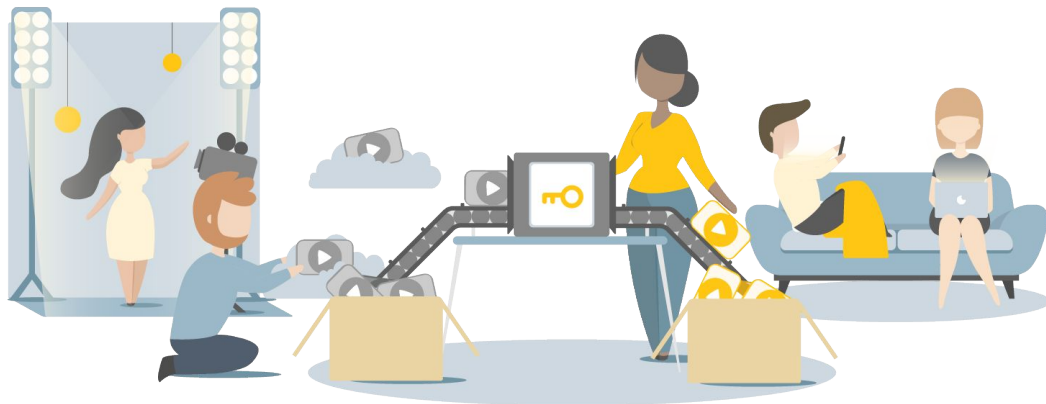# Supporting Tizen 2.4

Not for the faint-hearted.

Pieter-Jan Speelmans - Co-founder & CTO

Michel Roofthooft - VP Engineering

THEO

Pieter-Jan Speelmans
Chief Technical Officer, Co-Founder
THEO Technologies

Pieter-Jan is the Co-Founder and the head of the technical team at THEO. He is the brain behind THEOplayer, HESP and EMSS.

With a mission to 'Change the way the world streams video over the Internet', he is innovating the way video is delivered online from playback all the way to ultra-low latency streaming. Pieter-Jan is committed to enable media companies to easily offer exceptional video experience across any device.
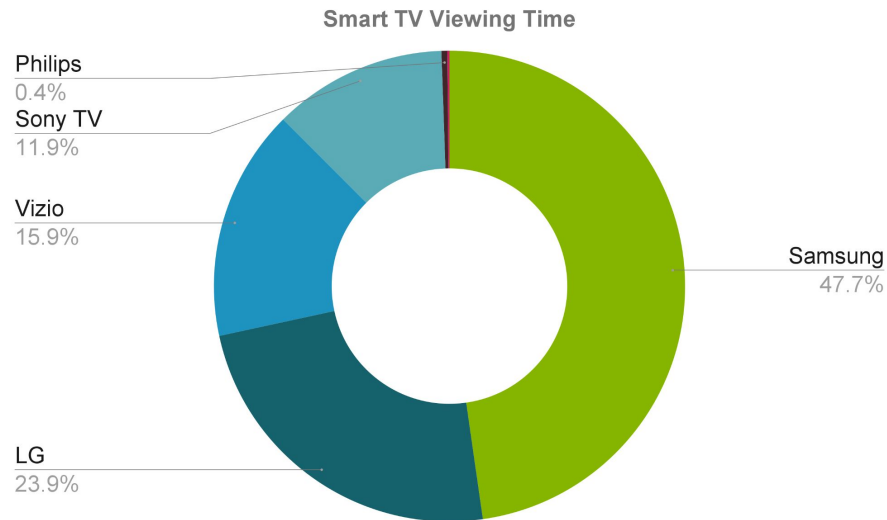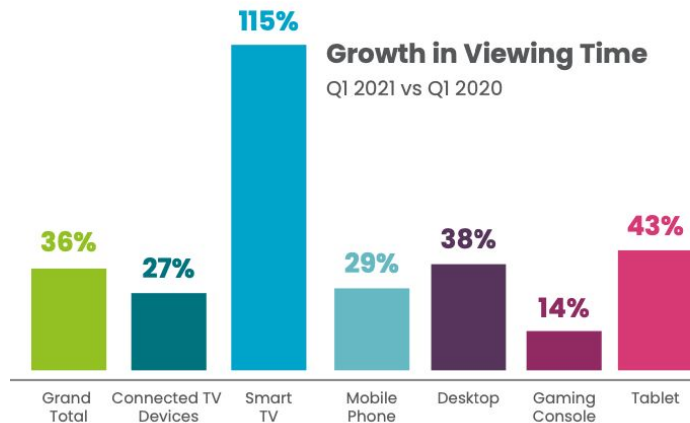
Michel Roofthooft
VP of Engineering
THEO Technologies

Michel is the VP Engineering at THEO, leading our development teams. He's helping the teams focus to continuously push the boundaries of our product development building great and quality products. With over 15yrs of experience working in high profile, high pressure and business critical environments he's continuously challenging the status quo and looking for ways to make online video better than broadcast.

