glTF Briefing
September 2016

Background and Motivation

- **OpenGL ES and WebGL have led to a proliferation of Web 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 developing new pipelines per project**
  - Huge inefficiencies
  - Limited opportunities for sharing data among applications
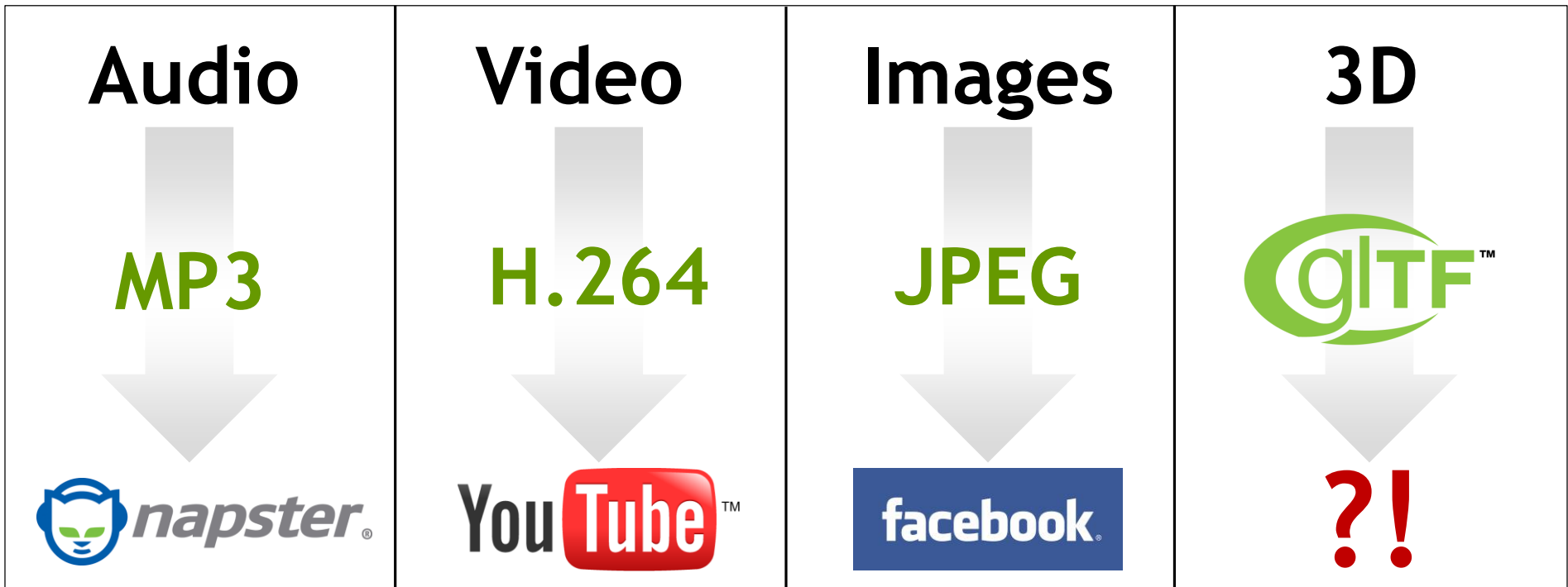
glTF™

