



MPEG-I & Khronos Joint Technical Workshop

September 29, 2021

Updates on glTF 2.0 in The Khronos Group

Brent Scannell
3D Formats Working Group Chair

Photo by Markus Winkler on Unsplash

Quick Intro to 3D Formats



Quick Intro to 3D Formats



3D Authoring Tools



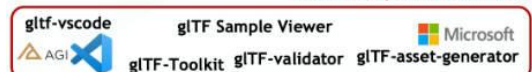
VR / AR Authoring Tools



3D Scanning Tools



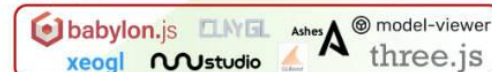
Converters, Optimizers and Loaders



Validation and Reference Tools



Game Engines



Web Engines



Apps and Engines



VR / AR Apps and Engines



Productivity and Social Apps

Quick Intro to 3D Formats



Member Companies and Sponsored Individuals

Task Sub-Groups (TSGs)

3D Formats Working Group

Chair: Brent Scannell (Autodesk)
Vice Chair: Alexey Medvedev (Facebook)
Outreach Officer: Adam Morris (Target)
Specification Editor: (Alexey Knyazev)

Physically Based Rendering

Chair: Ed Mackey (Analytical Graphics, Inc)

glTF Tooling

Chair: Leonard Daly (Daly Realism)

Adopters

Assist in building conformant implementation and products

Conferences and Press Events

Strengthen the ecosystem with presence and thought leadership

Industry and Ecosystem Advisors

Maintain connections and guarantee relevancy of specifications

Developers

Encourage application development using the specifications and APIs.
Develop and maintain samples

Standards Bodies

Create liaison opportunities and cooperation models

Quick Intro to 3D Formats



Member Companies and Sponsored Individuals

Task Sub-Groups (TSGs)

3D Formats Working Group

- Primary decision and discussion forum
- Strategy development and roadmapping
- Outreach discussions and feedback review

Physically Based Rendering

- Rendering and materials center of excellence
- Specification and Extension development

glTF Tooling

- Tools and adoption projects center of excellence
- Ensures ecosystem can stay up to date

