

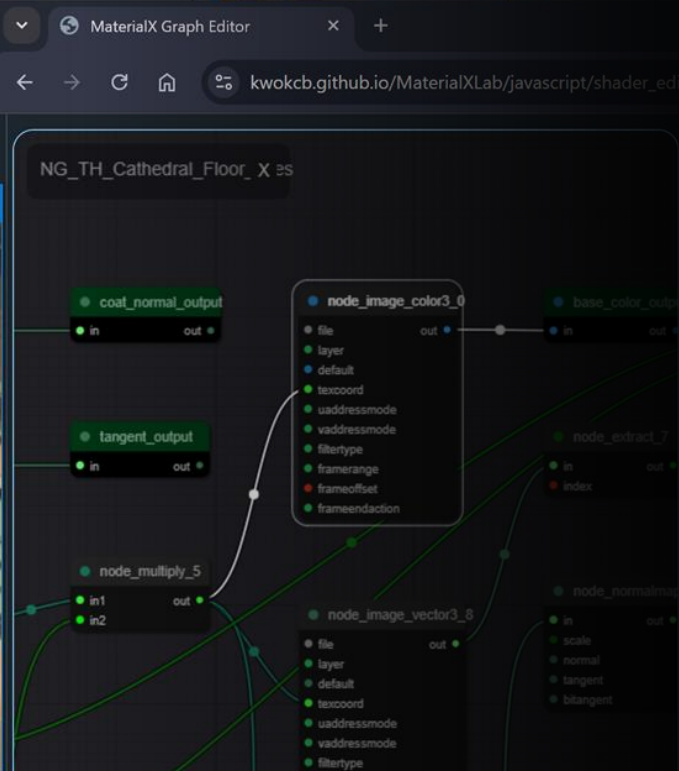
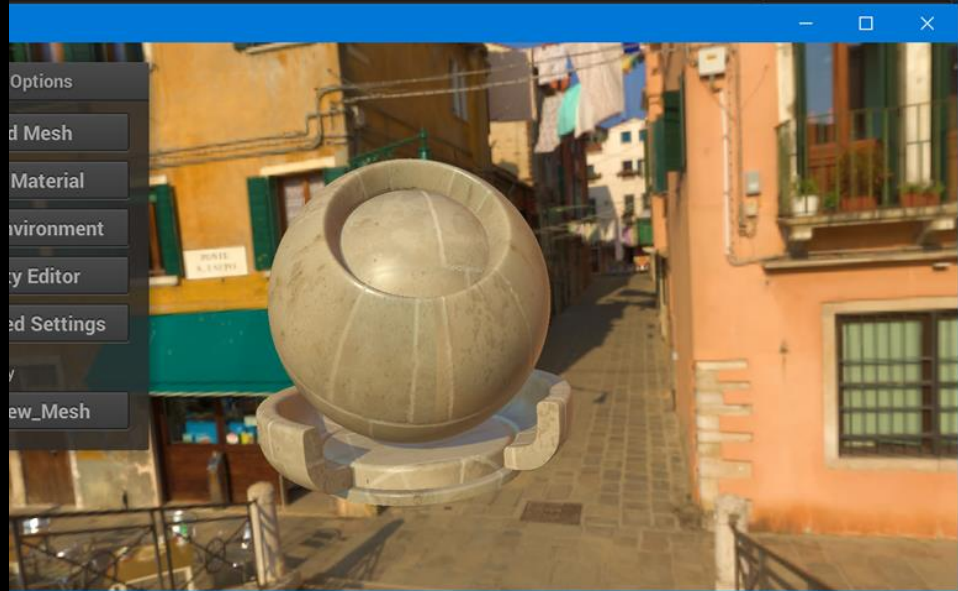
to



