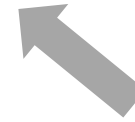
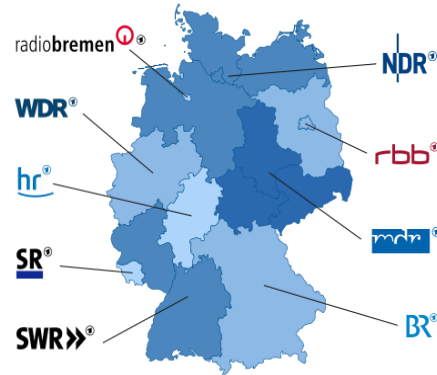
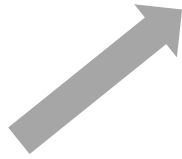


Open Source Support for TTML Subtitles

Status Quo and Outlook

FOSDEM 2017

Andreas Tai, IRT



IRT participation in technical standards

- SMPTE
- DVB
- HbbTV
- **EBU**
- **W3C**
- ...

TTML (Timed Text Markup Language)

- W3C Standard for Timed Text
- Start: 2003
- Candidate Recommendation (as **DFXP**): 2009
- Recommendation: 2010
- 2nd edition: 2013
- „Profiles“
 - (SMPTE-TT)
 - EBU-TT/EBU-TT-D
 - **IMSC 1**

TTML, XML and WebVTT

- TTML = XML, Web developer prefer JSON.
- Browser „manufacturer“ developed WebVTT.
- TTML: Choice of a lot of content driven organisations (EBU, ATSC, Studios).
- WebVTT: Native support by browsers/iOS.
- TTML: Support by various video players and frameworks.

"Standard makers" support Open Source

- **EBU**
 - EBU-TT-D in DASH.js
 - EBU-TT Live Toolkit (+BBC)
- **IRT**
 - Subtitle Conversion Framework (SCF)
 - EBU-TT-D Samples
- **Netflix (Sponsor)**
 - Timed Text Toolkit (by syknave/Glenn Adams)
- **MovieLabs (Sponsor)**
 - imscJS (by Pierre Lemieux)

