

CTA WAVE & Open Source

Presented by

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WAVE Overview

WEB APPLICATION VIDEO ECOSYSTEM

Vision: WAVE promotes commercial OTT interoperability
by creating interoperability specifications
and FOSS test suites
that leverage industry “core” specifications.

CMAF

HTML5/MSE/EME

DASH

HLS

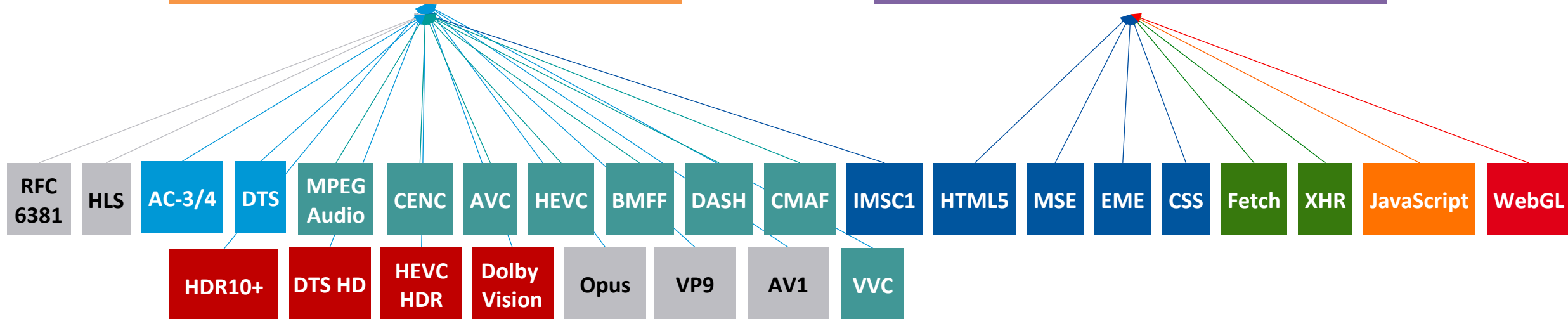
CENC

WAVE leverages existing web and media standards

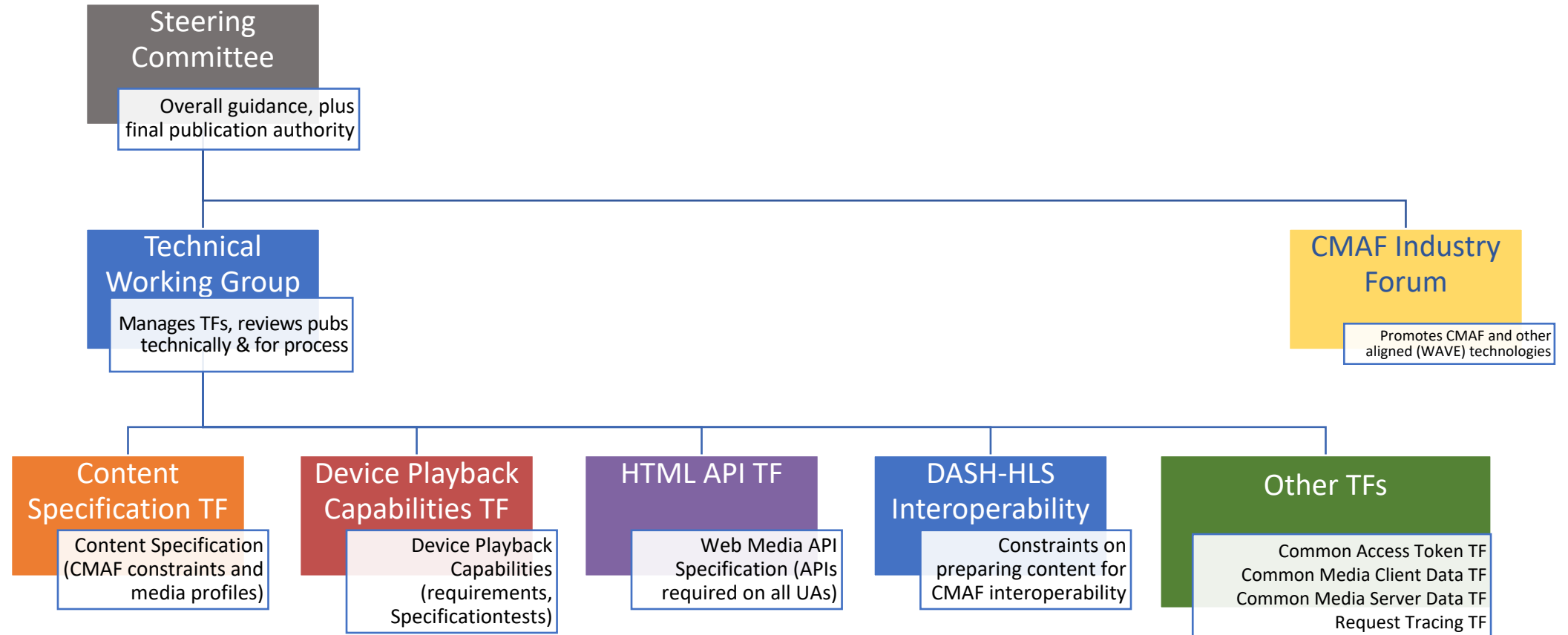
WAVE Device Playback Capabilities Spec

WAVE Content Spec

WAVE Web Media API spec



WAVE Setup and Organizations



Sponsoring

- Sponsored by Consumer Technology Association (CTA)
 - Trade association, ~1800 member companies
 - Owner/producer of the annual CES trade show
 - ANSI-accredited SDO (~90 groups, ~400 active participants)

License

Category	License	Used For
Code	3-Clause BSD	Default for code
	MIT	Code based on W3C Web Platform Tests
	Apache 2.0	Code involving 3rd-party patents
Media	Creative Commons Attribution 3.0	Test streams derived from <ul style="list-style-type: none"> • <i>Big Buck Bunny</i>, or • <i>Tears of Steel</i>
	Creative Commons Attribution 4.0	Test streams derived from <ul style="list-style-type: none"> • <i>Croatia</i>, or • WAVE-original content

Numbers & Stats

Akamai

Amazon.com

Apple

AT&T

ATEME

BBC Research &
Development

BitRouter

BrightCove

Broadpeak.tv

Cable Television Labs

castLabs

Charter Communications

Cisco Systems

Comcast Cable

Cox Communications

DataZoom

Disney Streaming Services

Dolby Laboratories

Ericsson

Eurofins Digital Testing

Eyevinn

Facebook

Fox Corporation

Fraunhofer

Google

Harmonic

Hulu

IneoQuest

Intel Corporation

