



Ecosystem infrastructure for smart and personalised inclusion
and PROSPERITY for ALL stakeholders

D204.5 Support for additional media types and hosting platforms including subtitle editor compatibility

Project Acronym	Prosperity4All
Grant Agreement number	FP7-610510
Deliverable number	D204.5
Work package number	WP204
Work package title	Media and Material Automated/Crowdsourced Transformation Infrastructures
Authors	Dean Jansen, PCF
Status	Final
Dissemination Level	Public/Consortium
Delivery Date	18/12/2017
Number of Pages	17

Keyword List

Media-types, broad support, and hosting platforms

Version History

Revision	Date	Author	Organisation	Description
1	13/11/2017	Dean Jansen	PCF	Initial Draft
2	20/11/2017	Christos Mettouris	UCY	Review
3	21/11/2017	Lars Ballieu Christensen	Sensus	Review

Table of Contents

- 1 Executive Summary 4**
- 2 Contribution to the Global Architecture 5**
- 3 Introduction 7**
- 4 Support for additional media types and hosting platforms including subtitle editor compatibility..... 8**
 - 4.1 Initial Situation8**
 - 4.1.1 Compatibility Levels..... 10
 - 4.1.1.1 Basic – Compatibility Level 10
 - 4.1.1.2 Metadata – Compatibility Level..... 10
 - 4.1.1.3 Import/Export Sync – Compatibility Level 10
 - 4.1.2 Pre-existing UE Compatibility with Video File Formats and Hosting Services..... 11
 - 4.1.2.1 Initial Industry Standard Video File Formats and Royalty-free Video File Formats Supported 11
 - 4.1.2.2 Initial Video Hosting Services Supported..... 12
 - 4.2 Goals & Targets.....13**
 - 4.2.1 File Format Compatibility Targets 13
 - 4.2.2 Video Hosting Site Compatibility Targets 14
 - 4.3 Implementation Notes14**
 - 4.3.1 YouTube – Maintenance..... 15
 - 4.3.2 Vimeo – Import/Export Sync Addition..... 15
- 5 Conclusion..... 16**
- Annex I: Glossary 17**

List of Figures

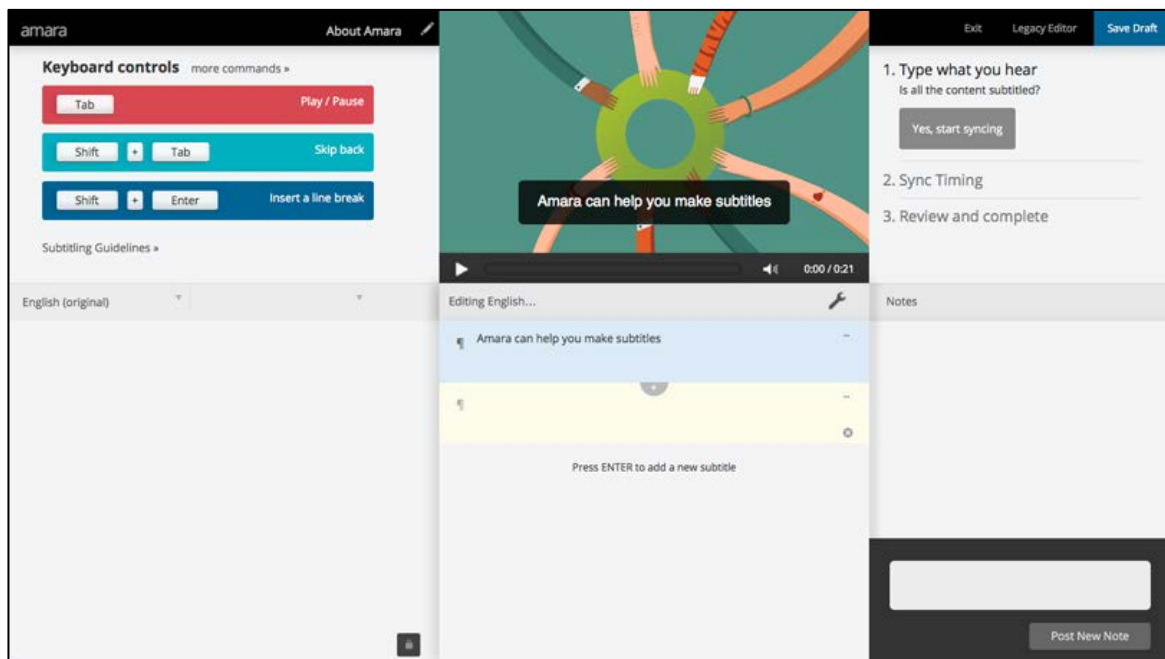
- Figure 1: UE Caption & Subtitle Editor 4
- Figure 2: Overall Picture of Prosperity4all, with WP204 Highlighted 5
- Figure 3: Videos Added Without Metadata Compatibility..... 11
- Figure 4: Videos Added With Metadata Compatibility 11
- Figure 5: YouTube Import/Export Sync 12
- Figure 6: Captions in Native Vimeo.com Interface 14

