glTF Update and Roadmap

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Tony Parisi
glTF Specification Co-Editor

tparisi@gmail.com @auradeluxe

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Background and Motivation

- **OpenGL ES and WebGL have led to a proliferation of 3D, but no standard way to deliver data into applications**
  - Efficient transmission
  - Full scene information
  - Vendor- and runtime-neutral

OBJ – too simple – COLLADA – too bulky – FBX – vendor-specific

- **As a result, content and app creators were developing a new pipeline for each project**
  - Huge inefficiencies
  - Limited opportunities for sharing data among applications

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The “JPEG of 3D”

Compact to Transmit

Fast to Load

Runtime Neutral

Extensible

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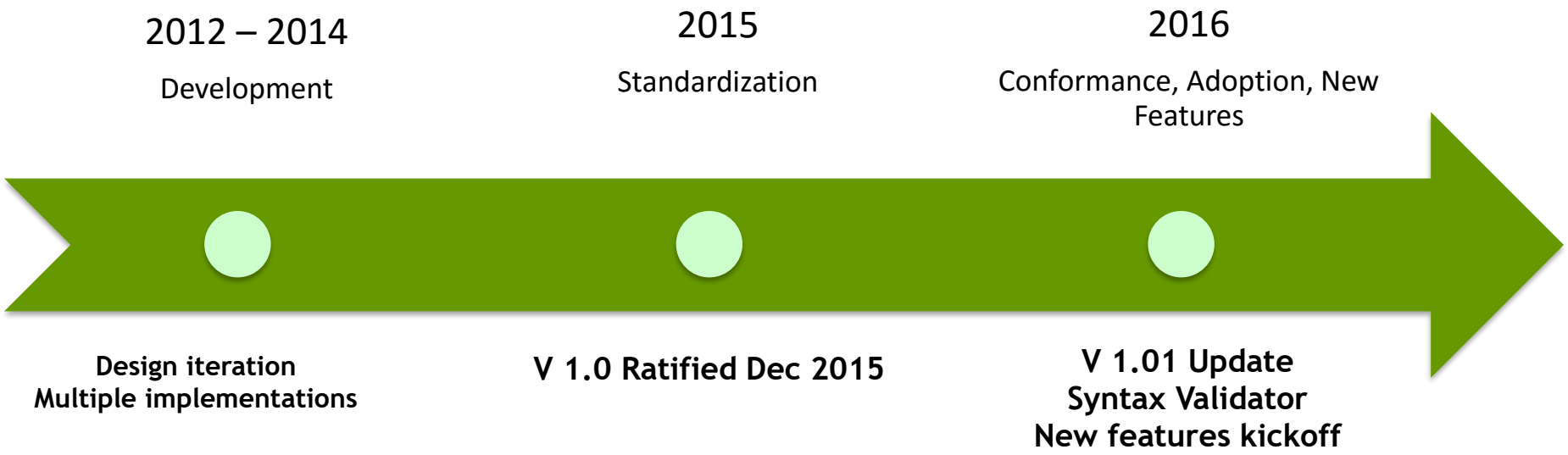
Timeline



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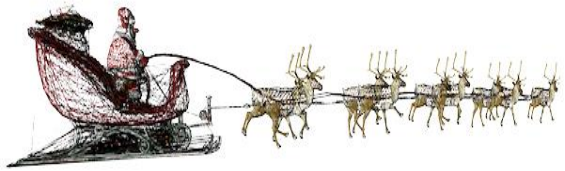
glTF Structure



glTF™ Describes full scenes- not just meshes

.gltf

JSON describes node hierarchy, materials, cameras

.bin

Geometry: vertices and indices
Animation: key-frames
Skins: inverse-bind matrices