Total registered companies

61

Total registered participants

163

Total working groups

11

WG and TF meeting cadence

Biweekly

Total published standards

6 (+3 in process)

Interdigital

John Simmons Consulting

LG Electronics

Martin Freeman Consulting

Microsoft Corporation

MPAA

Motion Picture Laboratories

Mux

Nagravision

NBC Universal

Netflix

NHK Science & Tech Research

P Thomsen Consulting

Philips

Qualcomm Incorporated

Samsung Electronics

Sony Electronics

Streaming Video Alliance

TBT

Toshiba

TP Vision

Unified Streaming

Verizon

Viacom

Vizio

Warner Media

WJR Consulting

W3C

Xperi

Status of the Project (WAVE Publications)

- Primary audience
- Secondary audience

App Devs	Content Prep	Origin & CDN	Device & UA	Title of Output (Doc # for next rev)	Date of Current Publication	Planned Update Publication
	●		○	Content Specification 2021 (CTA-5001-D*)	2021	(See Annex plan)
	●			DASH/HLS Interop Specification v2 (CTA-5005-A)	2021	tbd
●			●	Web Media API Snapshot 2022 (CTA-5000-E)	2021	2022Q4 (tent.)
●				Web Media Application Developer Guidelines (CTA-5002-A)	2018	tbd
●			●	"WMAS Test Subset for HbbTV & ASTC"	In process	tbd
	●		●	"Video Switching Sets for Device Reach" (5001-D annex)	In process	tbd
			●	Device Playback Specification 2022 (CTA-5003-A)	2018	2022Q2
		●		Common Access Token Specification (doc # tbd)	In process	2022Q2
●		○		Common Media Client Data Specification (CTA-5004-A)	In process	tbd
●		●		Common Media Server Data Specification (doc # tbd)	2020	2022Q2
		●		Media Request Tracing Specification (doc # tbd)	In process	tbd

* The Content Spec –D rev is current. The update may be an Annex only, see "Video Switching Sets" item.