1 Executive Summary

The Participatory Culture Foundation (PCF) hosts and develops Amara, a platform for crowd/community created captions and translated subtitles. Amara is undergirded by the Unisubs Engine (UE), an open source platform that will be included as an infrastructural building block in the P4A's DeveloperSpace.

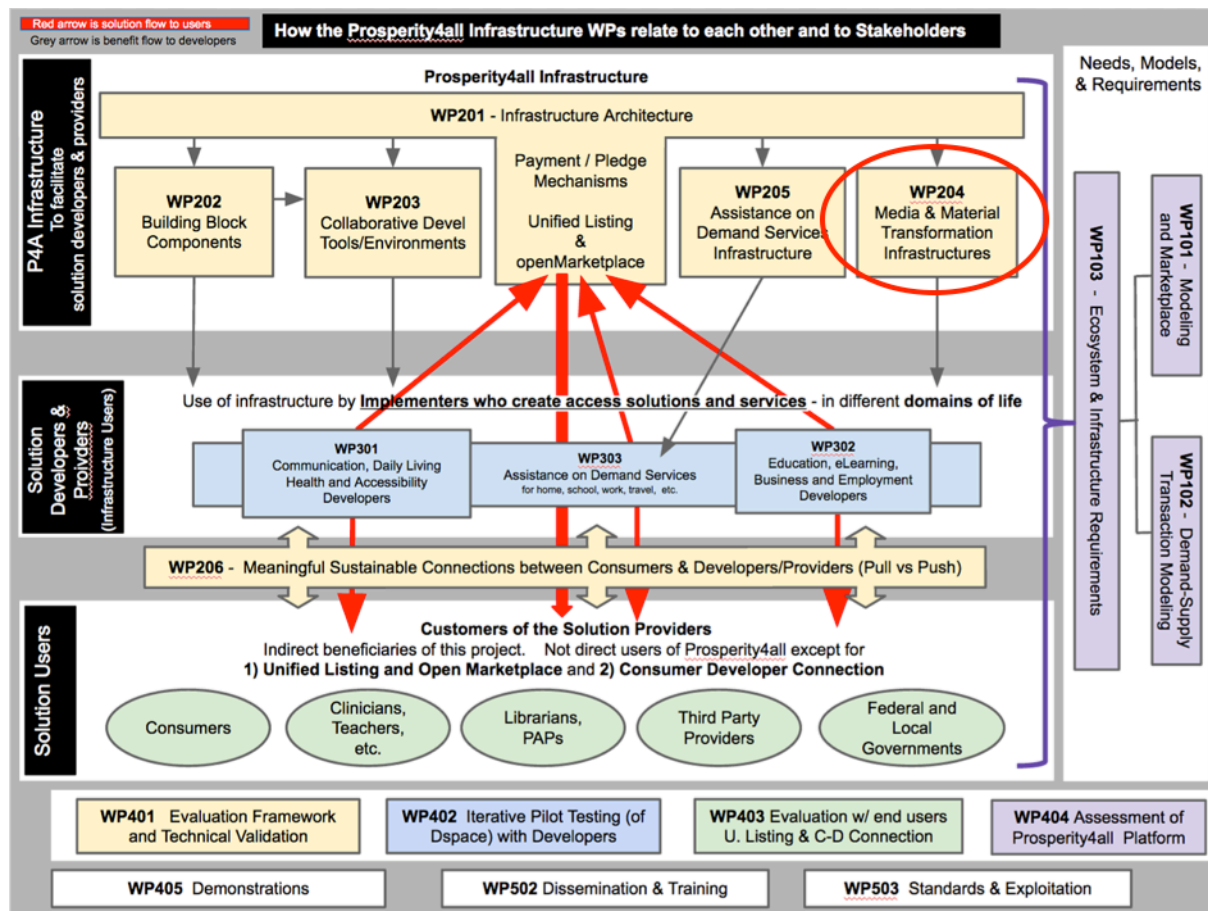
This document provides a summary of improvements made to the UE that will facilitate better collaboration between people who are captioning and translating videos, with the ultimate goal of making captioning easier and less costly. D204.5 accomplishes this goal by broadening and improving video file format and video hosting service compatibility with the UE Editor (see fig. 1) for easier and faster captioning and translation. This also includes import/export and syncing for some popular video platforms (with robust API's, which can support this type of exchange).