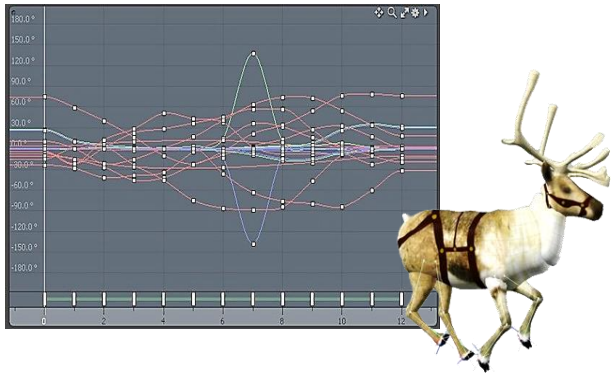
.glsl

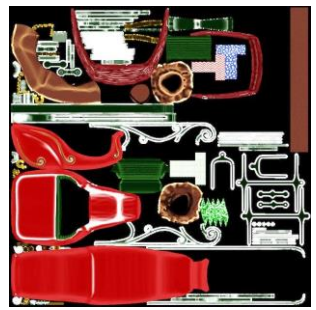
Shaders

.png
.jpg
...

Textures

NORAD's Santa Tracker





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Extensions

- **Syntax and name registry for extending the base specification**
  - KHR_binary_glTF – binary container format, single payload – ratified
  - KHR_materials_common – common fixed function materials and lights e.g.
  - Vendor extensions e.g. CESIUM_RTC, WEB3D_quantized_attributes
- **Keeps the base spec small while allow for experimentation and domain-specific use cases**
- **Popular extension can potentially be promoted to the base spec**

File declares extensions used up front

```
"extensionsUsed" : [
  "KHR_binary_glTF"
]
```

“extensions” property contains the data

```
"a_shader" : {
  "extensions" : {
    "binary_glTF" : {
      "bufferView" : // ...
    }
  }
}
```

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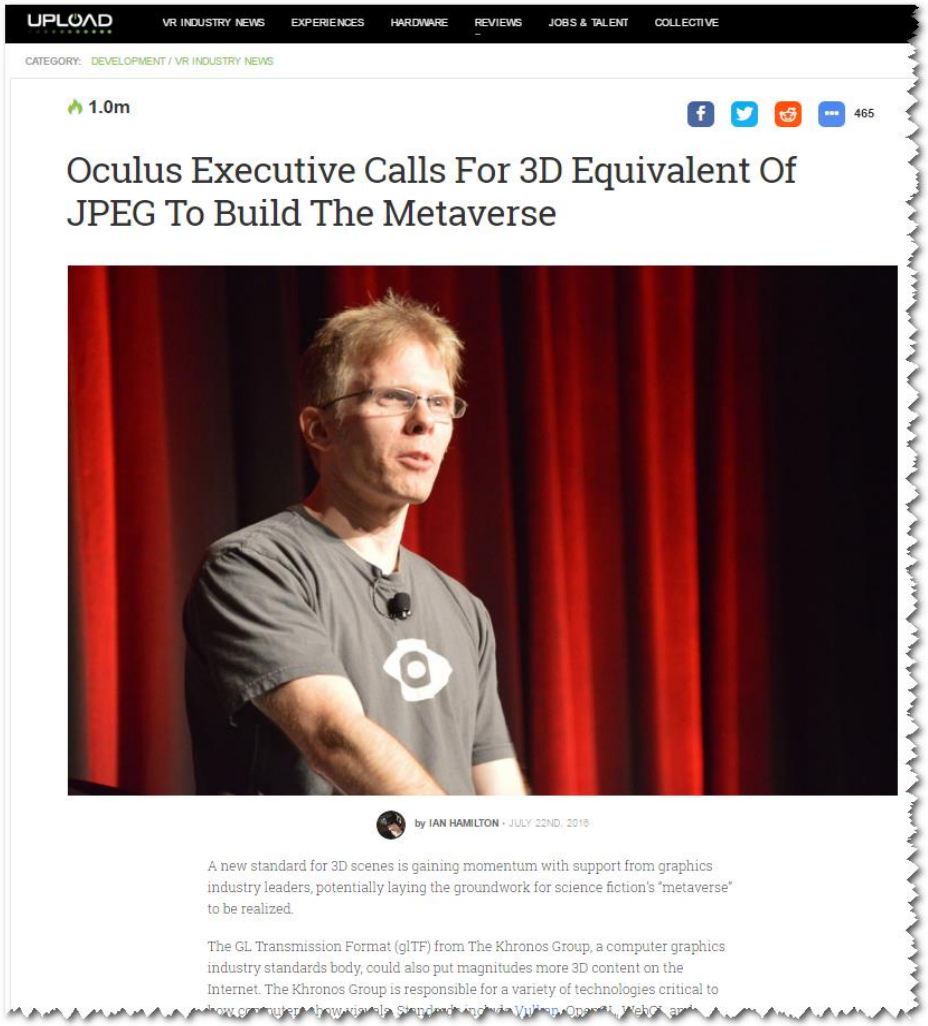
Adoption



