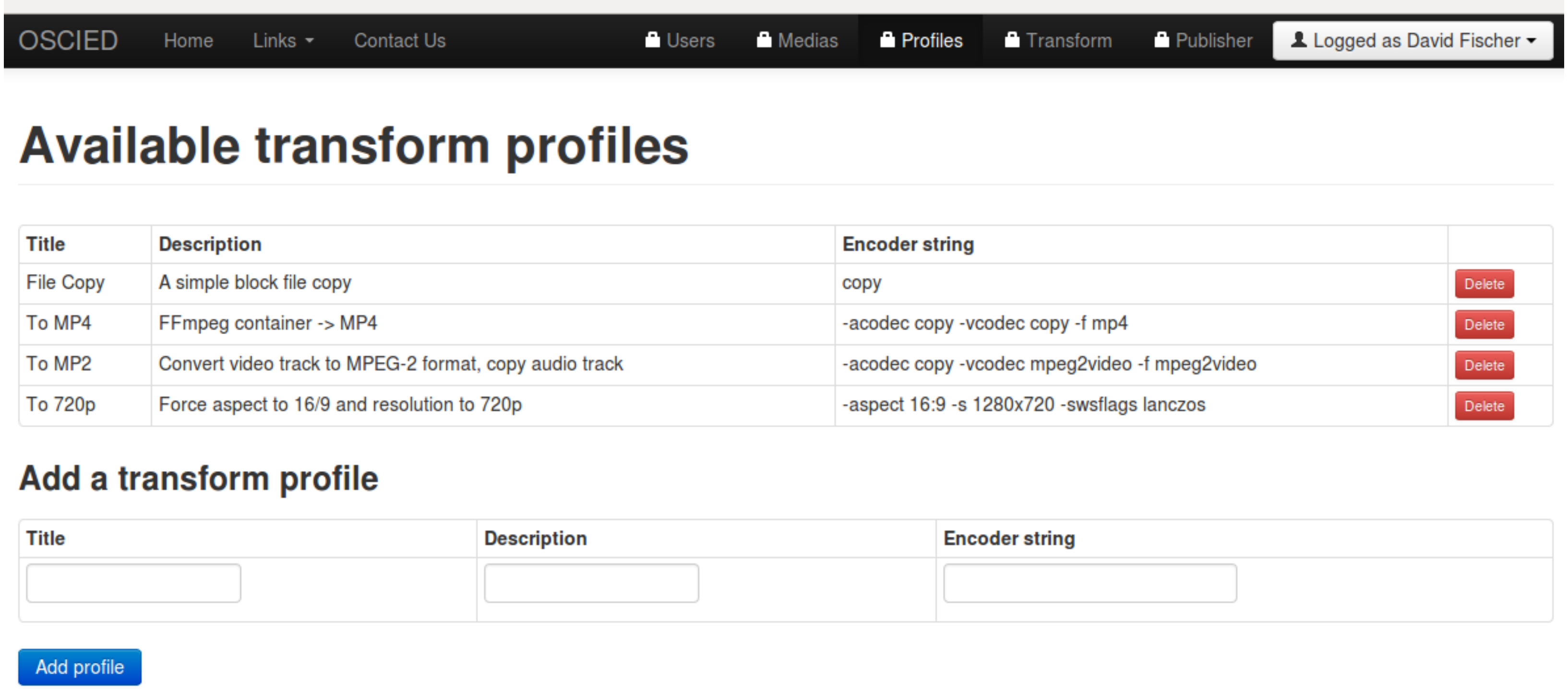
EBU
OPERATING EUROVISION AND EURORADIO

TRANSFORM UNIT



EBU
OPERATING EUROVISION AND EURORADIO

ENCODING SETTINGS



Available transform profiles

Title	Description	Encoder string	
File Copy	A simple block file copy	copy	Delete
To MP4	FFmpeg container -> MP4	-acodec copy -vcodec copy -f mp4	Delete
To MP2	Convert video track to MPEG-2 format, copy audio track	-acodec copy -vcodec mpeg2video -f mpeg2video	Delete
To 720p	Force aspect to 16/9 and resolution to 720p	-aspect 16:9 -s 1280x720 -swsflags lanczos	Delete