Roadmap: WAVE Open Source Test Suites

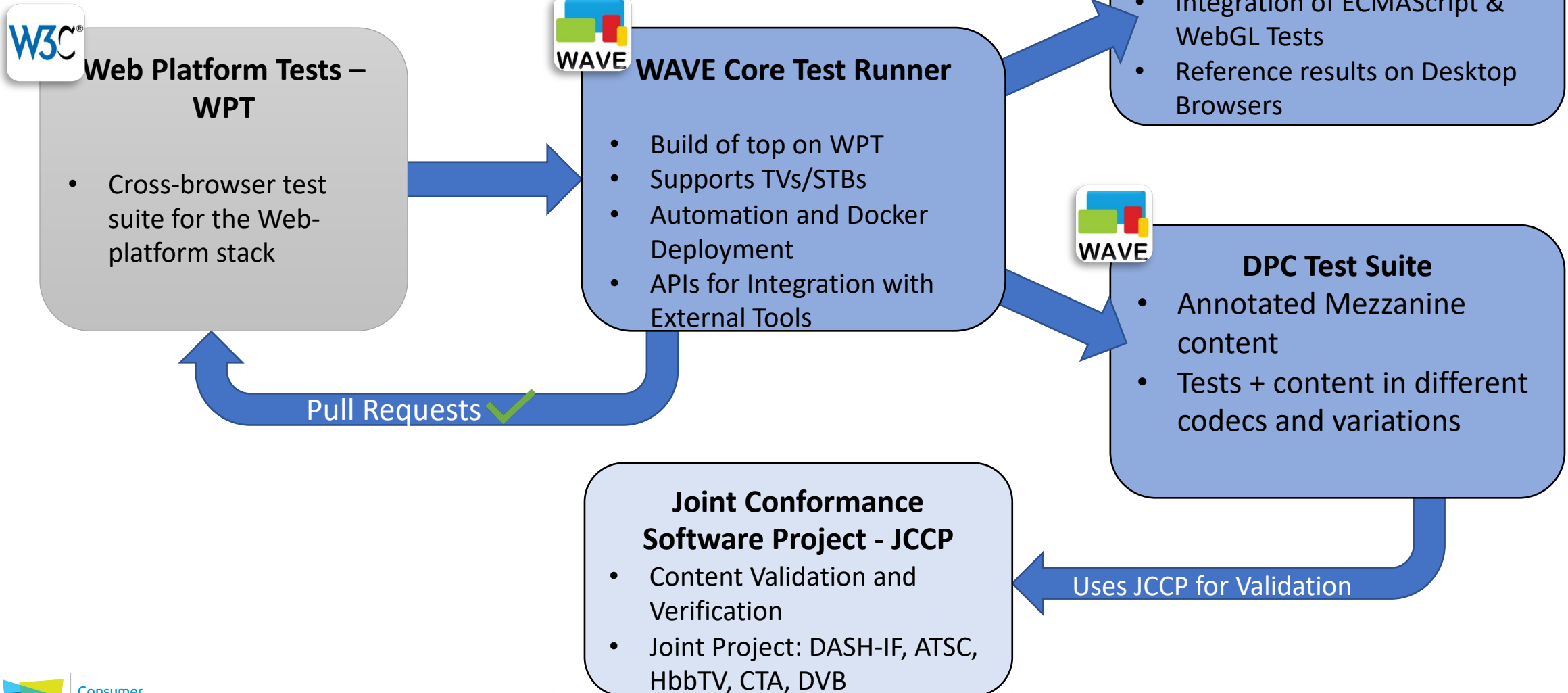
Specification	Conformance Test Suite or Status	Expected date of availability
Content Specification	JCCP	Q1 2023
Web Media API Snapshot	5000-C (2020) available now; 5000-D (2021) is at RFP	-C: Now -D: Q4 2022 (tent.)
Device Playback Specification	5003-A finalizing now	Q4 2022 (tent.)
DASH/HLS Interop Specification	Planning an extension to JCCP	Late 2023
Common Media Server Data Specification	No plan at this time	
Common Access Token Specification	No plan at this time	
Common Media Client Data Specification	No plan at this time	
Request Tracing Specification	No plan at this time	

WAVE Test Suites

- Vision:
 - WAVE promotes **commercial OTT interoperability** by creating **interoperability specifications** and **FOSS test suites** that leverage **industry “core” specifications**.
- The Tools:
 - DPC: Specification + conformance tests for **device playback capability**
 - WMAS: Specification + conformance tests for **minimum UA API support**
 - Content: Specification + conformance tests for **CMAF-prepared content that meets constraints**:
 - for overall interoperability, and
 - for DASH-HLS interoperability (if desired)
 - Based on ‘core’ specifications...