UPLOAD VR INDUSTRY NEWS EXPERIENCES HARDWARE REVIEWS JOBS & TALENT COLLECTIVE

CATEGORY: DEVELOPMENT / VR INDUSTRY NEWS

1.0m 465

Oculus Executive Calls For 3D Equivalent Of JPEG To Build The Metaverse

by IAN HAMILTON • JULY 22ND, 2016

A new standard for 3D scenes is gaining momentum with support from graphics industry leaders, potentially laying the groundwork for science fiction's "metaverse" to be realized.

The GL Transmission Format (glTF) from The Khronos Group, a computer graphics industry standards body, could also put magnitudes more 3D content on the Internet. The Khronos Group is responsible for a variety of technologies critical to

glTF™

Oculus VR™ web 3D CONSORTIUM

MPEG Adobe blender™

OGC box

Microsoft Fraunhofer

AREA Augmented Reality for Enterprise Alliance otoy NVIDIA

CESIUM

AUTODESK Google

Publicly Stated Support for glTF

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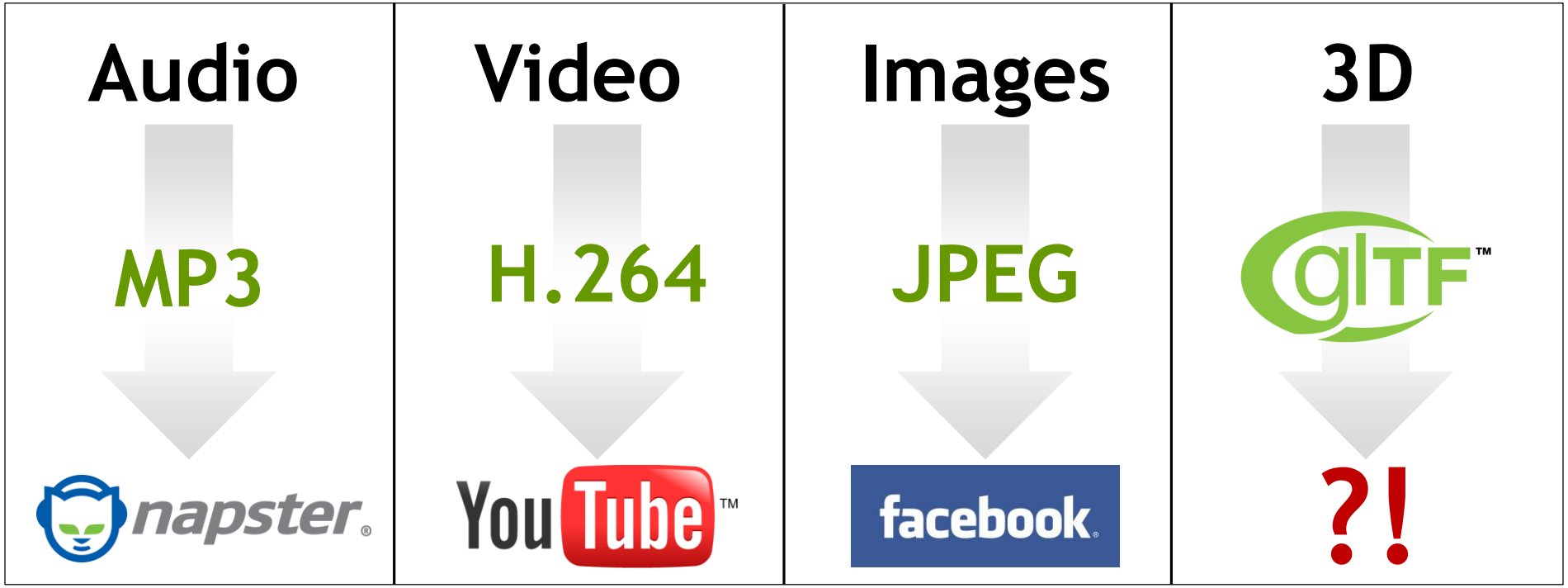
With New Formats Come New Opportunities!