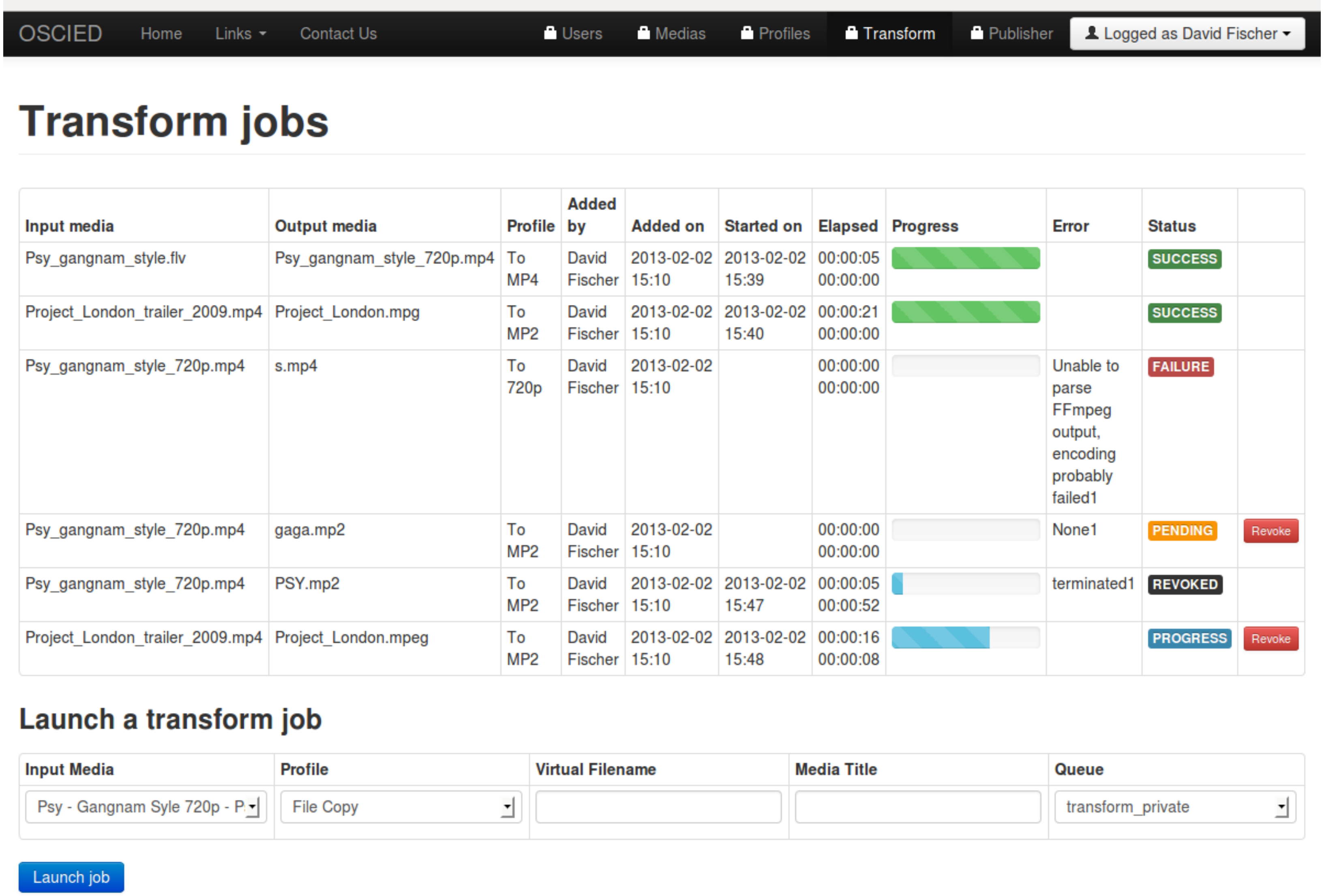
Add a transform profile

Title	Description	Encoder string

Add profile

EBU
OPERATING EUROVISION AND EURORADIO

ENCODING QUEUE



Transform jobs

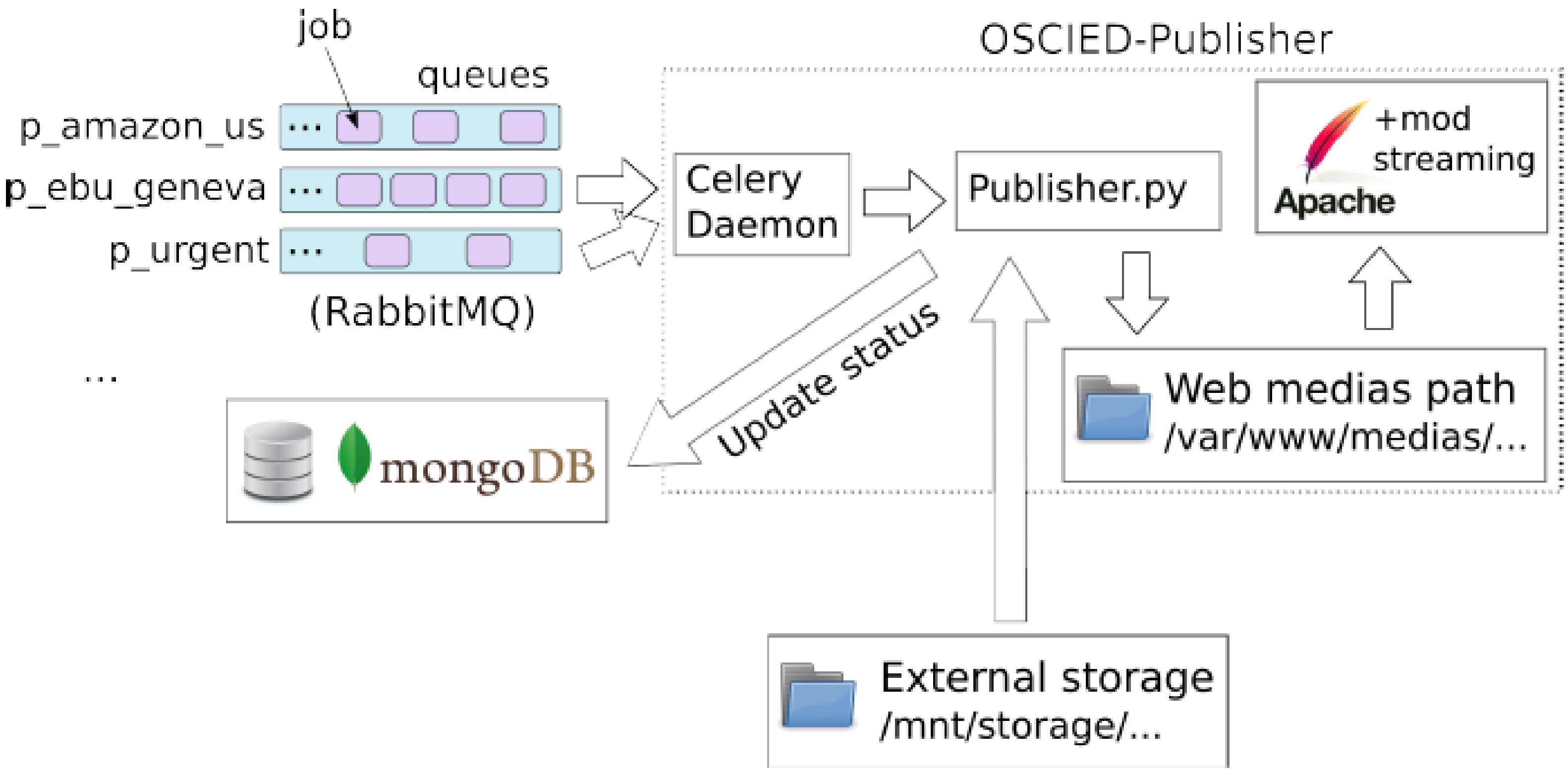
Input media	Output media	Profile	Added by	Added on	Started on	Elapsed	Progress	Error	Status	
Psy_gangnam_style.flv	Psy_gangnam_style_720p.mp4	To MP4	David Fischer	2013-02-02 15:10	2013-02-02 15:39	00:00:05 00:00:00			SUCCESS	
Project_London_trailer_2009.mp4	Project_London.mpg	To MP2	David Fischer	2013-02-02 15:10	2013-02-02 15:40	00:00:21 00:00:00			SUCCESS	
Psy_gangnam_style_720p.mp4	s.mp4	To 720p	David Fischer	2013-02-02 15:10		00:00:00 00:00:00		Unable to parse FFmpeg output, encoding probably failed1	FAILURE	
Psy_gangnam_style_720p.mp4	gaga.mp2	To MP2	David Fischer	2013-02-02 15:10		00:00:00 00:00:00		None1	PENDING	Revoke
Psy_gangnam_style_720p.mp4	PSY.mp2	To MP2	David Fischer	2013-02-02 15:10	2013-02-02 15:47	00:00:05 00:00:52		terminated1	REVOKED	
Project_London_trailer_2009.mp4	Project_London.mpeg	To MP2	David Fischer	2013-02-02 15:10	2013-02-02 15:48	00:00:16 00:00:08			PROGRESS	Revoke

