Collaboration Paths for glTF and USD

Alexey Medvedev
AR Tech Lead at Meta
Chair, Khronos 3D Formats Working Group
Collaboration Paths for glTF and USD

- **First interoperability project. Goals:**
  - glTF -> USD -> glTF “lossless” round trip
  - Building synergistic use of glTF within USD composition framework

- **Mission**
  - Identify features preventing “lossless” round trip between glTF and USD
  - Generate useful data and recommendations for glTF and USD communities
  - Create and distribute mutually agreed test assets
  - For ongoing experimentation and testing
  - Encourage availability and testing of importers/exporters and other tooling
High-Level Discussions / Questions

- **What does ‘round-trip’ precisely mean**
  - Conversion to USD and re-conversion to glTF?
  - Or use of unconverted assets within USD run-time?

- **How will USD be using glTF in this project**
  - Import to Preview Surface?

- **What is round-trip success criteria - different levels**
  - Round-tripped assets pass glTF validation!
  - Looks the same in viewer - before and after?
  - Structurally equivalent?

- **Do we want to identify specific tooling?**
  - When will open source importer/exporters be available?
    - nVidia announced open source USD connectors
Phased Testing of glTF Roundtripping

- Two parallel tracks in each phase
  - Test what can be round-tripped today
  - Investigate and discuss what we mutually want to round-trip ‘tomorrow’

- **First phase needs to be informative but pragmatic**
  - glTF 2.0 + any current widely adopted extensions that can be round-tripped
  - Geometry, Materials, Animations?

- **First step is to agree how much of existing glTF & USD is a round-trip candidate**

Roadmap alignment discussions and investigations

Test round trip of existing glTF 2.0 functionality
(e.g., materials and animations?)

Phase #1

Next round of roadmap alignment discussions

Test round trip of additional glTF 2.0 functionality
(e.g., interactivity, SubDiv, glXF scenes, physics?)

Phase #2

Avoid future incompatibilities through roadmap alignment discussions in parallel with testing

Then create assets to exercise round-tripping of those roadmap features through importers/exporters

More phases as needed …
How to Bin Technical Features into Phases

- **Current glTF functionality**
  - Unlit materials
  - GPU-compressed textures (KTX 2.0)
  - Metadata
  - PBR

- **Future glTF functionality**
  - MaterialX materials
  - Quads
  - SubDiv Surfaces
  - Expanded UV channels
  - Animation weights and blending
  - Physics
  - Interactions
  - Composition scenes

- **What else?**
Where we at this moment? At Phase 1

- **PBR material discussion**
- **We ran basic test cases (glTF Asset Repo) for example**
  - Basic geometry
    - Covered: `accessors`, `buffers`, `bufferViews`, `meshes`
    - Ignored: `animations`, `cameras`, `images`, `materials`, `nodes`, `samplers`, `scene`, `scenes`, `skins`, `textures`
  - Animations:
    - Covered: `accessors`, `animations`, `buffers`, `bufferViews`, `meshes`, `nodes`, `samplers`
    - Ignored: `cameras`, `images`, `materials`, `scene`, `scenes`, `skins`, `textures`
- **We require a formal description what is a “successful roundtrip”**
  - Must have is a glTF and USD conformance
  - Low bar is a visual consistency
  - Next level is structural equivalency. It requires many iterations
Thank you!

- The Khronos 3D Formats Working Group values this cooperation
- Please join as MSF and/or Khronos member or an advisory panel member
  - [https://metaverse-standards.org/](https://metaverse-standards.org/) - “3D Asset Interoperability using USD and glTF”
  - [https://www.khronos.org/](https://www.khronos.org/) - “3D Formats” and “3D Commerce”