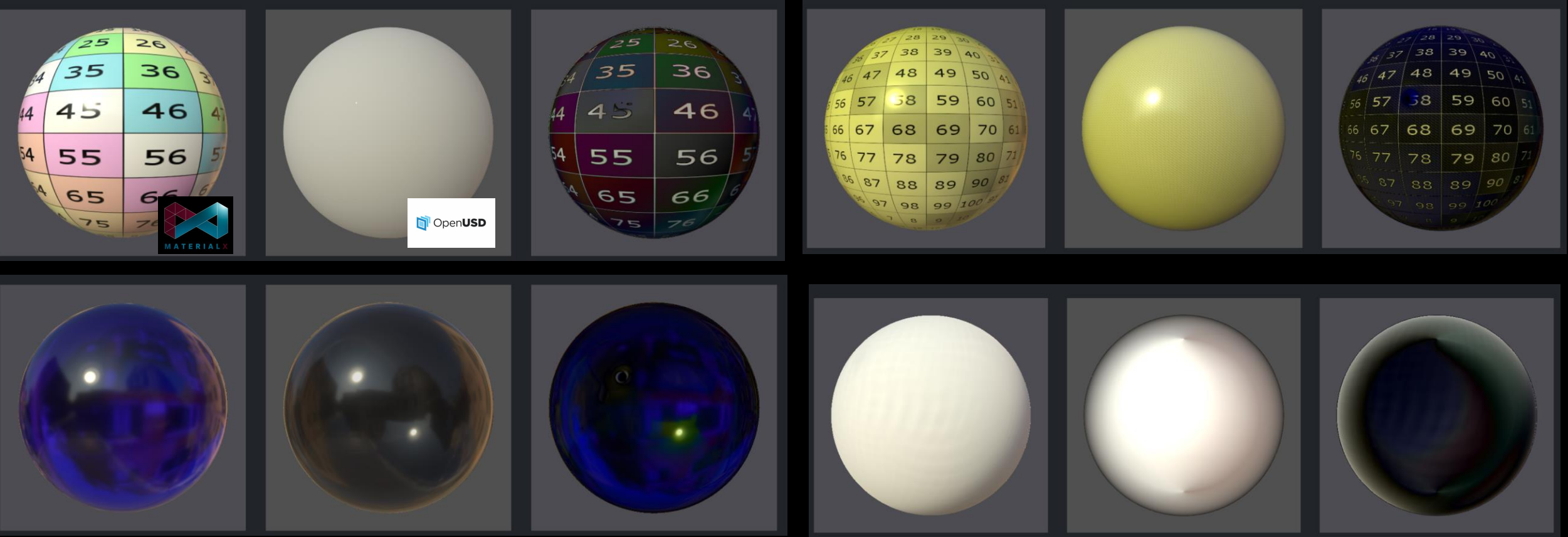
# Interoperability

Discovery via a “Render Test Suite Experiment”


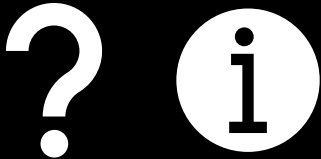
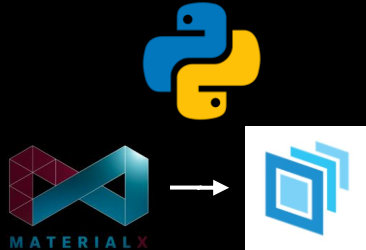
March 12, 2025  
Bernard Kwok



# User Query: Which are expected and why ?



# Targets

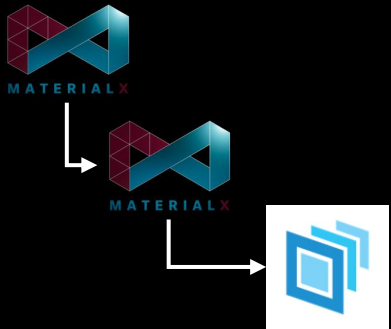
Interop	Assets	Discovery	Knowledge	Validation
<p>Examine MaterialX to USD equivalency mapping</p> <ul style="list-style-type: none"><li>❑ Data Model</li><li>❑ Rendering</li></ul>	<p>“Standardize” MaterialX assets in USD format.</p> 	<p>Learn how to make it work.</p> <p>Find document insufficiencies</p> 	<p>Publish reference logic for MaterialX to USD distillation</p> 	<p>Create building blocks</p> <p>Allow render delegates to use reference MaterialX</p> <p>No bespoke tooling: <a href="#">usdMtlx</a>, <a href="#">usdChecker</a>, no plugins.</p>

Desired: Simplest reference workflow with minimal dependencies

# Process

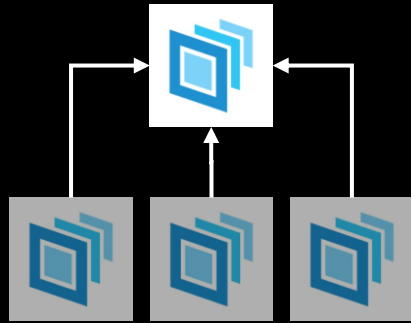
## Get Material

Iterate MaterialX  
“renderables” in  
USD



## Build Scene

Add required  
scene elements +  
validation  
metadata.



## “Distill”

Meta-data / value  
/ connection pre-  
processing

(Re)map scene  
bindings



## Validate

- ☐ MTLX validation
- ☐ usdMtlx
- ☐ USD checker
- ☐ Visual compare



- ☐ Slow: Schema checking useful

## Triage

- ☐ “Guess” if missing content
- ☐ Validation errors (x2)
- ☐ Binding errors
- ☐ Iterate

Result: Working backwards from image comparisons is difficult.