OSS for TTML



Production

**Contribution
(Archive, Exchange)**

Distribution

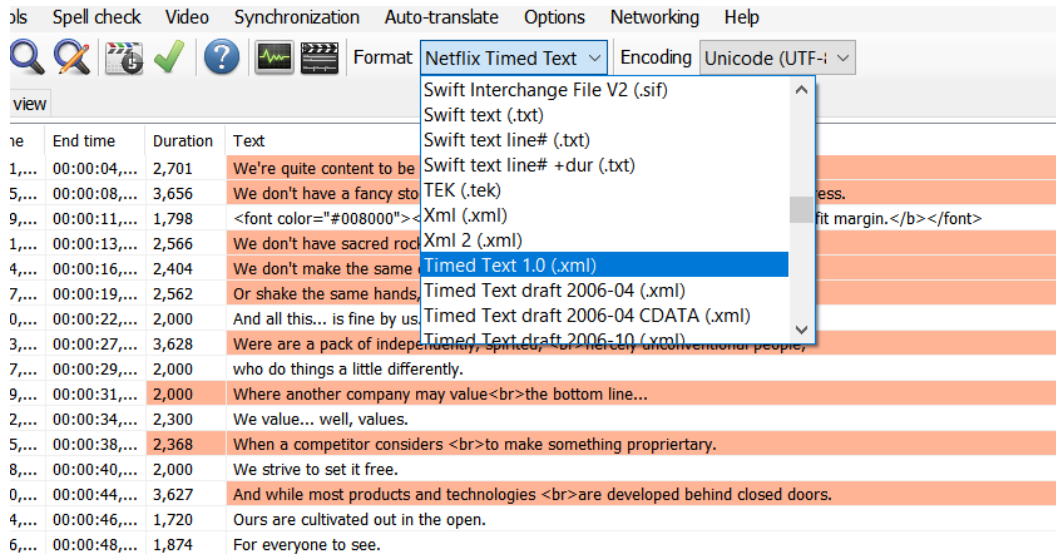
Presentation

OSS for TTML



Production

SubtitleEdit - Subtitle Editor

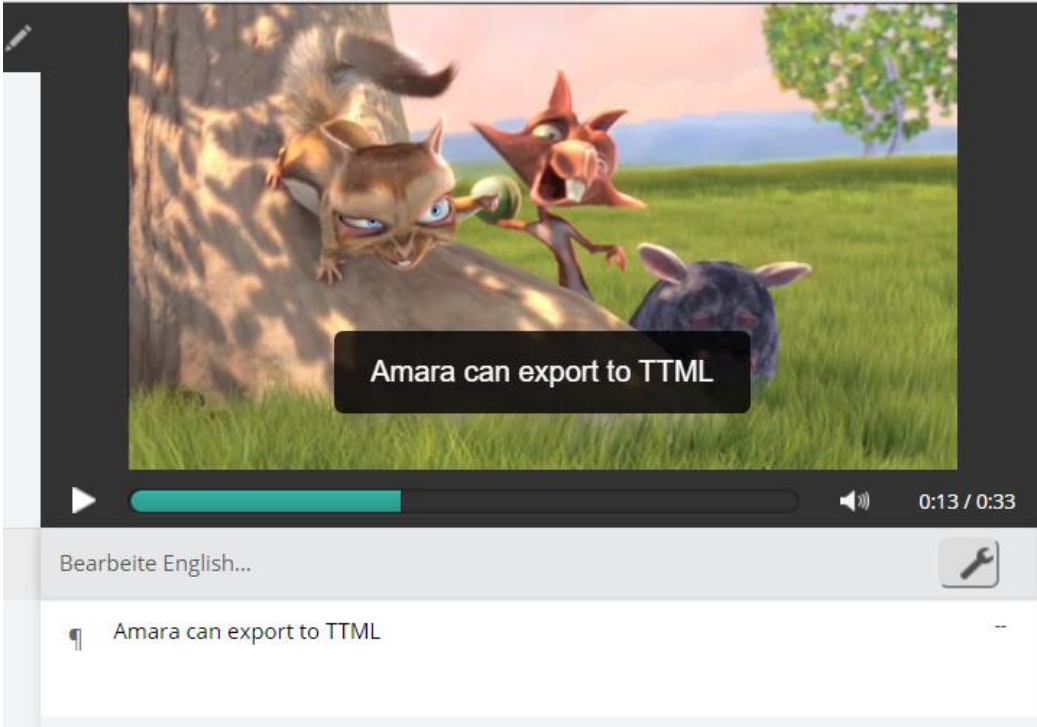


The screenshot shows the SubtitleEdit application window. The menu bar includes: File, Spell check, Video, Synchronization, Auto-translate, Options, Networking, Help. The 'Format' menu is open, displaying a list of subtitle formats. The 'Timed Text 1.0 (.xml)' option is highlighted. The main window displays a subtitle list with columns for line number, end time, duration, and text. The text in the list is highlighted in orange.

line	End time	Duration	Text
1,...	00:00:04,...	2,701	We're quite content to be
5,...	00:00:08,...	3,656	We don't have a fancy sto
9,...	00:00:11,...	1,798	<
1,...	00:00:13,...	2,566	We don't have sacred roc
4,...	00:00:16,...	2,404	We don't make the same
7,...	00:00:19,...	2,562	Or shake the same hands,
0,...	00:00:22,...	2,000	And all this... is fine by us
3,...	00:00:27,...	3,628	Were are a pack of indepen
7,...	00:00:29,...	2,000	who do things a little differently.
9,...	00:00:31,...	2,000	Where another company may value the bottom line...
2,...	00:00:34,...	2,300	We value... well, values.
5,...	00:00:38,...	2,368	When a competitor considers to make something proprietary.
8,...	00:00:40,...	2,000	We strive to set it free.
0,...	00:00:44,...	3,627	And while most products and technologies are developed behind closed doors.
4,...	00:00:46,...	1,720	Ours are cultivated out in the open.
6,...	00:00:48,...	1,874	For everyone to see.