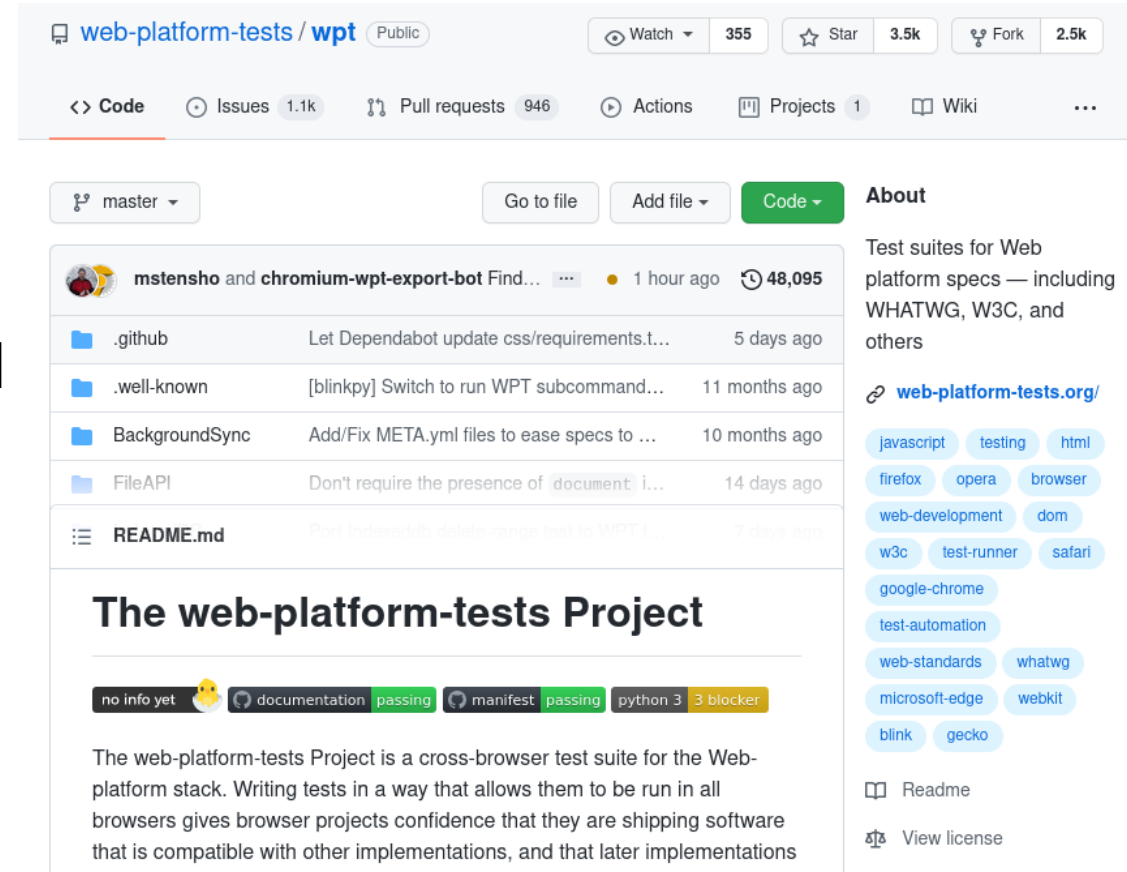
CMAF**HTML5/MSE/EME****DASH****HLS****CENC**

WAVE Test Suites



Web Platform Tests - WPT

- Cross-browser test suite for the Web-platform stack [\[GitHub\]](#)
- Built for desktop
 - accessible via mouse and keyboard
 - multi window
 - hosted locally, persisting results locally
 - hard to run on embedded devices



The screenshot shows the GitHub repository for `web-platform-tests / wpt`. The repository is public and has 355 watchers, 3.5k stars, and 2.5k forks. It includes tabs for Code, Issues (1.1k), Pull requests (946), Actions, Projects (1), and Wiki. The main content area shows a commit by `mstensho` and `chromium-wpt-export-bot` from 1 hour ago, with 48,095 commits in total. Below the commit list, there is a section titled "The web-platform-tests Project" which includes a status bar showing "no info yet", "documentation: passing", "manifest: passing", "python 3: 3 blocker", and a description of the project as a cross-browser test suite for the Web-platform stack.

web-platform-tests / wpt Public

Watch 355 Star 3.5k Fork 2.5k

<> Code Issues 1.1k Pull requests 946 Actions Projects 1 Wiki ...