Figure 1: UE Caption & Subtitle Editor



2 Contribution to the Global Architecture

Figure 2: Overall Picture of Prosperity4all, with WP204 Highlighted



The UE is an infrastructure module available in the P4A Infrastructure; it provides an infrastructure or platform that can be used by both vendors and communities to caption and/or translate videos for greater accessibility. The source code and infrastructure for the UE will be available through P4A's DeveloperSpace.

Prior to being part of the P4A consortium, PCF launched Amara as a prototype, which evolved into an award-winning platform for community-driven captions and subtitles. Although the underlying software, the UE, was open source since the beginning, it was not particularly modular or easy to extend.

The goal, in improving the UE as a member of the P4A consortium, is to increase the platform's flexibility, modularity, compatibility, and ease-of-use – ultimately driving broader and more cost-effective accessibility for video and the ability for other developers to add

other enhancements (see fig. 2). Improvements to the UE have primarily been to the code and documentation (as in D204.1), as well as additional features. In addition, the P4A-driven features add compatibility with additional video services, enable users on mobile devices to participate in community accessibility efforts, and enable community members to work together in real time to caption and subtitle video.

3 Introduction

The purpose of the second portion of T204.1 feature enhancements, in WP204, are to make the UE –which is the open source software and platform that undergirds Amara– more broadly compatible with popular video file formats and hosting services. To accomplish this task, the team focused on a variety of key improvements to the UE that not only expand compatibility with video hosting services, but also enable easier management and publishing of finished captions and subtitles.

4 Support for additional media types and hosting platforms including subtitle editor compatibility

As noted above, the second batch of feature enhancements for T204.1 are clustered around the UE video compatibility. The three subsections in this section review the initial state of compatibility, the goals and targets for the enhancements, and, finally, the execution and implementation of the enhancements.

4.1 Initial Situation

The UE began life as a prototype interface for captioning and subtitling web video. The prototype evolved into a more robust caption and subtitle editor that won awards for advancements in accessibility and multi-culturalism.

The original goal with the UE was to create a "Collaborative Wikipedia-like-system for captioning and subtitling;" however, with the prototype, compatibility with video file formats and, especially, video hosting services was limited. This was an obstacle to broader adoption, where users expected simple compatibility with popular video file formats and services, without requiring downloading, transcoding, and/or re-uploading or migration to a different video hosting service.

To more understand the process of adding video file format and host compatibility to the UE, it's helpful to be aware of the structure of the system. One of the UE's early innovations was using JavaScript and HTML to "overlay" the UE Editor atop an embedded video, within the browser. In other words, videos are not downloaded and re-hosted on the UE server, but instead remain hosted on whatever server or service they were originally uploaded to¹. The pre-existing video stream is used as a reference inside the UE Editor, and JavaScript "hooks" are used to manipulate the video playback and controls. The UE Editor is simply an overlay on top of existing videos. This approach makes the UE much more convenient, fast, and simple, both from the user and the server perspectives; however, the trade-off in convenience is the requirement of ensuring broad compatibility for popular video hosting services and/or video file formats.

¹ Does Amara Host my Videos or Subtitles?, Amara Support Center:
<https://support.amara.org/support/solutions/articles/7285-does-amara-host-my-videos-or-subtitles->

For video file format support, the UE leverages the HTML5 video framework and JavaScript to control video streams hosted in native format (i.e. a video file that is served as a stream, with an extension such as .webm or .mp4). After moving from prototype to beta, the UE supported all major royalty-free video file formats, as well as the most popular de-facto standard video file formats (which are patent-encumbered). At the time of the FP7 proposal, it was unclear what new video file formats might emerge, but the importance of continuing to keep up with any additions to the market was clear.