- C#, GPL 3
- TTML: „Nearly“ standard conform, Problems with styles
- Profiles: TTML 1, Netflix -TT (will be deprecated in favor of IMSC)

Amara (unisubs) - Online Subtitle Editor



- Python, AGPL 3.0
- Simple TTML Export
- Minor bug on datatype

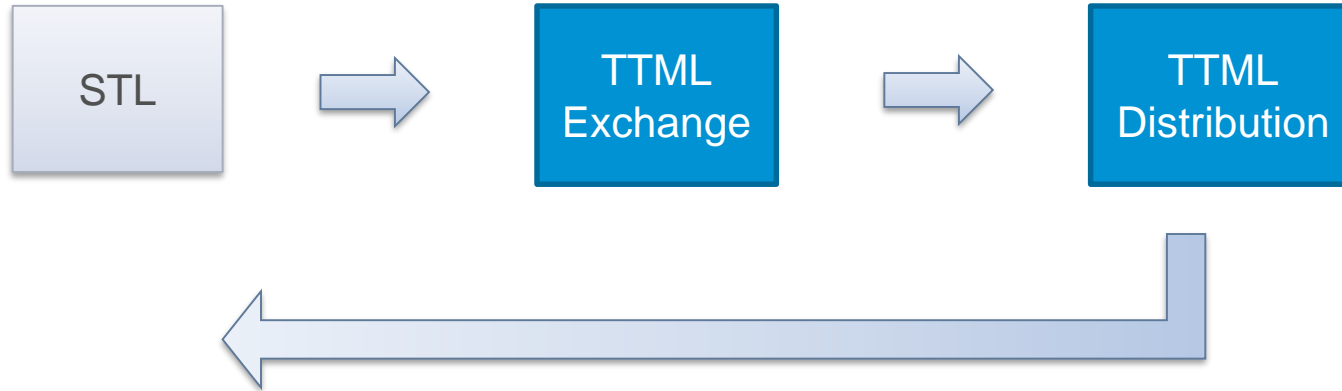
OSS for TTML



Production

**Contribution
(Archive,Exchange)**

Subtitle Conversion Framework (SCF)



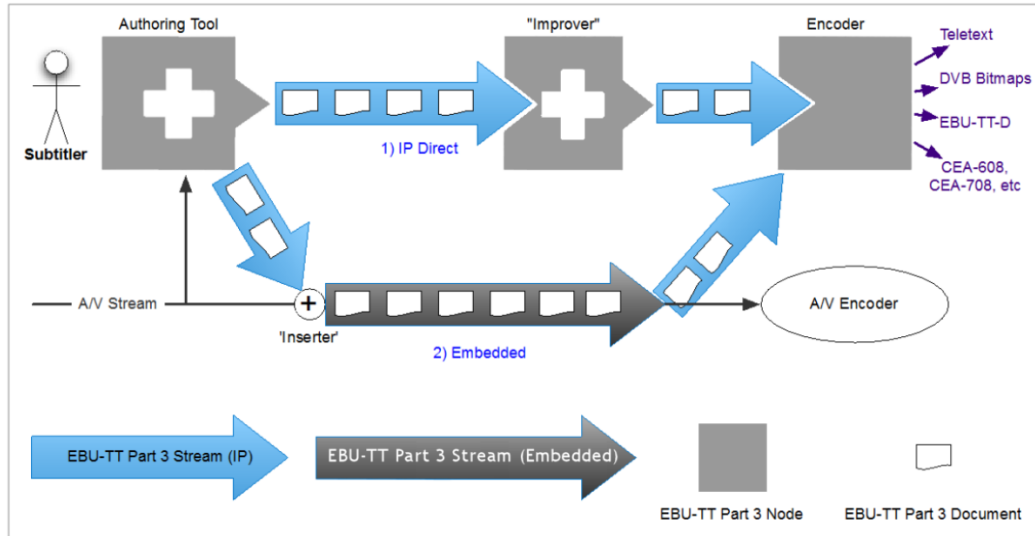
- Command Line Conversion of Subtitle Formats
- XSLT, Apache 2
- Supports: EBU STL, EBU-TT, EBU-TT-D, IMSC

Timed Text Toolkit (ttt)

```
$ java -jar ttt-ttxv-all-3.0-SNAPSHOT.jar --model ttml1 test.ttml
```