TIZEN: more than ever **the** go-to platform

Growth in Viewing Time
Q1 2021 vs Q1 2020

- Grand Total: 36%
- Connected TV Devices: 27%
- Smart TV: 115%
- Mobile Phone: 29%
- Desktop: 38%
- Gaming Console: 14%
- Tablet: 43%

Smart TV Viewing Time

- Philips: 0.4%
- Sony TV: 11.9%
- Vizio: 15.9%
- LG: 23.9%
- Samsung: 47.7%

HOW can I bring my application to TIZEN ?

What are the different TIZEN versions ?

Year	Version	MSE/EME	Lifecycle	Views
2015	Tizen 2.3	✓	2023	11%
2016	**Tizen 2.4**	✓	**2024**	**11%**
2017	Tizen 3.0	✓	2025	16%
2018	Tizen 4.0	✓	2026	17%
2019	Tizen 5.0	✓	2027	21%
2020	Tizen 5.5	✓	2028	24%

https://developer.samsung.com/smarttv/develop/specifications/tv-model-groups.html

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What version is commonly supported by the majority of streaming services?

	Version
prime	2015
NETFLIX	2015
Disney+	2016
hulu	2016
peacock	2017
YouTube	2015
tv+	2018

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TIZEN 2.4 Not for the faint-hearted ...

2013   2016   2024

Engineered   Sold   8yrs Average lifetime
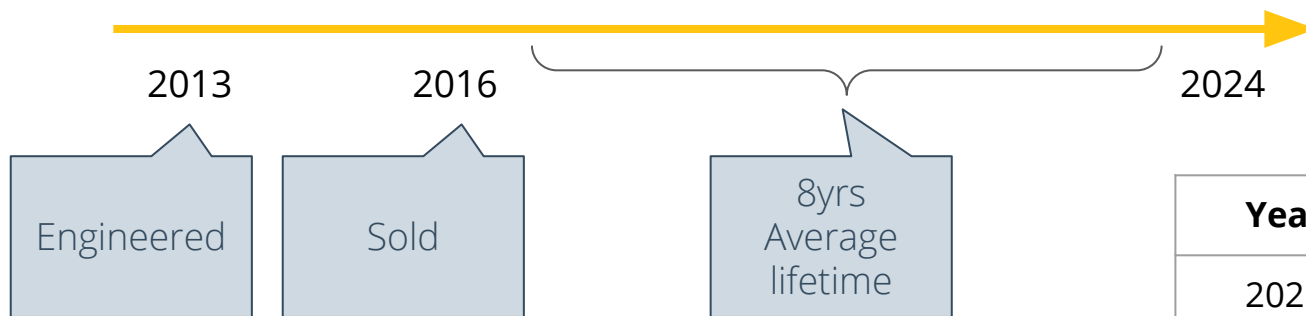
Year	Engine	Version
2020	Chromium	M69
2019	Chromium	M63
2018	Chromium	M56
2017	Chromium	M47
2016	WebKit	r152340

https://developer.samsung.com/smarttv/develop/specifications/web-engine-specifications.html

Using AVPlay: simple

```
<script type= "text/javascript" src="$WEBAPIS/webapis/webapis.js"></script>
...
var objElem = document.createElement('object');
objElem.type = 'application/avplayer';
document.body.appendChild(objElem);
webapis.avplay.open('https://content.domain.com/channel1.m3u8');
webapis.avplay.prepare();
webapis.avplay.play();
```

https://www.theoplayer.com/blog/how-to-use-samsung-tizens-avplay

Using AVPlay: but limited

Tizen 2.3
2015

DRM:
 - PlayReady 2.5 with SL2000 (software - CENC/CTR only)
 - Widevine Classic only (no Modular)
HLS:
 - No support for session keys
 - No byte-range request support
 - All limitations of more recent versions
MPEG-DASH
 - All limitations of more recent versions

Tizen 2.4
2016

DRM:
 - PlayReady 2.5 with SL2000 (software - CENC/CTR only)
 - Widevine Modular 2.08
HLS (Limited version 7 support):
 - No support for discontinuity sequence (improper handling of SSAI)
 - No support for alternative audio tracks
 - No support for in-band subtitles (WebVTT)
 - No support for in-band captions (CEA-608)
 - All limitations of more recent versions
MPEG-DASH:
 - Not following DASH interop on HEVC usage
 - No support for alternative audio tracks
 - No support for in-band subtitles
 - No support for trick modes
 - No support for in-band captions (CEA-608)
 - All limitations of more recent versions