Video hosting services, as opposed to video file formats, require significantly more engineering work to integrate with the UE. Video hosting services generally use a variety of non-standard embedders that differ from service to service. A critical dependency, for adding any new video hosting service compatibility with the UE, is that the service's embedder supports Javascript API "hooks" with calls for manipulating video playback and controls². Often these hooks are well documented, but sometimes they require some level of reverse-engineering. Furthermore, any changes to a video hosting service's embedder or JavaScript API's can result in broken compatibility.

To provide the highest level of compatibility with a video hosting service, UE must seamlessly handle the import and export of caption and/or subtitle files. From the user perspective, this means being able to add video(s) to UE, from the hosting service of their choice, and 1) automatically have pre-existing captions or subtitles on the video hosting service appear in the UE Editor, and 2) automatically export all finished captions or subtitles from the UE Editor back to the video hosting service. This workflow requires user authentication, in order to validate that the user who is exporting captions onto a hosted video service is the same user that uploaded the video onto the service in the first place. As with the basic video hosting service compatibility, any changes to the service's API result in a broken integration that must be repaired to regain compatibility.

Some users of UE are adding captions for videos which they did not originally upload, but would like to make accessible for deaf or hard of hearing. In these cases, it's critical to support embedding the videos through the UE platform. This is possible by leveraging the same system of Javascript "hooks" as the UE Editor does, but instead allowing viewers to access the video and captions/subtitles from their browser. This can be done natively on the

² Markov, Danny. How to Control YouTube's Video Player with JavaScript, tutorialzine: <https://tutorialzine.com/2015/08/how-to-control-youtubes-video-player-with-javascript>

UE site, or added to a 3rd party site via the “UE Embedder”, a tool for embedding UE-captioned videos and enabling caption playback³. Adding compatibility for video file formats and hosting services to the UE Editor makes it simple to also add support for the UE Embedder. Some additional tweaks and testing are required to ensure the video playback works as expected on 3rd party sites, but the basics of player manipulation and control are pre-existing.

4.1.1 Compatibility Levels

UE integrations range from basic capabilities to more advanced. Video file formats that are compatible with UE will uniformly meet the “Basic” integration level (i.e. no additional compatibility features are possible). However, video hosting services have a broader range of compatibility options, which are described below.

4.1.1.1 Basic – Compatibility Level

- UE will accept valid video stream or service URLs
- Captions and subtitles can be created for these videos in the UE Editor
- UE Embedder allows playback on 3rd party websites

4.1.1.2 Metadata – Compatibility Level

- UE will retrieve and display the video thumbnail and title from the video hosting service

4.1.1.3 Import/Export Sync – Compatibility Level

- UE enables the user to authenticate with the video hosting service to enable
 - Previously completed captions and subtitles to be automatically imported from video hosting site, into UE
 - Captions and subtitles finished on UE editor to be automatically exported out to the video hosting site

³ Using Amara embed code, Amara Support Center:

<https://support.amara.org/support/solutions/articles/7287-using-amara-embed-code>