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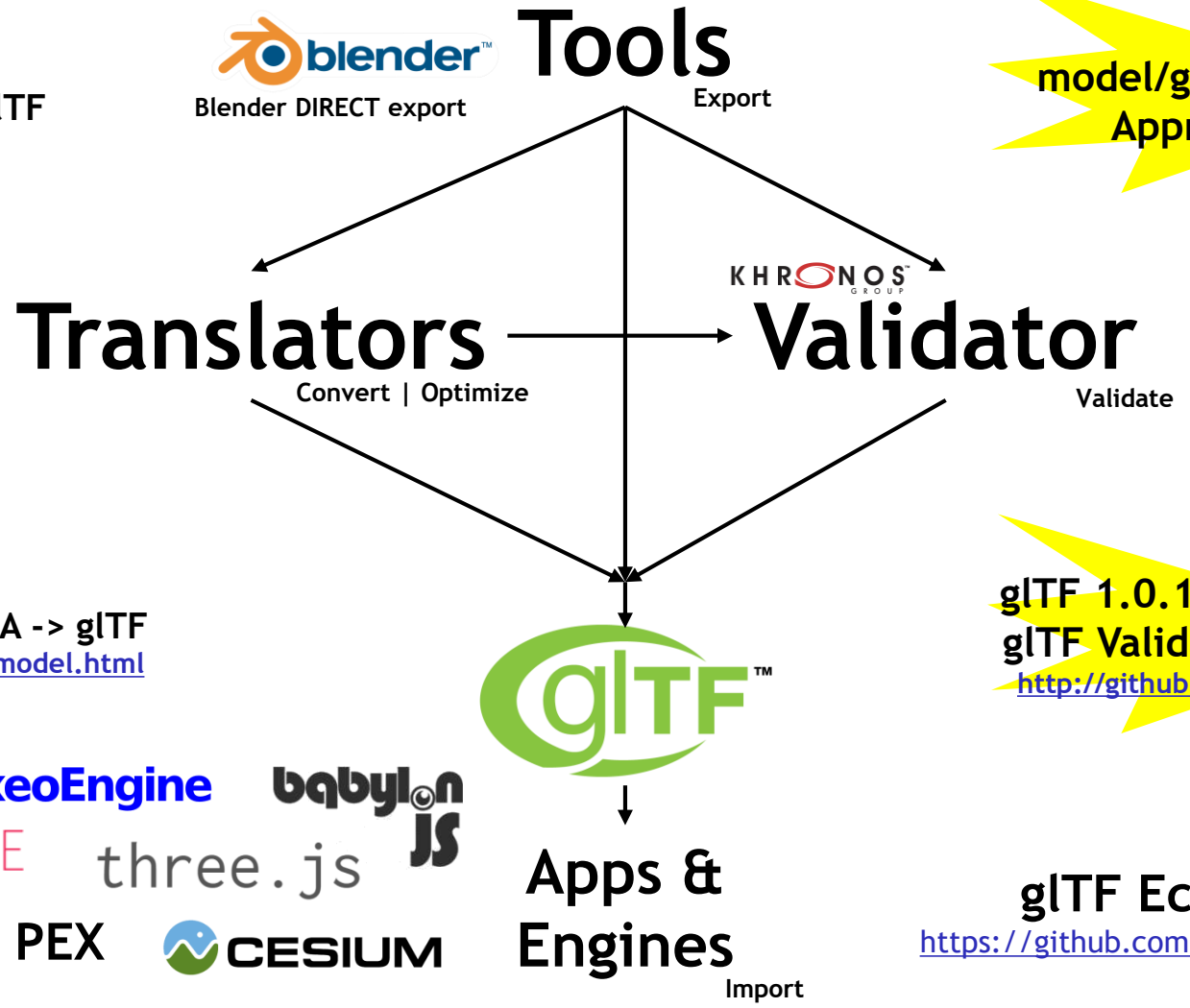
glTF Ecosystem News!