Tizen 3
2017

DRM:
 - PlayReady 2.5 with SL2000 (software - CENC/CTR only)
 - Widevine Modular 2.08
HLS (Limited version 7 support):
 - All limitations of more recent versions
MPEG-DASH:
 - No support for key rotation
 - All limitations of more recent versions

Tizen 4
2018

DRM:
 - PlayReady 3.3 with SL3000 (hardware - CENC/CTR only)
 - Widevine Modular 3.2
HLS (Limited version 7 support):
 - All limitations of more recent versions
MPEG-DASH:
 - All limitations of more recent versions

Tizen 5
2019

DRM:
 - PlayReady 3.3 with SL3000 (hardware - CENC/CTR only)
 - Widevine Modular 14.1
HLS (limited version 7 support):
 - All limitations of more recent versions
MPEG-DASH:
 - All limitations of more recent versions

Tizen 5.5
2020

DRM:
 - PlayReady 4.2 with SL3000 (hardware - including CBCS support)
 - Widevine Modular 15.2
HLS (limited version 7 support):
 - No low latency support
 - No support for CMAF or HEVC
 - No metadata support (daterange, program datetime, ...)
 - No support for initializations through MAP
 - No support for start offsets
 - No support for IMSC1 subtitles
 - No support for alternative video tracks
 - No support for parts, delta playlists, gapmarking, preload hints, ...
MPEG-DASH:
 - No low latency support
 - No SSAO: multi-period support is not stable
 - Mixed results for enabling/disabling DRM and rotating keys
 - No metadata support (eventstream, emsg, ...)
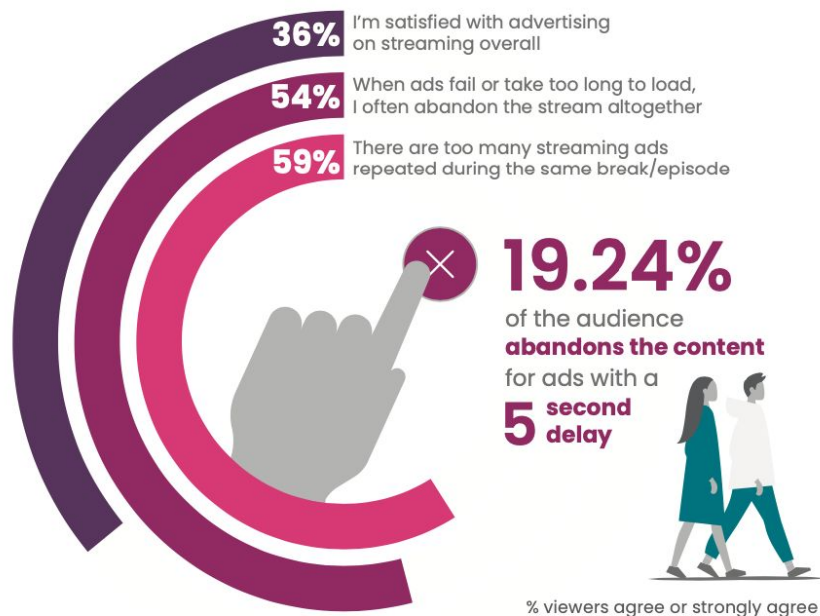 - No support for alternative video tracks

https://www.theoplayer.com/blog/exhaustive-list-of-samsung-tizens-avplay-limitations

Bring-Your-Own player

Model	Engine	MSE	EME	Quirks
2015 Models Tizen 2.3	Webkit r152340	Dec 2013 (Draft)	Aug 2012 (Draft 0.1b)	Hard to implement DRM ("Promise-bug" in EME) DRM toggling limitations (SSAI) Codec switching limitations (SSA) Only seeking to keyframes
2016 Models Tizen 2.4	Webkit r152340			
2017 Models Tizen 3.0	Chromium M47 (Dec 2015)	Nov 2015 (Draft)	Feb 2016 (Draft)	DRM toggling limitations (SSAI) Codec switching limitations (SSAI) Only seeking to keyframes allowed
2018 Models Tizen 4.0	Chromium M56 (Jan 2017)	July 2016 (Draft)	July 2016 (Draft)	Codec switching limitations (SSAI)
2019 Models Tizen 5.0	Chromium M63 (Sept 2017)	Nov 2016 (Rec.)	Sep 2017 (Rec.)	Mostly OK
2020 Models Tizen 5.5	Chromium M69 (sept 2018)			

https://www.theoplayer.com/blog/key-considerations-when-reaching-samsung-tizen
https://www.theoplayer.com/blog/how-to-use-your-own-player-on-samsung-tizen