Figure 3: Videos Added Without Metadata Compatibility

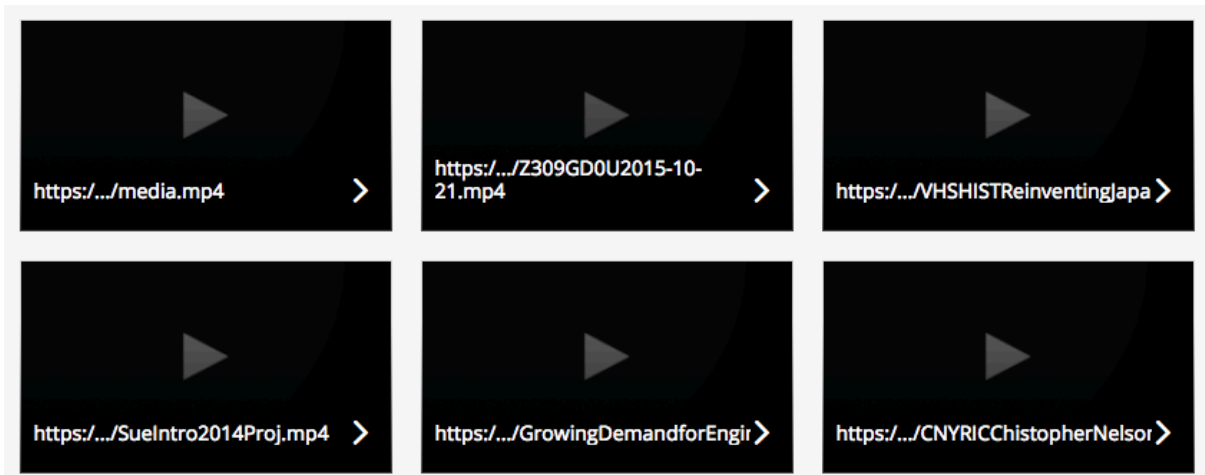
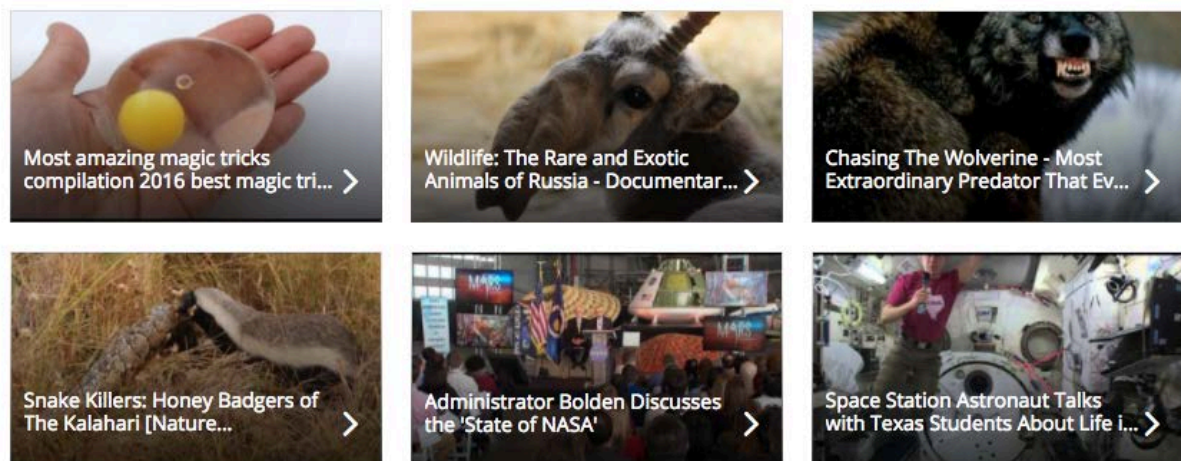


Figure 4: Videos Added With Metadata Compatibility



4.1.2 Pre-existing UE Compatibility with Video File Formats and Hosting Services

4.1.2.1 Initial Industry Standard Video File Formats and Royalty-free Video File Formats Supported

Broad support of all industry standard video file formats for web streaming has always been a goal, in developing UE. Support for the following standard video (and audio) file formats already existed in UE, before the Prosperity4All FP7 project began:

- mp4
- flv
- mp3

PCF has been an advocate for open video standards and a founding member of the Open Video Alliance⁴ and Open Video Conference⁵. As such, support for a number of royalty free video (and audio) file formats also existed before the Prosperity4All FP7 project began:

- webm
- ogg

4.1.2.2 Initial Video Hosting Services Supported

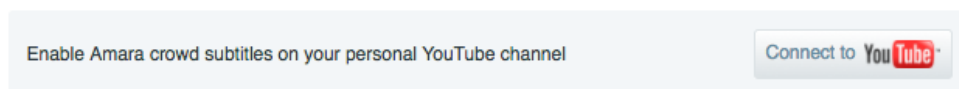
Similar to video file format support, compatibility with a range of popular video hosting services has long been a goal for making UE more useful for users needing to caption or subtitle internet video. The following popular video hosting services had some level of support before the beginning of the Prosperity4All FP7 project:

- **YouTube** – Initial compatibility
 - Basic
 - Metadata*
 - Import/Export Sync* (fig. 5)
- **Vimeo** – Initial compatibility
 - Basic

*Note: UE team was aware that YouTube compatibility would require planned updates, due to the YouTube Data API v2 being deprecated in May of 2015⁶.