Launch a transform job

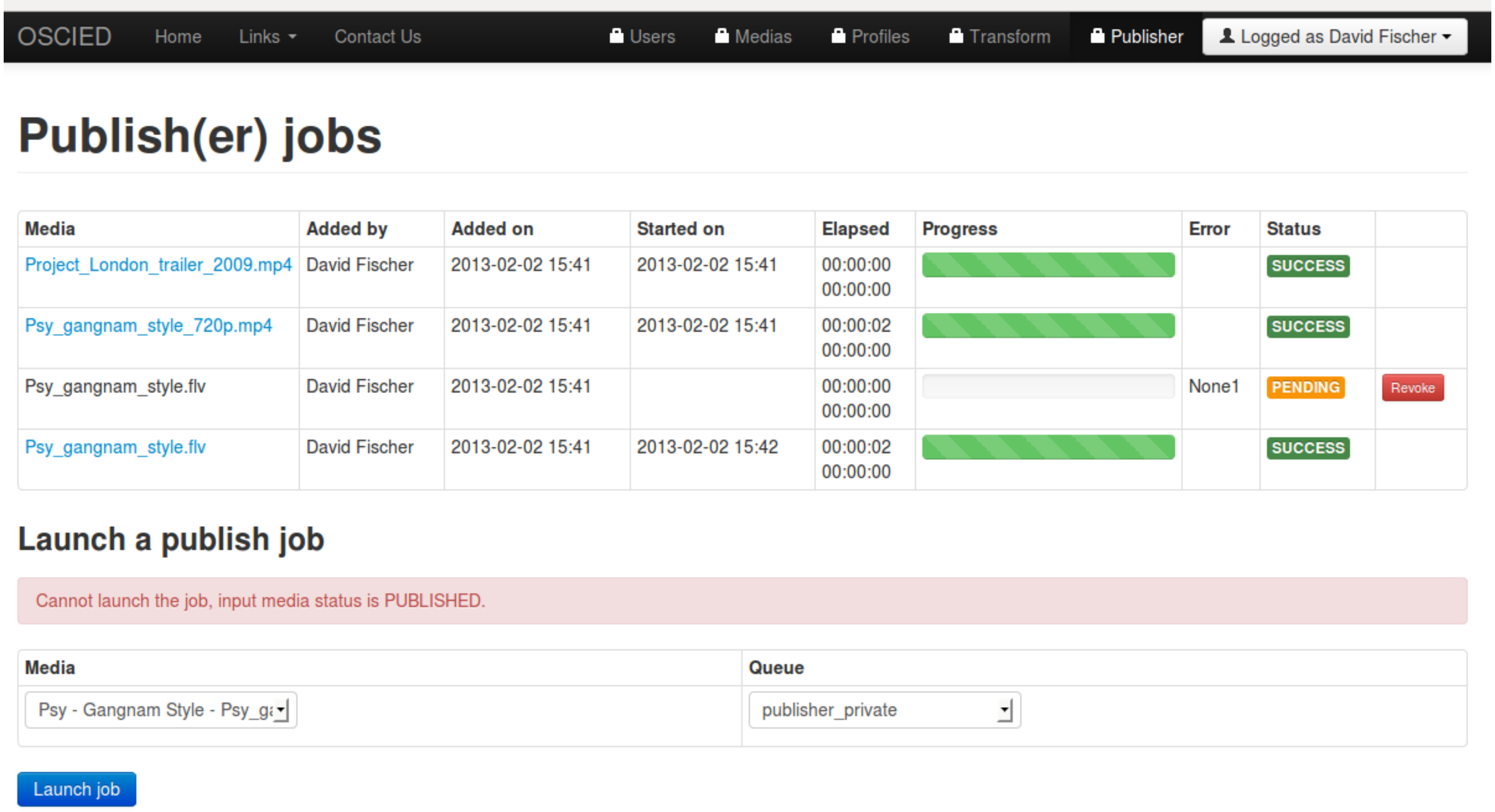
Input Media	Profile	Virtual Filename	Media Title	Queue
Psy - Gangnam Syle 720p - P	File Copy			transform_private