master

Go to file Add file Code

About

Test suites for Web platform specs — including WHATWG, W3C, and others

[web-platform-tests.org/](#)

javascript testing html

firefox opera browser

web-development dom

w3c test-runner safari

google-chrome

test-automation

web-standards whatwg

microsoft-edge webkit

blink gecko

Readme

View license

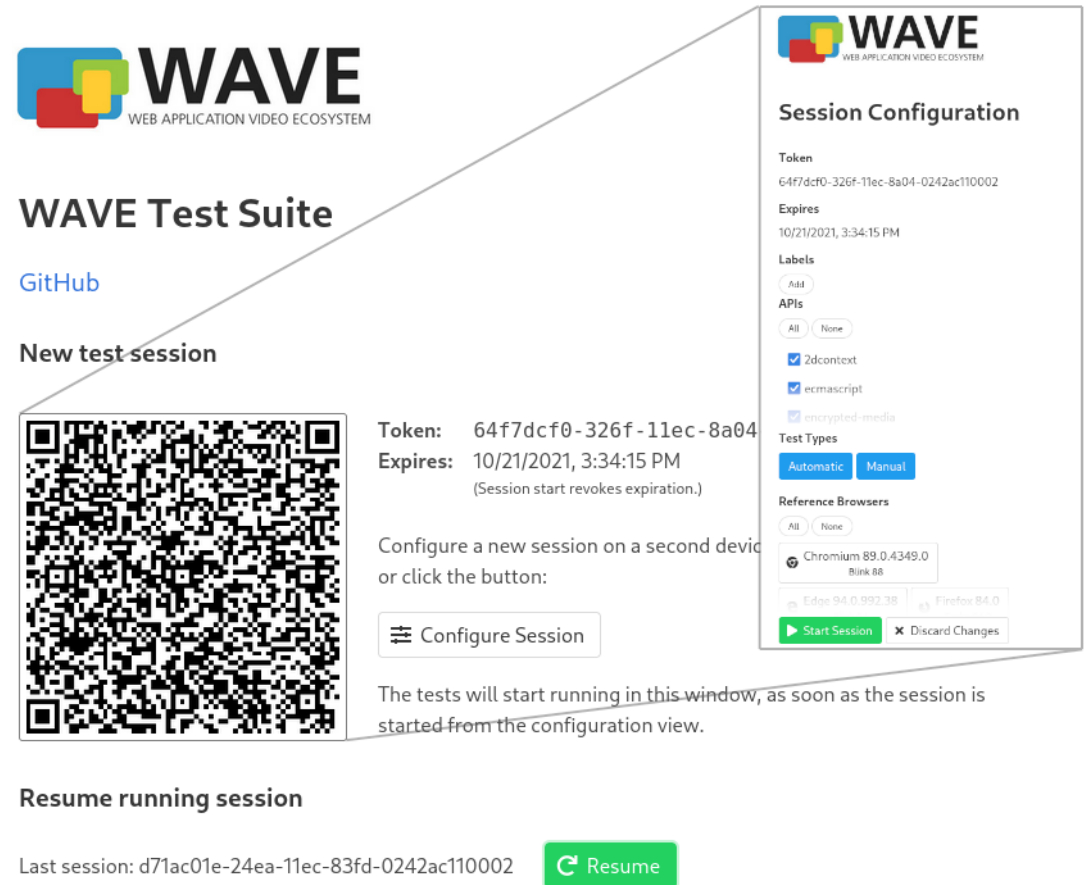
The web-platform-tests Project

no info yet documentation: passing manifest: passing python 3: 3 blocker

The web-platform-tests Project is a cross-browser test suite for the Web-platform stack. Writing tests in a way that allows them to be run in all browsers gives browser projects confidence that they are shipping software that is compatible with other implementations, and that later implementations

WAVE Core Test Runner

- Built on top of WPT to make test runner accessible on embedded devices (TVs/STBs)
 - remote server manages test sessions and results
 - custom wrapper executes tests in single window
 - configure session using companion device by scanning QR code
 - REST API for full automation and integration into other systems and workflows




WAVE
WEB APPLICATION VIDEO ECOSYSTEM

WAVE Test Suite

[GitHub](#)

New test session



Token: 64f7dcf0-326f-11ec-8a04-0242ac110002
Expires: 10/21/2021, 3:34:15 PM
(Session start revokes expiration.)

Configure a new session on a second device or click the button:

[Configure Session](#)

The tests will start running in this window, as soon as the session is started from the configuration view.