Figure 5: YouTube Import/Export Sync

YouTube Sync



The services above were selected because of their focus in two distinct areas: 1) mass-appeal and 2) creator-driven content. YouTube, the dominant video platform at the time of project planning, required little discussion – it clearly stands out as the front running service

⁴ Open Video Alliance, "P2P Foundation Wiki." http://wiki.p2pfoundation.net/Open_Video_Alliance

⁵ Open Video Conference. <http://openvideoconference.org/>

⁶ Ulukaya, Ibrahim. "Bye-bye, YouTube Data API v2." YouTube Engineering and Developers Blog. <https://youtube-eng.googleblog.com/2015/04/bye-bye-youtube-data-api-v2.html>

with mass appeal⁷. Vimeo was selected due to its network of “Vimeo Creators”, independent filmmakers, and other high-quality content makers. Content on Vimeo varies from many other hosting services in that it often attracts a more sophisticated type of video creator, with a greater ratio of higher production quality of media and educational material being published as a result⁸.

4.2 Goals & Targets

The major areas for improvement, in the previous section, will be broken down into specifics in this section. The implementation section will review the final output and realization of these features in UE.

4.2.1 File Format Compatibility Targets

Mp4, the most popular and widespread video file format⁹, and WebM, the most popular advanced royalty-free video file format¹⁰, were both fully compatible in UE before the Prosperity4All FP7 project began. As part of the FP7 effort, the UE development team was ready for any additional competing formats that might emerge. However, despite a press-release by the Open Media Alliance –announcing that a new royalty-free file format would be released in early 2017^{11 12}– there is nothing production-ready about the video file format software that has been released to-date. Likewise, no major competition to mp4 has arisen during the course of the Prosperity4All FP7 project. Given the lack of development in this space, the UE development team has opted to focus efforts on expanding video hosting site capabilities instead of adding support for additional video file formats.

⁷ Donchev, Danny. "36 Mind Blowing YouTube Facts, Figures and Statistics – 2017." FORTUNELORDS. <https://fortunelords.com/youtube-statistics/>

⁸ Lee, Joel. "5 Reasons to Host Videos on Vimeo Instead of YouTube." Make Use Of. <http://www.makeuseof.com/tag/reasons-vimeo-instead-youtube/>

⁹ Orlin, Jon. "Survey: MP4 is Top Format for Web and Mobile Videos." TechCrunch. <https://techcrunch.com/2012/04/17/survey-mp4-is-top-format-for-web-and-mobile-videos/>

¹⁰ Shonfeld, Erick. "Google, Mozilla, And Opera Take On H.264 With The WebM Project, A New Royalty-Free Video Codec." TechCrunch. <https://techcrunch.com/2010/05/19/webm-google-h-264/>

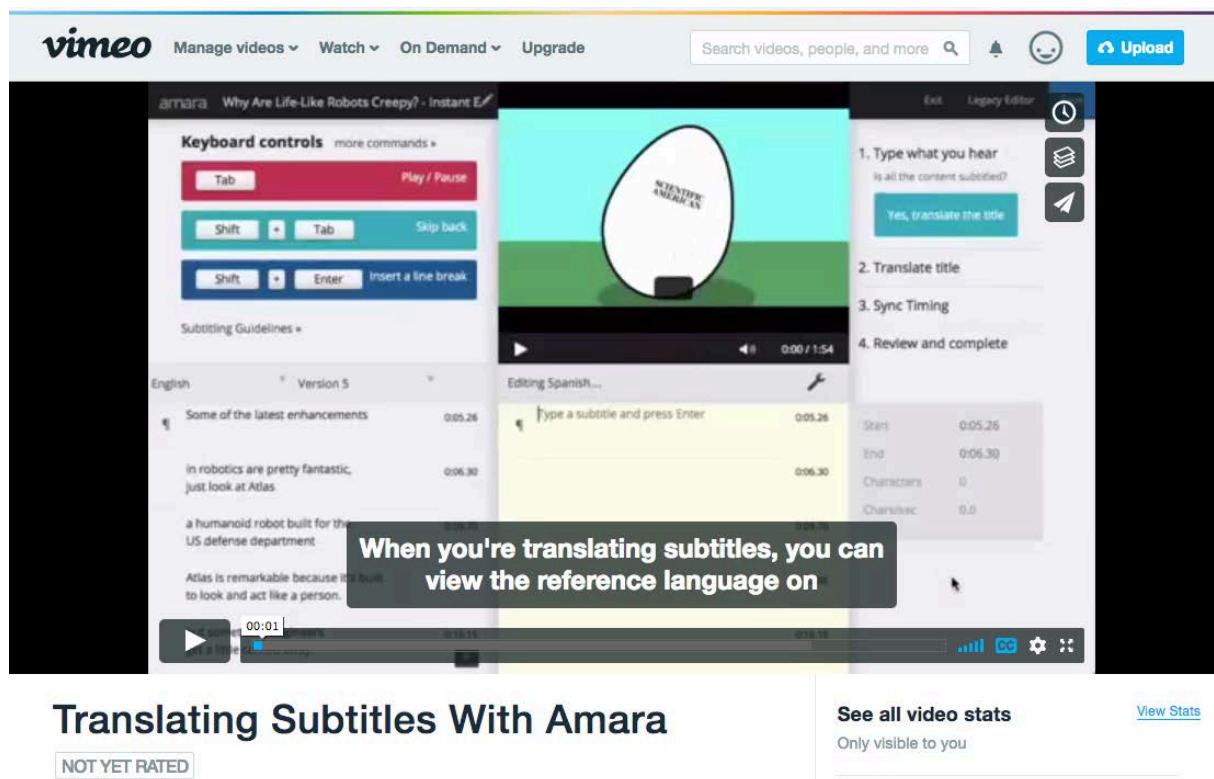
¹¹ Ozer, Jan. "Amazon, Google, and More Working on Royalty-Free Codec." Streamingmedia.com. <http://www.streamingmedia.com/Articles/News/Online-Video-News/Amazon-Google-and-More-Working-on-Royalty-Free-Codec-106091.aspx>