Launch job

DISTRIBUTION



DISTRIBUTION WINDOW



Publish(er) jobs

Media	Added by	Added on	Started on	Elapsed	Progress	Error	Status	
Project_London_trailer_2009.mp4	David Fischer	2013-02-02 15:41	2013-02-02 15:41	00:00:00 00:00:00	🟩		SUCCESS	
Psy_gangnam_style_720p.mp4	David Fischer	2013-02-02 15:41	2013-02-02 15:41	00:00:02 00:00:00	🟩		SUCCESS	
Psy_gangnam_style.flv	David Fischer	2013-02-02 15:41		00:00:00 00:00:00		None1	PENDING	Revoke
Psy_gangnam_style.flv	David Fischer	2013-02-02 15:41	2013-02-02 15:42	00:00:02 00:00:00	🟩		SUCCESS	

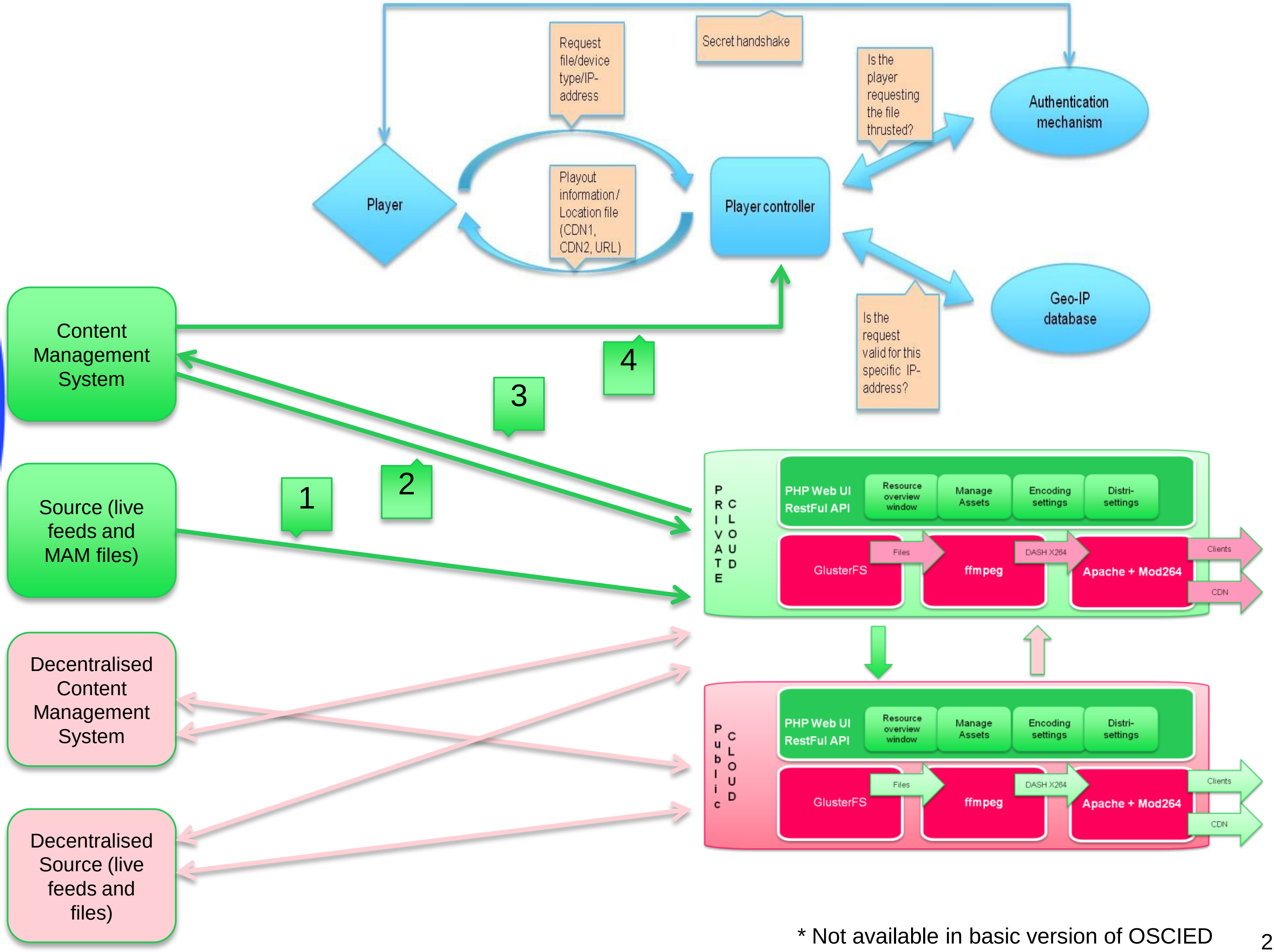
Launch a publish job

Cannot launch the job, input media status is PUBLISHED.