Monetization; 67% of the providers make use of advertisement

36% I'm satisfied with advertising on streaming overall

54% When ads fail or take too long to load, I often abandon the stream altogether

59% There are too many streaming ads repeated during the same break/episode

19.24% of the audience **abandons the content** for ads with a **5 second delay**

% viewers agree or strongly agree

Conviva's State of Streaming Advertising 2021

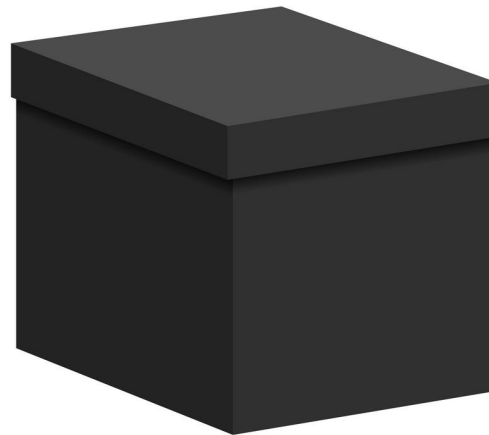# THEO's challenges faced to support TIZEN 2.4

! MSE/EME From the old days

No support out there

✓ Industry experts

Build from the ground up

Build SSAI and CSAI

Removing the lid of the black box …

Parameterized feeds

Protocol →

Encoding →

DRM →

← Test automation

← Tizen & Player Versions

← Debugging

Experts looking at haystack
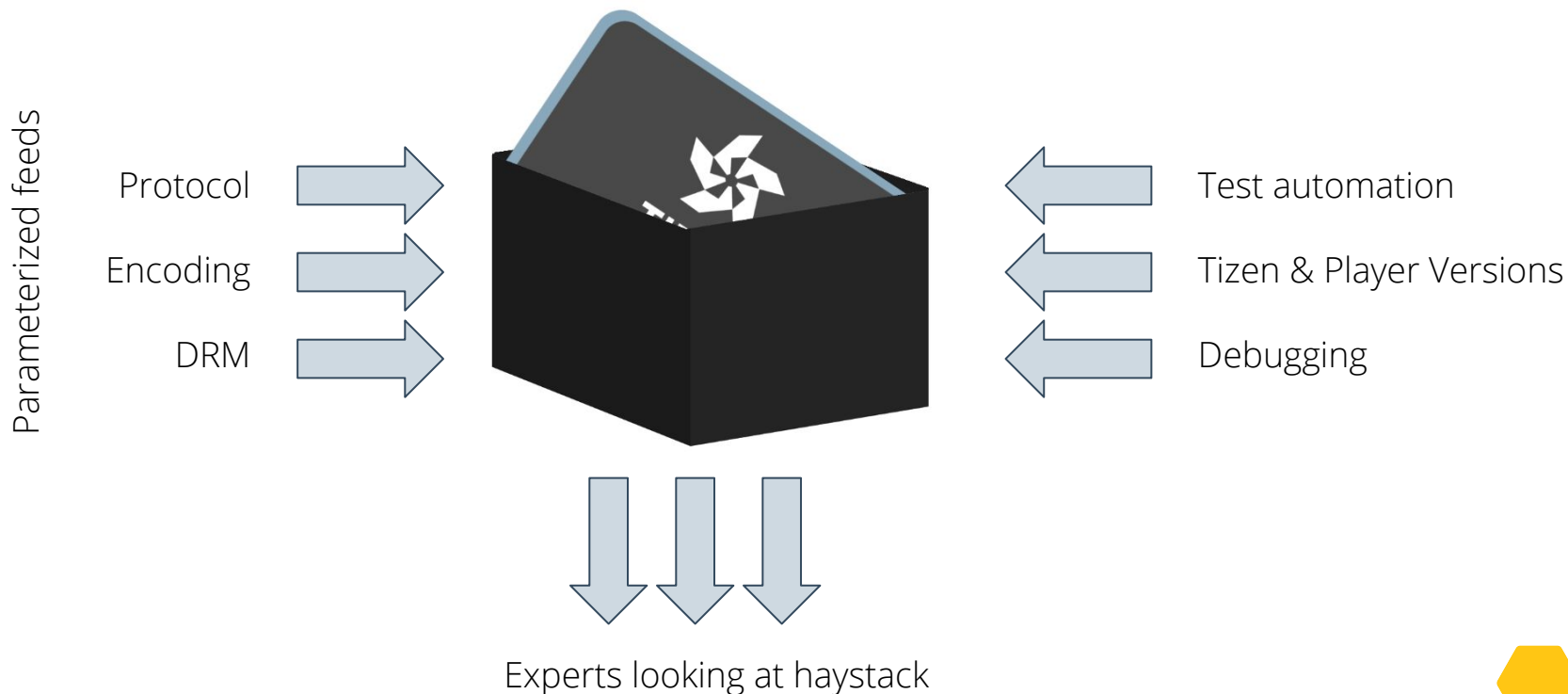
Countless hours of testing later ...