Resume running session

Last session: d71ac01e-24ea-11ec-83fd-0242ac110002 [Resume](#)

WAVE
WEB APPLICATION VIDEO ECOSYSTEM

Session Configuration

Token
64f7dcf0-326f-11ec-8a04-0242ac110002

Expires
10/21/2021, 3:34:15 PM

Labels
[Add](#)

APIs
[All](#) [None](#)

☒ 2dcontext
☒ ecmaascript
☒ encrypted-media

Test Types
[Automatic](#) [Manual](#)

Reference Browsers
[All](#) [None](#)

Chromium 89.0.4349.0
Blink 88

Edge 94.0.992.38 Firefox 84.0

[Start Session](#) [Discard Changes](#)

WAVE Core Test Runner

- Share test results
 - HTML reports
 - JSON reports
 - Export/Import results between multiple instances
- Use completed sessions as reference for new sessions
 - e.g. run tests on TV that pass on Desktop Browser code bases



Result

[← Results Overview](#)
⏸ Pause ■ Stop 🗑 Delete

Session details

Token da39b02a-2503-11ec-ad8a-6c88140d17f8
User Agent Mozilla/5.0 (X11; Linux x86_64; rv:84.0) Gecko/20100101 Firefox/84.0
Test Paths /2dcontext, /beacon, /content-security-policy, /css, /dom, /ecmascript, /encrypted-media, /fetch, /FileAPI, /fullscreen, /hr-time, /html, /IndexedDB, /manifest, /media-source, /navigation-timing, /notifications, /page-visibility, /performance-timeline, /referrer-policy, /resource-timing, /service-workers, /subresource-integrity, /uievents, /upgrade-insecure-requests, /user-timing, /webaudio, /WebCryptoAPI, /webgl, /webmessaging, /websockets, /webstorage, /workers, /xhr
Excluded Test Paths 0 [show](#)
Total Test Files 48872
Status running
Date Started 10/4/2021, 1:11:48 PM
Date Finished 10/13/2021, 5:31:04 PM
Duration 220:19:16

API Results

API	Pass	Fail	Timeout	Not Run	Test Files Run	Export
2dcontext	774 (87.95%)	106 (12.04%)	0 (0%)	0 (0%)	880/880 (100%)	json report
beacon	18 (85.71%)	1 (4.76%)	1 (4.76%)	1 (4.76%)	10/10 (100%)	json report
content-security-policy	2353 (62.93%)	1199 (32.06%)	139 (3.71%)	48 (1.28%)	764/764 (100%)	json report
css	26972 (67.5%)	12743 (31.89%)	86 (0.21%)	154 (0.38%)	2117/2117 (100%)	json report