- Java, BSD
- Validates different TTML profiles, Generation of svg+png, ...
- Covers already TTML 2 features (e.g. Ruby)

ebu-tt-live-toolkit



Source: <https://tech.ebu.ch/files/live/sites/tech/files/shared/tech/tech3370.pdf>

- Python, BSD 3
- Streaming of subtitles (Contribution), EBU-TT Live Profile, WebSocket
- Scripts: Produce, Consume, Forward, Encode (EBU-TT-D)

OSS for TTML



Production

Contribution
(Archive, Exchange)

Distribution

MP4BOX

Useful command-lines for import:

```
MP4Box -add sample.ttml sample.mp4
```

- C, LGPL 2.1
- Package TTML into mp4
- Profiles: EBU-TT-D (IMSC and other TTML flavours using NHML)

OSS for TTML



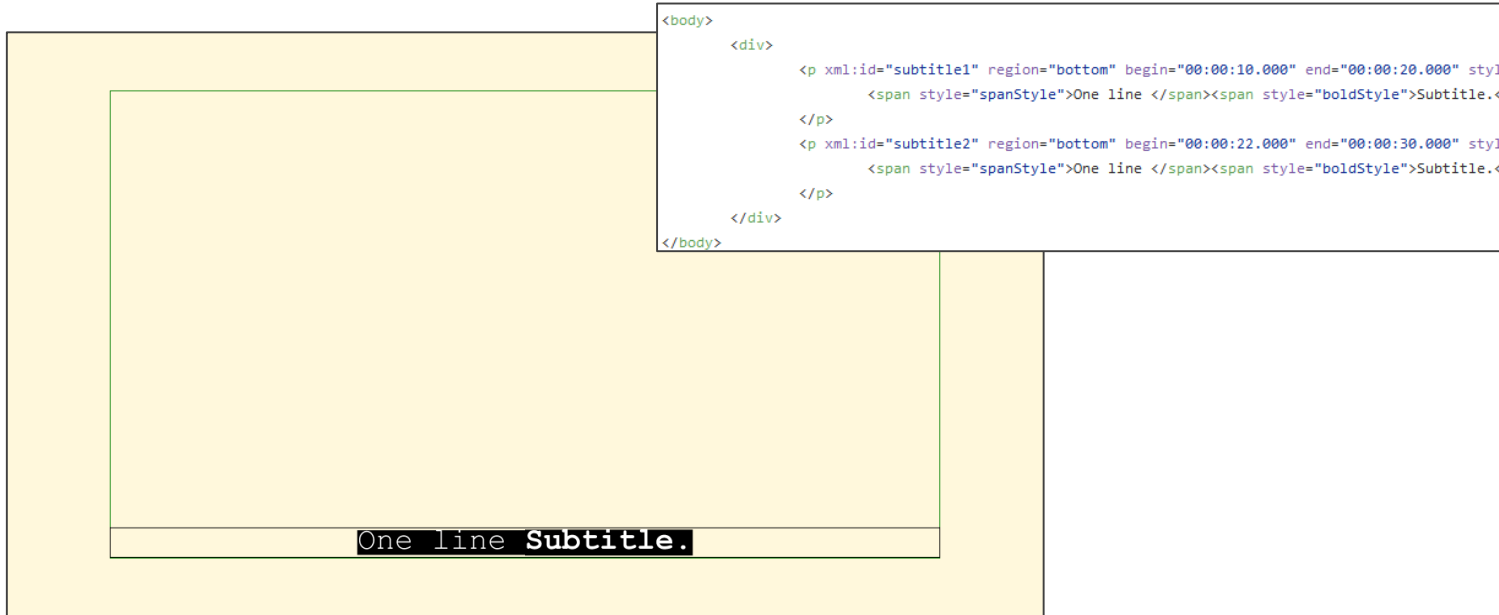
Production

Contribution
(Archive, Exchange)