Media	Queue
Psy - Gangnam Style - Psy_ga	publisher_private

EBU
OPERATING EUROVISION AND EURORADIO

MEDIA ASSET MANAGEMENT AND OSCIED*



Request file/device type/IP-address

Secret handshake

Is the player requesting the file thrusted?

Authentication mechanism

Player

Playout information / Location file (CDN1, CDN2, URL)

Player controller

Geo-IP database

Is the request valid for this specific IP-address?

Content Management System

Source (live feeds and MAM files)

Decentralised Content Management System

Decentralised Source (live feeds and files)

1

2

3

4

PRIVATE CLOUD

PHP Web UI
RestFul API

Resource overview window

Manage Assets

Encoding settings

Distri-settings

GlusterFS

Files

ffmpeg

DASH X264

Apache + Mod264

Clients

CDN

Public CLOUD

PHP Web UI
RestFul API

Resource overview window

Manage Assets

Encoding settings

Distri-settings

GlusterFS

Files

ffmpeg

DASH X264

Apache + Mod264

Clients

CDN

* Not available in basic version of OSCIED

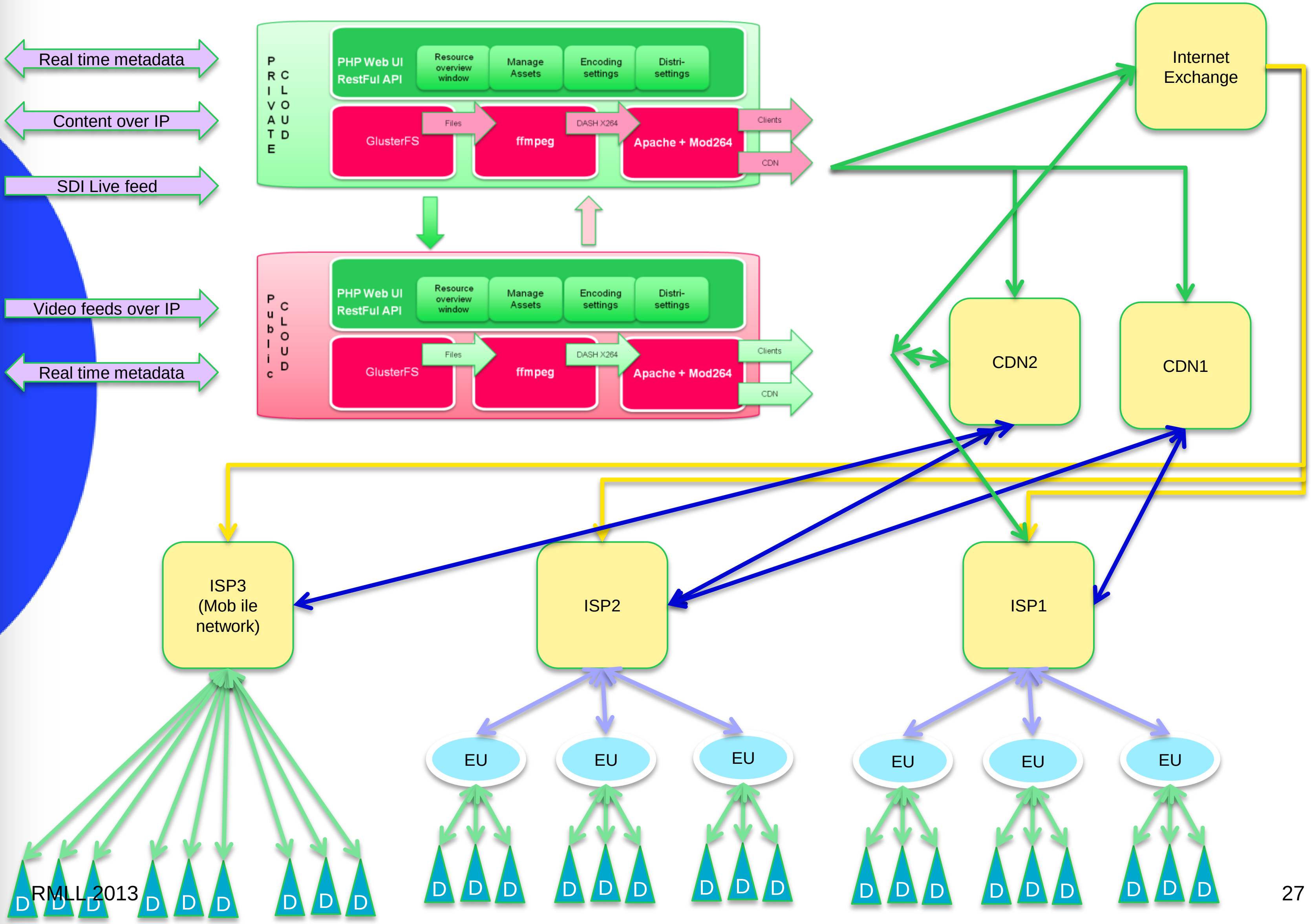
MEDIA ASSET MANAGEMENT AND OSCIED

OSCIED needs to be able to interface automatically with MAM backends in order to become useful in a professional environment

1. A source file is uploaded to the private cloud of OSCIED
2. The CMS sends a notification XML with details of the file that is uploaded (name, location, requested encoding profile and publication details)
3. The management layer of OSCIED will send a notification XML to the CMS when the file is available where in the distribution chain
4. The CMS will communicate with the Player Controller the locations of the files

It should be possible to ingest content directly in the public cloud of OSCIED, or from a external location to the private cloud.

POTENTIAL MEDIAFLOWS



Real time metadata

Content over IP

SDI Live feed

Video feeds over IP

Real time metadata

PRIVATE CLOUD

PHP Web UI
RestFul API

Resource overview window

Manage Assets

Encoding settings

Distri- settings

GlusterFS

Files

ffmpeg

DASH X264

Apache + Mod264

Clients

CDN

Public CLOUD

PHP Web UI
RestFul API

Resource overview window

Manage Assets

Encoding settings

Distri- settings

GlusterFS

Files

ffmpeg

DASH X264

Apache + Mod264

Clients

CDN

Internet Exchange

CDN2

CDN1

ISP3 (Mob ile network)