Adopters

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glTF Evolution



glTF Roadmap balances new functionality versus being deployable on all platforms

glTF 1.0
Primarily for WebGL
Uses GLSL for materials

2015

glTF 2.0
Native AND Web Apps
Metallic-Roughness and
Specular-Glossiness PBR

2017

**Draco Mesh
Compression**
10-20X
compression ratios

2018

**#1 PBR
Extensions**
Transmission
Clearcoat
Sheen

2020

**Material
Variants**
3D Commerce
use cases

**#2 PBR
Extensions**
Refraction
Specular Color
Color attenuation
Volumetric Properties

**KTX 2.0
Universal
Textures**
Basis Universal
Supercompression

Metadata
KHR_xmp_json_Id
supports XMP Extensible
Metadata Platform
ISO 16684-1

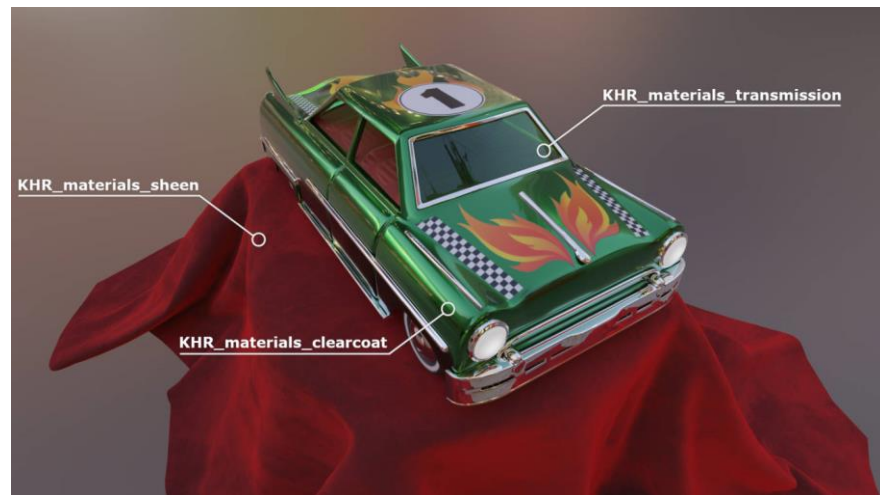
2021

Roadmap Discussions

PBR (Node-based?)
Subsurface Scattering, Anisotropy,
Translucency, Thin Film (iridescence)
Composability
Procedural Textures
Interaction/Constraints
LODs/Streaming
Mesh Variants
Geospatial Metadata
Subdiv Surfaces
XR Dimensions/GeoPose
Enhanced Animation
Point Clouds

The first wave of PBR

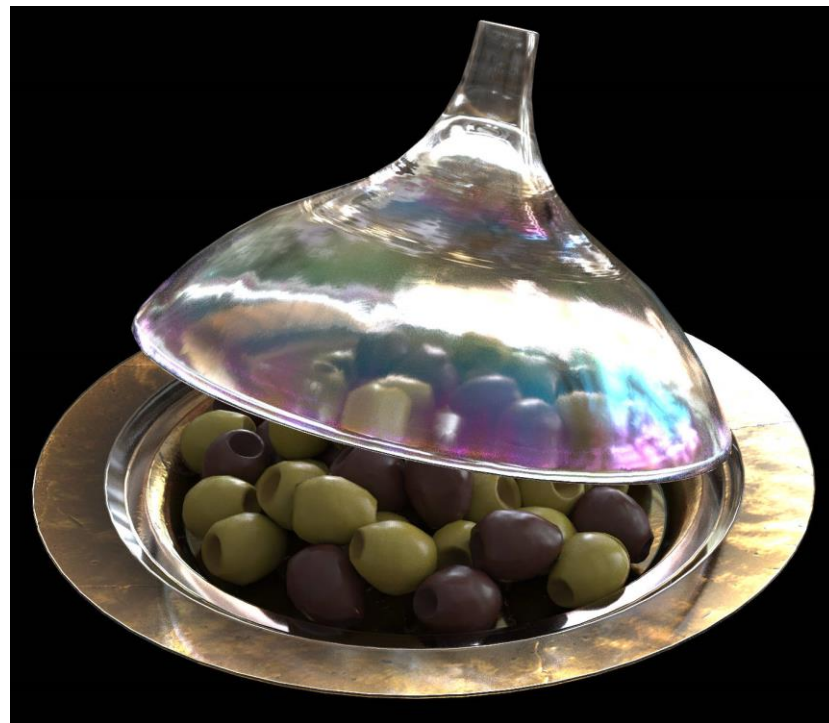
- KHR_materials_clearcoat (December 2020)
 - Adds a layer on top of existing material
- KHR_materials_transmission (December 2020)
 - Enables materials like plastics and glass
 - More accurate than using alpha coverage/opacity
- KHR_materials_sheen (December 2020)
 - Enables materials like cloth and fabric



- <https://www.khronos.org/news/press/khronos-releases-wave-of-new-gltf-pbr-3d-material-capabilities>
- See <https://github.khronos.org/glTF-Sample-Viewer-Release/>

A second wave of PBR

- KHR_materials_ior (July 2021)
 - Adds index of refraction to transparent materials
- KHR_materials_volume (July 2021)
 - Adds depth and attenuation properties
 - Adds thickness for non ray-tracing engines
- KHR_materials_specular (July 2021)
 - Enables colored specular highlights within the metal/roughness material model
- <https://www.khronos.org/news/press/new-gltf-extensions-raise-the-bar-on-3d-asset-visual-realism>
- See <https://github.khronos.org/glTF-Sample-Viewer-Release/>