# Distillation Is Complex

Validity*	Equivalence	Verification*	Bindings*
<p>Differing validation criteria</p> <p>“Renderable” concept differs.</p> <p>Strictness differs: MaterialX allows “invalid” + non-material interop.</p>	<p>Topological + value ≠ functional equivalence</p> <p>Same evaluation: different graph configurations required</p> <p>Same graph configuration: different evaluation</p>	<p>Multiple (conflicting) validation criteria</p> <p>* <code>usdMtlx</code> (<code>hdMtlx</code>) accepts subset of <code>USDShade</code></p> <p>Round-trip interop helps validation (USD ➡ MaterialX)</p>	<p>Binding semantics differ / unclear</p> <p>E.g. value / connection priority, implicit bindings, asset path resolve.</p>

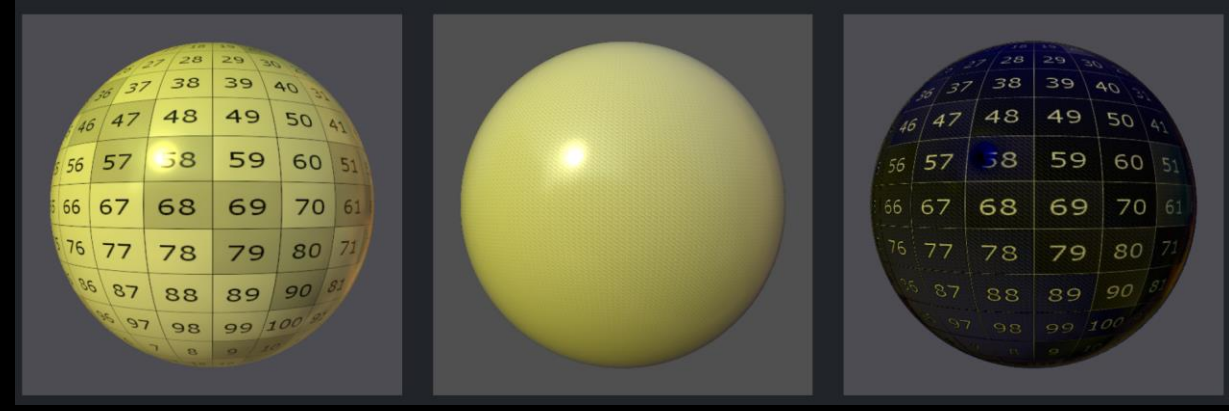
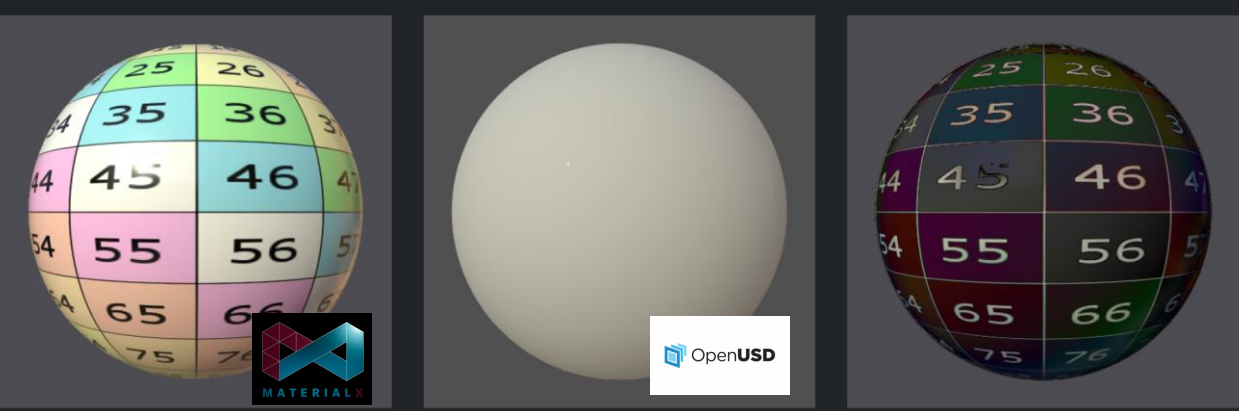
Result: “Hit and miss” to figure out cause of issue.  
Requires domain knowledge of USD and MaterialX



# Some Answers & More Follow-up

Translate Disallows Valid Graph\*

Real World Unit Metadata Difference \*\*\*



Performance Option : Both Correct\*\*

Unknown: Guess geometric spaces

# Tooling and Results

[kwokcb.github.io/materialxusd/](https://kwokcb.github.io/materialxusd/)

Repo: <https://github.com/kwokcb/materialxusd>