ISP2

ISP1

EU

EU

EU

EU

EU

EU

D D D D D D D D D

D D D D D D D D D

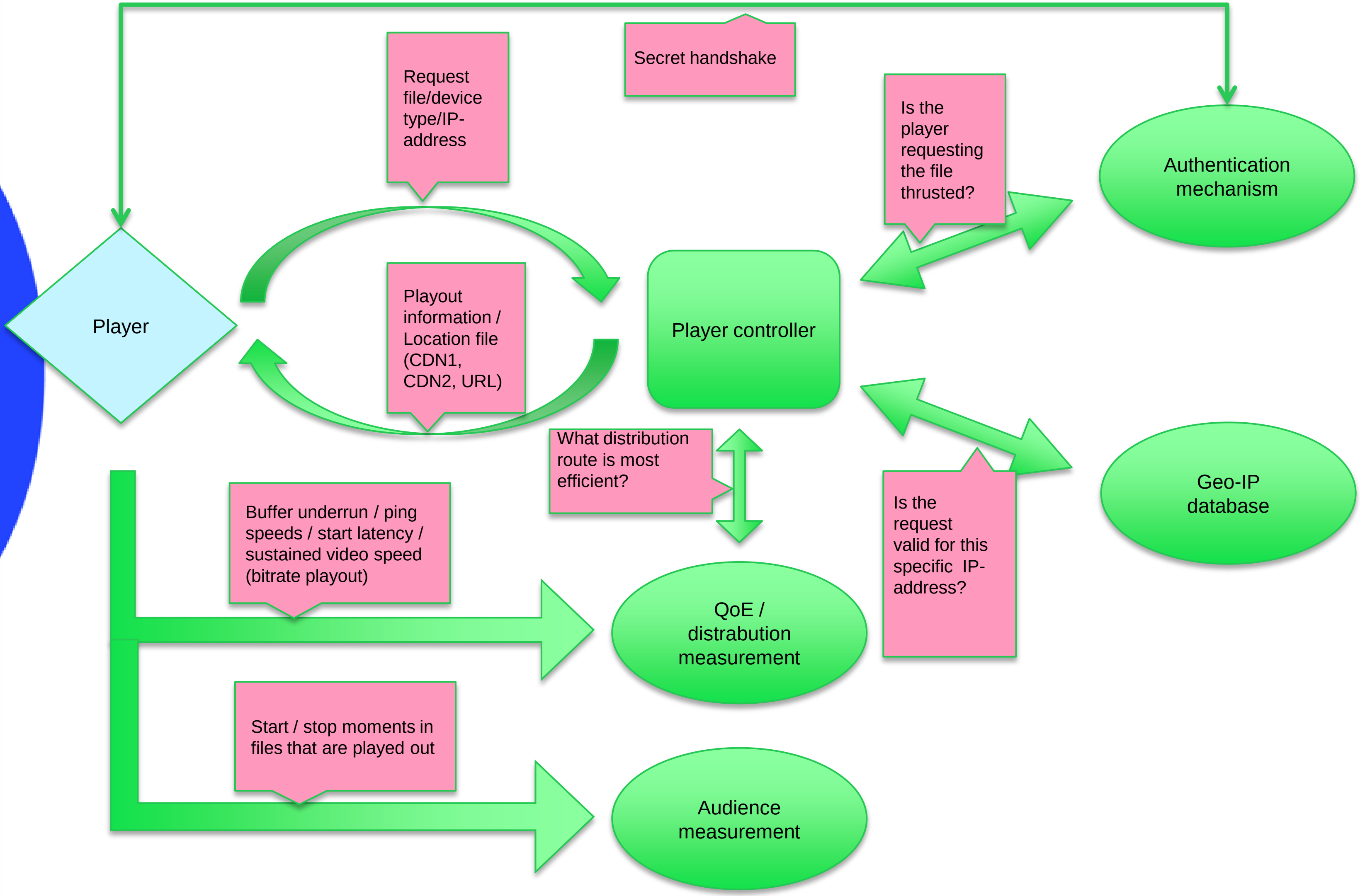
D D D D D D D D D

POTENTIAL FUTURE WORK…

Connect different distribution outlets with automated distribution intelligence to optimise data flows from and to OSCIED

1. **Distribution overlay**: The management environment decides what the optimal data route is to distribute content from private or public OSCIED via IXPs, CDNs, ISPs, End User networks (EU) to specific devices (D).
   - *Congestion in network avoided*
   - *Capabitlity of network is taken into account (for example if it can transcode content for playback on specific devices)*
   - *Distribution costs are taken into account (cost per GB or GB/s)*
2. **Communication overlay**: Dataflows from end user devices (D) are aligned with those of the content provider and processed in the cloud or the network (for example active nodes in the CDN)
   - *Synchronisation of media flows*
   - *Generating interactive interfaces to thin clients / devices with limited playback options*
   - *Upload of source files of media assets that are processed decentralised (remote editing, postproduction, etc.)*

PLAYER BACKEND COMMUNICATION


Secret handshake
Request file/device type/IP-address
Is the player requesting the file thrusted?
Authentication mechanism
Player
Playout information / Location file (CDN1, CDN2, URL)
Player controller
What distribution route is most efficient?
Geo-IP database
Buffer underrun / ping speeds / start latency / sustained video speed (bitrate playout)
Is the request valid for this specific IP-address?
QoE / distrabution measurement
Start / stop moments in files that are played out
Audience measurement

MORE FUTURE INTELLIGENCE IN OSCIED