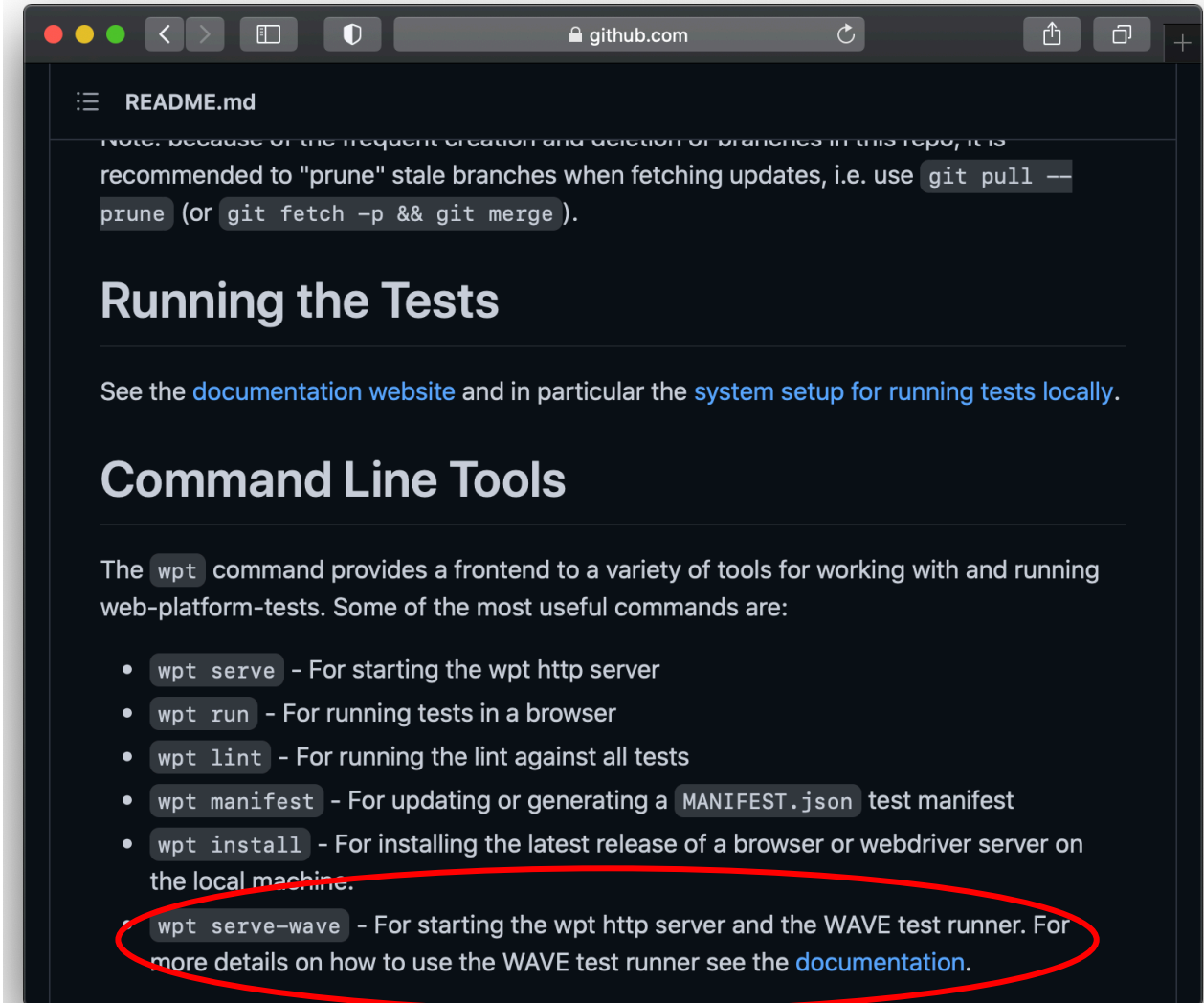
Export

Results Download results for import into other WMAS Test Suite instances.
All JSON Files Download JSON files containing results of completed test files.
Session result HTML Download this sessions result as standalone HTML page, similar to this page.

[Download Zip](#)
[Download Zip](#)
[Download HTML](#)

Contribution to WPT

- The WAVE WPT Extension is already contributed and merged in the WPT project.
- New Features and bug fixes are also contributed back to the WPT project