Distribution

Presentation

EBU-TT-D Samples



The diagram illustrates the mapping between a video frame and its XML representation. On the left, a yellow rectangular frame contains a smaller green rectangular area representing a subtitle. At the bottom of this green area, the text "One line Subtitle." is displayed, with "One line" in a standard font and "Subtitle." in a bold font. On the right, a white box contains the XML code that defines this subtitle. The code uses `<div>` to define the subtitle region, `<p>` for the text, and `` with `spanStyle` and `boldStyle` attributes to format the text.

```
<body>  
  <div>  
    <p xml:id="subtitle1" region="bottom" begin="00:00:10.000" end="00:00:20.000" styl  
      <span style="spanStyle">One line </span><span style="boldStyle">Subtitle.</span>  
    </p>  
    <p xml:id="subtitle2" region="bottom" begin="00:00:22.000" end="00:00:30.000" styl  
      <span style="spanStyle">One line </span><span style="boldStyle">Subtitle.</span>  
    </p>  
  </div>  
</body>
```

Apache 2

TTML , Video, Reference Images (Coverage EBU-TT-D)

VLC Player - Multi-* -player



- C, GPL 2.0
- Shows TTML subtitles (not all features supported)
- File extension has to be renamed to "txt"

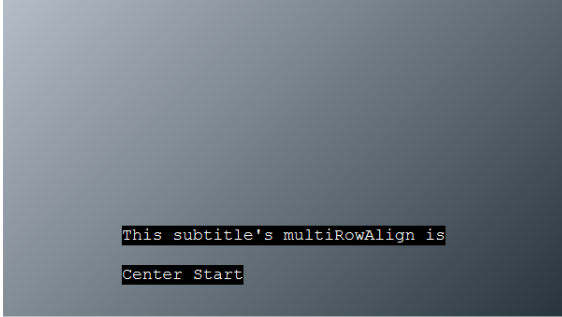
imscJS - TTML to HTML 5

IMSC1 Renderer

Choose an IMSC1 (or EBU-TT-D) document from your computer. The document will be rendered by your browser in the area below, and is not sent to the server. Image URLs must be absolute.

Durchsuchen... multibrow-align-center-start-001-ttml.xml

This sample application uses the [imscJS](#) library, which is an open source JavaScript library for rendering IMSC1 subtitles and captions to HTML5. Please report [issues](#). A sample IMSC1 document can be downloaded [here](#). **WARNING:** This experimental software should not be used for production.



Media time (in seconds): 10 displayForcedOnlyMode

Save as PNG sequence

- Javascript, BSD 2
- TTML Renderer
- Coverage of IMSC 1 (text and image)

imscJS - TTML to HTML 5

```
ttmlObject = imsc.fromXML(ttmlXmlString);  
  
times = ttmlObject.getMediaTimeEvents();  
  
snapshot = imsc.generateISD(ttmlObject, times[1]);  
  
domNode = document.getElementById("videoContainer");  
  
imsc.renderHTML(snapshot, domNode);
```

Summary

- Broad support of TTML through OSS
- Some OSS needs "tweaking" to be standard compliant
- "Standard Makers" need to contribute
 - Test Material
- Bug Reports

LINKS

SubtitleEdit

<https://github.com/SubtitleEdit/subtitleedit>

Amara (unisubs)

<https://www.amara.org/>

<https://github.com/pculture/unisubs>

Subtitle Conversion Framework

<https://github.com/IRT-Open-Source/scf>

LINKS

Timed Text Toolkit

<https://github.com/skynav/ttt>

ebu-tt-live-toolkit

<https://github.com/ebu/ebu-tt-live-toolkit/>

<http://ebu.github.io/ebu-tt-live-toolkit/>

mp4box

<https://gpac.wp.imt.fr/mp4box/>

<https://github.com/gpac/gpac>

LINKS

EBU-TT-D Application Samples

<https://github.com/IRT-Open-Source/irt-ebu-tt-d-application-samples>

VLC media Player

<http://www.videolan.org/vlc/>

<https://github.com/videolan/vlc>

imscJS

<https://github.com/sandflow/imscJS>

<http://sandflow.com/imsc1proc/index.html>

Thank you for your attention!

Experts in audio-visual media

Andreas Tai (tai@irt.de)
Production Technology (PT)



Floriansmühlstraße 60
80939 München
Tel +49 89 323 99 – 0
FAX +49 89 323 99 – 351
www.irt.de
presse@irt.de

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