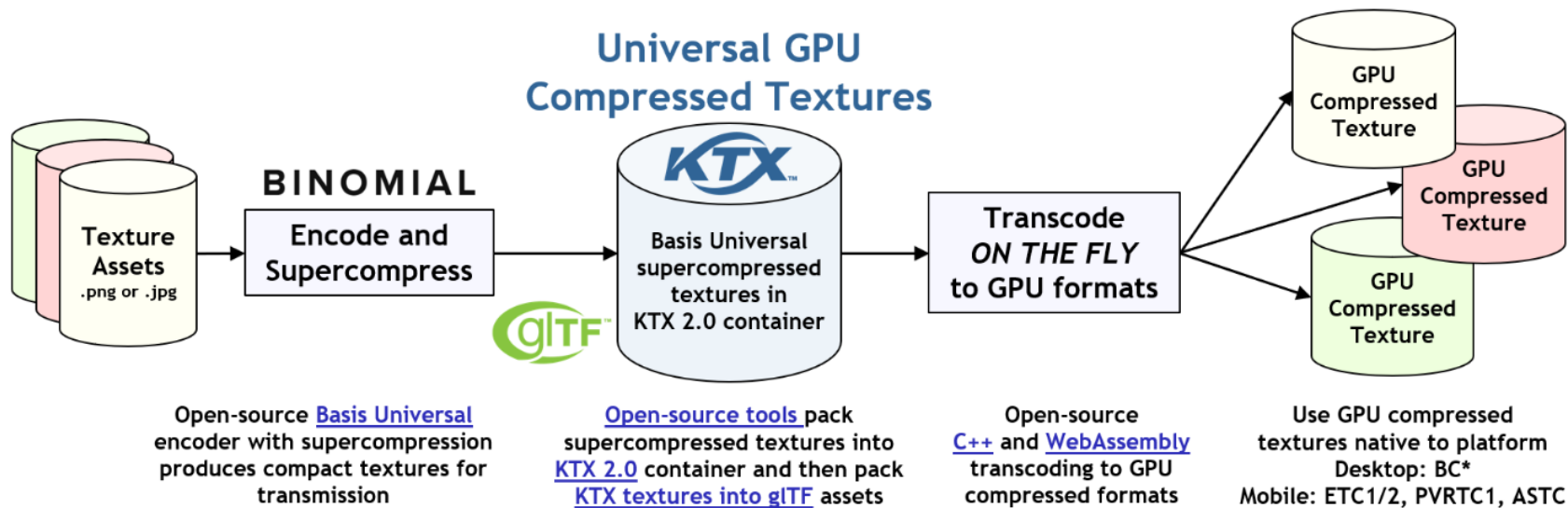


KTX 2.0 Supercompression

- KTX 2.0 image container (April 2021)
 - Adds support for Basis Universal supercompressed GPU textures
 - Basis Universal is developed by Binomial (binomial.info)
- KHR_texture_basisu (April 2021)
 - glTF extension to support KTX2 textures
- <https://www.khronos.org/news/press/khronos-ktx-2-0-textures-enable-compact-visually-rich-gltf-3d-assets>



KTX 2.0 Supercompression



KTX 2.0 Supercompression



Collaboration with 3D Commerce

- KHR_material_variants (November 2020)
 - To support multiple material variations of an object
- KHR_xmp_json_ld (prov. June 2021)
 - Supporting the metadata needs of retailers and more



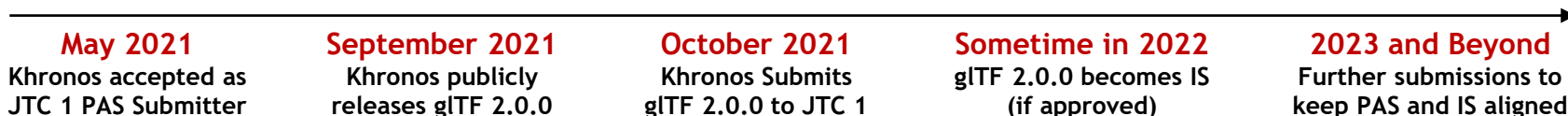
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glTF 2.0 as International Standard (IS)