¹² Shankland, Stephen. Tech Giants Join Forces to Hasten High-quality Online Video, CNET: <https://www.cnet.com/news/tech-giants-join-forces-to-hasten-high-quality-online-video/>

4.2.2 Video Hosting Site Compatibility Targets

- **YouTube** – Compatibility targets
 - Basic - *maintain*
 - Metadata - *maintain*
 - Import/Export Sync - *maintain*
- **Vimeo** – Compatibility targets
 - Metadata - *add*
 - Import/Export Sync – *add* (fig. 6)

Figure 6: Captions in Native Vimeo.com Interface



4.3 Implementation Notes

The implementation was largely straightforward, went according to the targeted plan, and resulted in the successful integrations.

4.3.1 YouTube – Maintenance

The planned update from YouTube Data API v2 to v3 went smoothly. Basic compatibility, as well as support for metadata and import/export continued to function. The switch was completed before the final API v2 to v3 switch-over dates in June of 2015, so there was no downtime when the feature ceased to work.

4.3.2 Vimeo – Import/Export Sync Addition

The addition of caption and subtitle import and export syncing went smoothly. A similar approach to the YouTube integration was used; however, the API for Vimeo is significantly different and thus the development work was not able to benefit from a “modularized”^{13 14}.

¹³ YouTube Data API Reference: <https://developers.google.com/youtube/v3/docs/>

¹⁴ Vimeo API Reference: <https://developer.vimeo.com/api/endpoints>

5 Conclusion

Because the internet video field is an ever-evolving field, a significant amount of work has gone toward researching video file formats and hosting services in order to determine where to focus and best support UE users. The result of the research and implementation is broad support on UE for all industry standard and royalty-free video file formats, as well as highly-functional compatibility with some of the most popular video hosting sites in use today.

Source code for the Unisubs Engine: <https://github.com/pculture/unisubs/>.

The Unisubs Engine can be seen working in a production environment at: <https://amara.org/en/videos/create/>*

*Note: Videos/captions added to the Amara.org become publicly viewable/editable.

Annex I: Glossary

Abbreviation	Full form
AAL	Ambient Assisted Living
ACS	AsteRICS Configuration Suite
AoD	Assistance on Demand
API	Application Program Interface
AsteRICS	Assistive Technology Rapid Integration & Construction Set
AT	Assistive Technology
C4A	Cloud4All
D	Deliverable
DoW	Description of Work
DSpace	DeveloperSpace
FLV	Flash Video file format
GUI	Graphical User Interface
GPII	Global Public Inclusive Infrastructure
ICT	Information and Communications Technology
IDE	Integrated Development Environment
ISO	International Organization for Standardization
IT	Information Technology
KPI	Key Performance Indicator
MP4	MPEG-4 (Moving Picture Experts Group) video file format
OGG	Ogg Vorbis/Theora video file format
P4A	Prosperity4all
PCF	Participatory Culture Foundation
R&D	Research and Development

Abbreviation	Full form
RtD	Read the Docs
REST	Representational State Transfer
SP	Sub-Project
UE	Unisubs Engine
UI	User Interface
UX	User Experience
VM	Virtual Machine
WEBM	WebM video file format
WP	Work Package