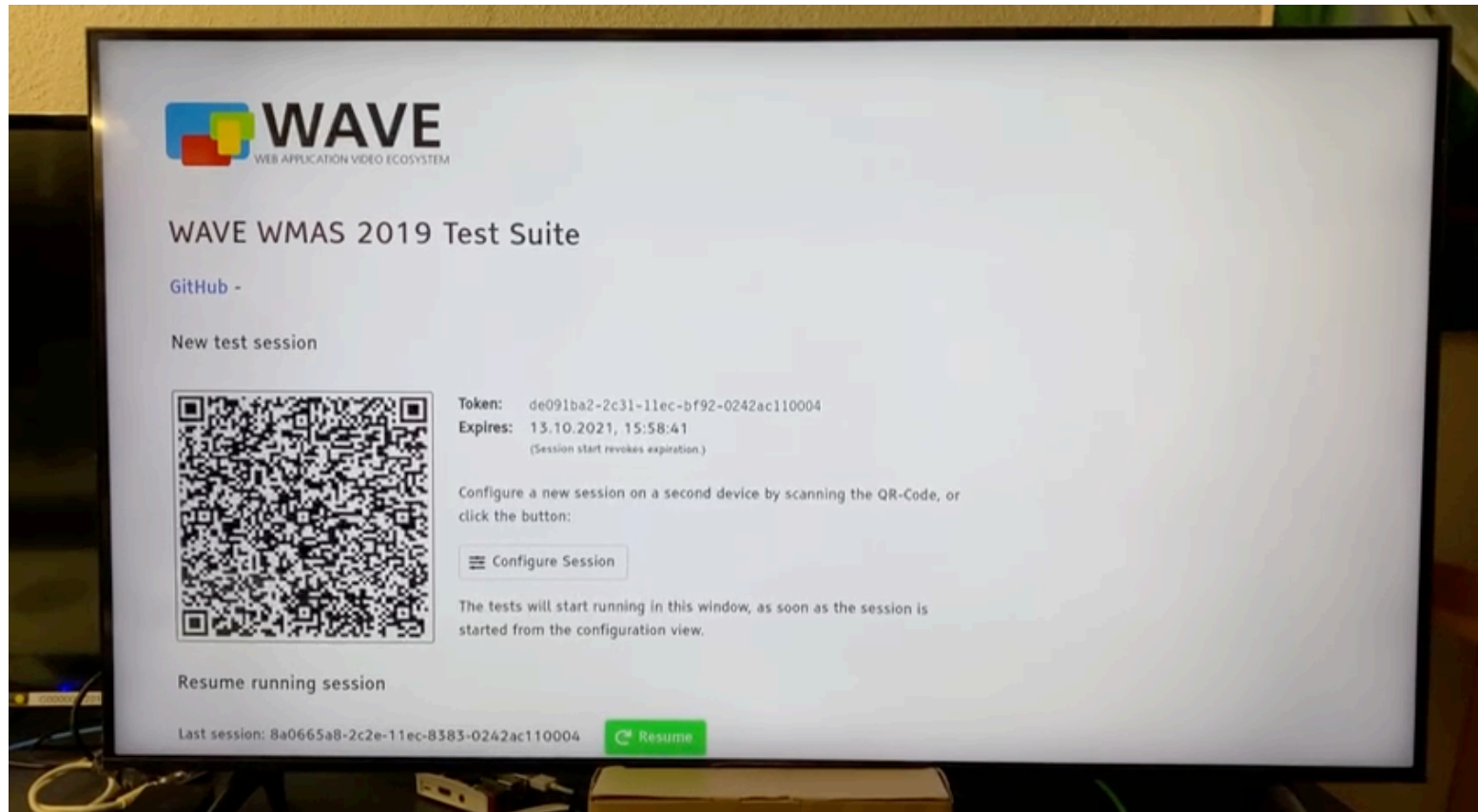
WMAS API Test Suite

- Built on top of WAVE Core Test Runner
- Defines subsets of WPT Tests according to WMAS specifications
- Integrates external test suites and convert tests to WPT compatible format: ECMAScript, WebGL
- Provides reference test results for major desktop browsers (Chrome/Chromium, Edge, Safari/WebKit, Firefox)
- Provides Docker configurations for easy deployment
- Validation on embedded devices (TV/STB, HbbTV)
- GitHub: [WMAS Test Runner](#), [Docker Deployment](#)

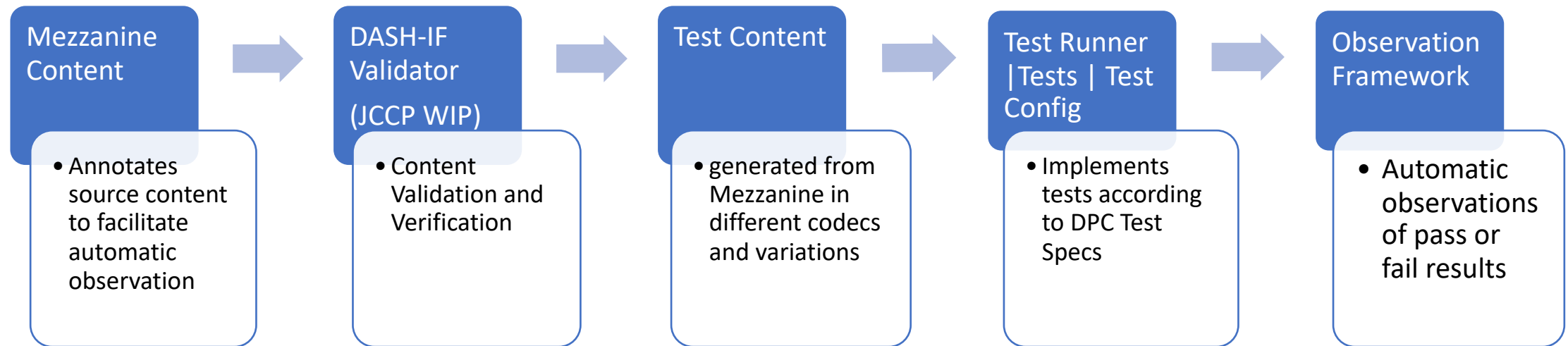
Hosted WMAS API Test Suites

- WMAS2017:
 - Spec: <https://www.w3.org/2017/12/webmediaapi.html>
 - Test Runner: <https://webapitests2017.ctawave.org/>
- WMAS2018:
 - Spec: <https://www.w3.org/2018/12/webmediaapi.html>
 - Test Runner: <https://webapitests2018.ctawave.org/wave/>
- WMAS2019:
 - Spec: <https://www.w3.org/2019/12/webmediaapi.html>
 - Test Runner: <https://webapitests2019.ctawave.org/wave/>
- WMAS2020:
 - Spec: <https://www.w3.org/2020/12/webmediaapi.html>
 - Test Runner: <https://webapitests2020.ctawave.org/wave/>

WMAS API Test Suite on HbbTV - Demo



DPC Test Suite – Building Blocks



DPC Test Suite

- Custom tests to test playback of different media under various circumstances
- Implements tests according to DPC Test Specification
- Offers tools to generate tests for different variations of Test Implementation and Test Content
- Offers docker configuration for easier deployment
- GitHub: [DPC Test Suite](#)



DPC Test Suite - Demo