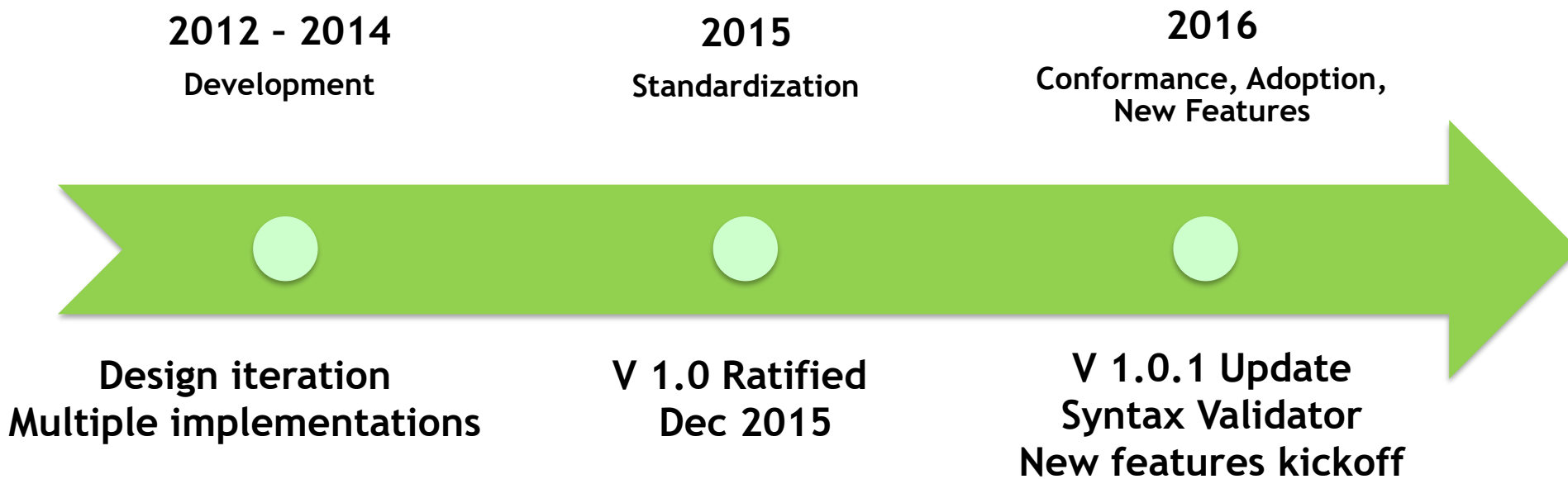**Compact to Transmit** ✓

Fast to Load ✓

Runtime Neutral ✓

Extensible ✓

glTF - The "JPEG of 3D"

Audio	Video	Images	3D
MP3	H.264	JPEG	glTF
napster	YouTube	facebook	?!

Timeline

2012 – 2014

Development

2015

Standardization

2016

Conformance, Adoption, New Features

Design iteration
Multiple implementations

V 1.0 Ratified
Dec 2015

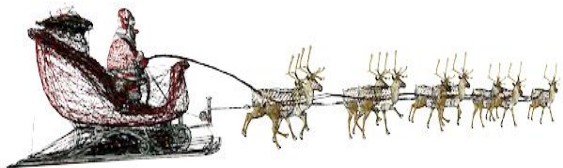**V 1.0.1 Update**
Syntax Validator
New features kickoff

glTF Structure

Describes full scenes- not just meshes

.gltf
JSON describes node hierarchy, materials, cameras

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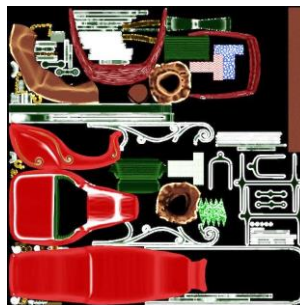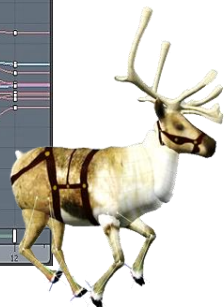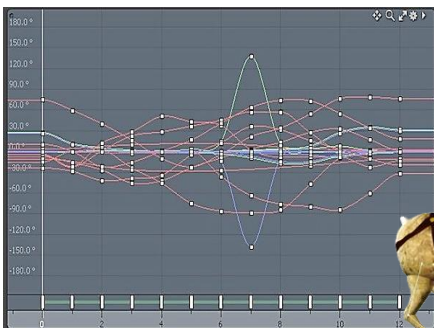Skins: inverse-bind matrices