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Tizen 2.4

	Basic playback	DRM	CSAI	SSAI
AVPlay	✔	✔	✖	✖
dash.js	✔	✖	✖	✖
Shakaplayer	✔	✖	✖	✖
THEOplayer	✔	✔	✔	✔

Tizen 3

	Basic playback	DRM	CSAI	SSAI
AVPlay	✔	✔	✖	✖
dash.js	✔	✔	✖	✖
Shakaplayer	✔	✔	✖	✖
THEOplayer	✔	✔	✔	✔

Tizen 4

	Basic playback	DRM	CSAI	SSAI
AVPlay	✔	✔	✖	✖
dash.js	✔	✔	✖	✔
Shakaplayer	✔	✔	✖	✔
THEOplayer	✔	✔	✔	✔

Tizen 5

	Basic playback	DRM	CSAI	SSAI
AVPlay	✔	✔	✖	✖
dash.js	✔	✔	✖	✔
Shakaplayer	✔	✔	✖	✔
THEOplayer	✔	✔	✔	✔

Let's get in touch!

Contact THEO to have a more detailed conversation about your particular Use Case.

www.theoplayer.com/contact

THANK YOU!

WWW.THEOPLAYER.COM

CONTACT@THEOPLAYER.COM

Usage of Tizen versions Importance of leveraging Tizen

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- *Build up relevance of Tizen 2016*
    - *Big services support (Netflix, Hulu)*
    - *Supported by Samsung (2016+)*
    - *Sales + average lifespan*
    - *Real usage: X, Y, Z*
    - *Market % of Tizen (Conviva State Of Streaming report)*
    - *It's 4K HDR*

[MiRo] Multi-platform streaming strategy is critical

- Brands planning for growth: 75% growth mostly by new platforms (state of OTT revenue)
- Growth hack: apps on Samsung and LG (49% of the market)

- Smart tv: doubles in viewing time (State of streaming Q3 2020)
- Sales market share since 2017 for samsync: 33%
- Viewing time on Samsung: 49%

- Tizen more than ever the go-to platform

- *But old technology*
  - *Sold in 2016*
  - *Built in 2015*
  - *Software made in 2015*
  - *Spec updates since?*
  - *Try finding anyone at Samsung still supporting this*
  - *What were you doing in 2015? Probably a big difference*

https://developer.samsung.com/smarttv/develop/specifications/web-engine-specifications.html

https://developer.samsung.com/smarttv/develop/specifications/tv-model-groups.html

Playback support

Identifying the native player, AVPlay.

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- Do playback with AVPlay
    - Developed in 2015 (good luck)
    - SSAI was not a requirement
    - ...
- Or with MSE/EME
    - Early days MSE/EME
- Loads of bugs/issues & no software updates
- Differences between models
- Google IMA does not support Tizen officially
- Same goes for Google DAI
- Shakaplayer: unofficial support for Tizen
- DASH.js/hls.js don't mention it at all
- Support is one thing, now try to do it full featured (with subs, DRM, alternative audio, SSAI, CSAI, ...)

[MiRO] What are the options?

- What does a modern OTT service need for playback:
    - Adaptive streaming (MPEG-Dash for example)
    - Content-protection (DRM): Playready or Widevine
    - Multiple audio tracks and text-tracks
- 67% Of the OTT providers make use of advertisement (AVOD or combo)
    - Client-side (CSAI), for example google IMA
    - Server-side (SSAI) through multi-period DASH under-the-hood
- And of course we need insights in our viewers; analytics

- The options?
    - AVPlay: the player from Samsung
    - MSE/EME

THEO's approach

How we tackle the known Use Cases.

It lead us to confidently state: we did it!

	Basic playback	DRM	CSAI	SSAI
AVPlay	✔	✔	✖	✖
dash.js	✔	✖	✖	✖
Shakaplayer	✔	✖	✖	✖
THEOplayer	✔	✔	✔	✔

Support comparison for Tizen 2.4