Drag and Drop FBX -> glTF
(coming soon)
http://gltf.autodesk.io/

AUTODESK
Autodesk FBX -> glTF
AssImp
OBJ2GLTF
glTF Pipeline
COLLADA2GLTF
Cesium converter

COLLADA
Drag and drop COLLADA -> glTF
http://cesiumjs.org/convertmodel.html

model/gltf+json MIME type Approved by IANA!

glTF 1.0.1 Spec in Review and glTF Validator in open source!
http://github.khronos.org/glTF-Validator/

xeoEngine
babylon.js
A-FRAME
three.js
NVIDIA nvpro-pipeline
PEX
CESIUM

glTF Ecosystem Page
https://github.com/KhronosGroup/glTF#gltf-tools

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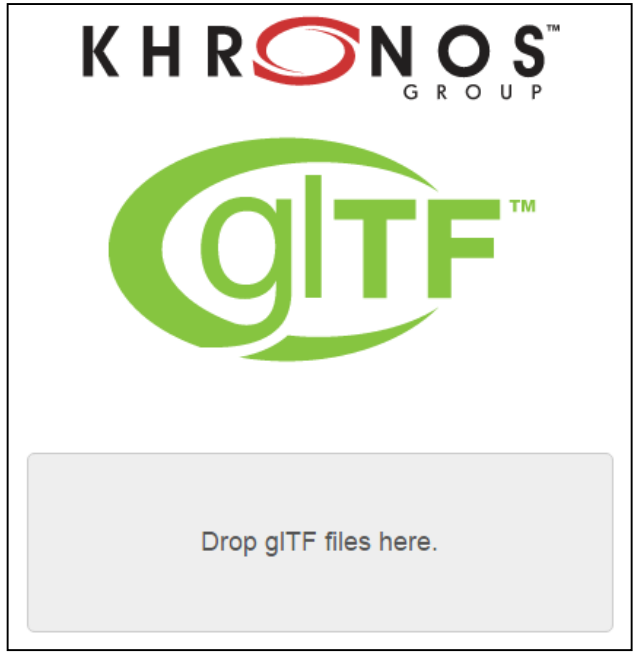
glTF 1.0.1 Validator

- **glTF 1.0.1 tightens specification**
  - For robust validation and interoperability
    https://github.com/KhronosGroup/glTF/issues/605
- **Validator in open source on GitHub**
  - Khronos Validator project RFQ awarded to Alexey Knyazev – doing awesome work!
  - Rigorous checking for correctly formed glTF files
  - Checks JSON syntax, all property details, GL parameter combinations etc. etc.
  - Built using Dart (easy API level integration)
  - Shipping today as client-side drag-n-drop and command-line wrapper
  - Client-side JavaScript library coming soon
  - Extensible – validation plugins for extensions – output can be integrated into the validation report

Please give us feedback on GitHub!

http://github.khronos.org/glTF-Validator/



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Roadmap Discussion Topics

Physically Based Rendering
Modern, compact, scalable
Fraunhofer, NVIDIA MDL

Streaming and Mesh Compression
MPEG 3DGC (royalty-free), Fraunhofer SRC

Enhanced API Support
Make efficient use of
WebGL 2.0 and Vulkan

Enhanced Animation
Morph Targets

Advanced Surfaces
Pixar's OpenSubdiv?

Increased Efficiency
Improved parsing, arrays, bounding boxes, spatial constructs

Must avoid the complexity trap!
Core glTF must remain efficient and straightforward to use
Extensions for domain specific functionality

Come to the glTF Community on GitHub

https://github.com/KhronosGroup/glTF

Or join Khronos to get directly involved!

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T-Shirts!

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