.glsl
Shaders

.png
.jpg
...
Textures

NORAD's Santa Tracker

glTF 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" : // ...
        }
    }
}
```

Adoption

glTF™

Oculus VR™   web|3D CONSORTIUM

MPEG   Adobe   blender™

OGC   box

Microsoft   otoy   Fraunhofer

AREA Augmented Reality for Enterprise Alliance   CESIUM   NVIDIA

AUTODESK   Google™

Publicly Stated Support for glTF

glTF Ecosystem

Tools

Blender DIRECT export

Export

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

Translators

Convert | Optimize

KHRONOS

Validator

Validate

**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/

glTF

**Apps &
Engines**

Import

xeoEngine

babylon.js

A-FRAME

three.js

NVIDIA.
nvpro-pipeline

PEX

CESIUM

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

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
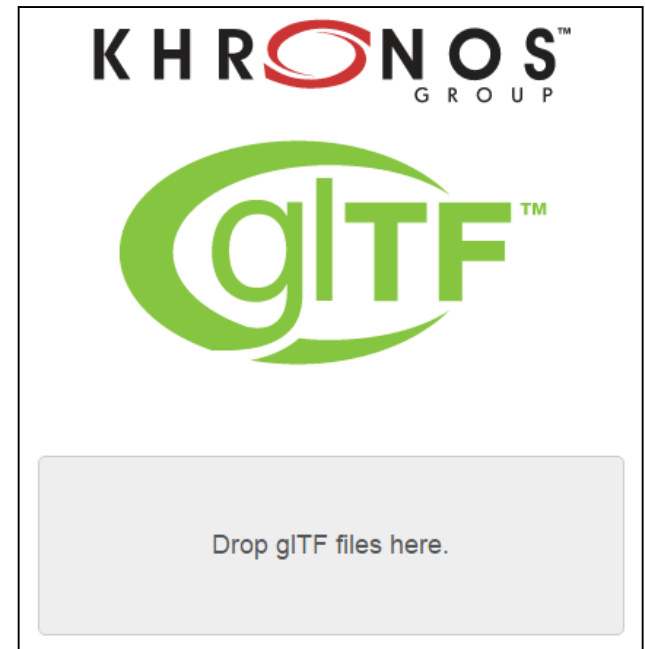
Please give us feedback on GitHub!

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

K H R O N O S
GROUP

glTF™

Drop glTF files here.

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 & Vulkan

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

Advanced Surfaces
Pixar's OpenSubdiv?

Enhanced Metadata
For mixing advanced experiences

Enhanced Animation
Morph Targets

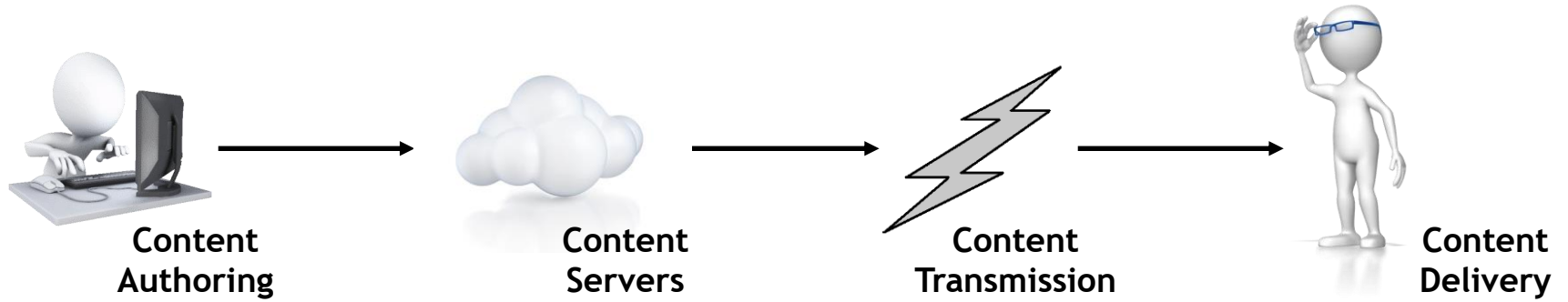**Must avoid the complexity trap!**
Core glTF must remain efficient and straightforward to use
'Feature Sets' for domain specific functionality

glTF Community on GitHub
https://github.com/KhronosGroup/glTF
Or join Khronos to get directly involved!

Khronos AR/VR Standards

	Content Authoring	Content Servers	Content Transmission	Content Delivery
WITHOUT Standards	Tools import/export custom 3D formats and so do not interoperate	Every service/app stores 3D assets in a custom format -> Silo'd content	Long download times and proprietary code to unpack received 3D assets	Apps have to be ported to each device and often don't use acceleration
WITH Standards	Mix and match tool pipelines through common 3D asset import/export	3D assets are easily understood and used by any application and device	3D assets packed into efficient formats with streaming and compression	APIs provide consistent access to graphics, compute and vision acceleration
Khronos standards useful for AR	COLLADA. Many other authoring formats	glTF COLLADA.	glTF	WebGL Vulkan OpenVX OpenCL OpenGL ES. OpenGL.

AR/VR Will Need Many, Many Standards Khronos standards can help..