Player backend functionalities and other feedback loops can be part of OSCIED in the future.

- Player sends information to OSCIED that can be used for end to end monitoring of the IP-network. This information can be used to manage traffic flows, for example avoid a busy CDN at a certain moment.
- Player sends information to OSCIED that can be used for **audience measurement.**
- Player can request a media file for playback from OSCIED. The Player Controller of OCSIED checks:
  - *If the player is **authentic***
  - *If the player is used in an **accepted location***
  - *What the best available location of the file is*
- Player receives an XML or MPD with information about either:
  - *The location of a still informing that the file cannot be played out in that region*
  - *The **location of the media files** that can be played out from the easiest to reach cache*

MORE POSSIBLE FUTURES

- Optimise for different public clouds (f.e. full integration with Amazon S3 or Cloudfront) and management a hybrid setup using more (decentralised) gateways.
- Add support of different CDNs and multi-CDN management.
- Add statistic / big data cloud intelligence to monitor:
  1. Quality of Service (the distribution network)
  2. Quality of Experience (the end user client)
  3. Platform specific behaviour (time, attention, content)
- Test platform for cloud deployments, new reference files etc.
- Decentralised production environment use cases.

OSCIED = WORK IN PROGRESS…

Let us hear your thoughts!

Release date EBU OSCIED Github repository: **13 September**

Come and see the **OSCIED demo** at IBC (EBU booth hall 11)

For more **information** mail:

Bram Tullemans (tullemans@ebu.ch)

David Fischer (david.fischer.ch@gmail.com)