- ISO/IEC JTC 1 PAS Submission Process for open standards to become IS
 - Approved submitters submit specifications to JTC 1 for approval by national standardization bodies for international recognition
- Fourteen standards organizations approved globally as PAS Submitters
 - Khronos is the most recent addition
- Updated [glTF 2.0.0](#) specification will be Khronos's first PAS Submission
 - No technical changes from glTF 2.0 beyond [bug fixes and clarifications](#)
 - Aligns glTF with IS document quality criteria
- Khronos will maintain both Khronos and International Standard versions of glTF
 - glTF will continue to rapidly evolve, glTF extension process is unchanged
 - Khronos will make new PAS submissions with proven functionality to avoid fragmentation



What's Next

Roadmap Discussions

More PBR (Node-based?)

Subsurface Scattering, Anisotropy, Translucency, Thin Film (iridescence)

Composability

Procedural Textures

Interaction/Constraints

LODs/Streaming

Mesh Variants

Geospatial Metadata

Subdiv Surfaces

XR Dimensions/GeoPose

Enhanced Animation

Point Clouds

Photo by Matt Duncan on Unsplash

What's Next

Key Cooperation Message:

- Khronos and 3D Formats welcome glTF roadmap feedback and requirements
- Khronos has applied for Cat A Liaison with SC29, in process
- Khronos cannot accept detailed design contributions to Khronos specifications from entities outside the Khronos IP Framework*
- Khronos welcomes discussion and coordination over vendor extensions, including whether some extensions with broad approval should be developed as Khronos extensions

Photo by Matt Duncan on Unsplash

What's Next

glTF Extension Feedback

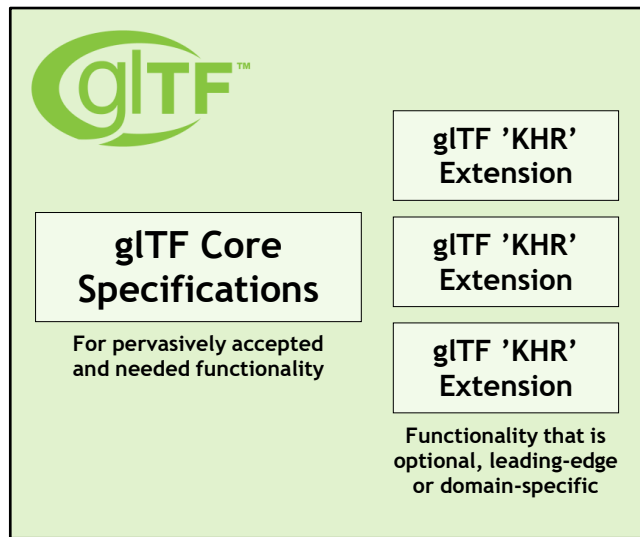
- Khronos has provided feedback to MPEG on glTF vendor extensions
 - Draft extensions distributed to Khronos on 23 September 2021
- Topics covered in Khronos' feedback
 - Best practices for use of glTF objects
 - Recommendations for glTF data structures and formats
 - Correctness of parameters and properties
 - Consistency and completeness of specifications and related schema

Photo by Markus Spiske Unsplash

glTF Extensibility

Created by the 3D Formats Working Group
Under the Khronos IP Framework
All specifications are open, and usage is royalty-free

Created by ANY external entity
Outside the Khronos IP Framework
Availability and licensing
depends on developer



Extensions may be adopted into core over time if
functionality is proven and pervasively adopted

Khronos welcomes and encourages
communication and coordination over the
development of Vendor Extensions to
encourage well-formed extensions that avoid
ecosystem, duplication or fragmentation

Industry and community
outreach and interaction

Khronos cannot accept unlicensed detailed
design contributions from non-members but
welcomes requirements, use cases and high-
level feedback to guide the evolution of
Khronos glTF specifications

glTF Vendor
Extension

glTF Vendor
Extension

glTF Vendor
Extension

glTF Vendor
Extension

Functionality to meet specific
customer or market needs.
No need for Khronos
permission or interaction