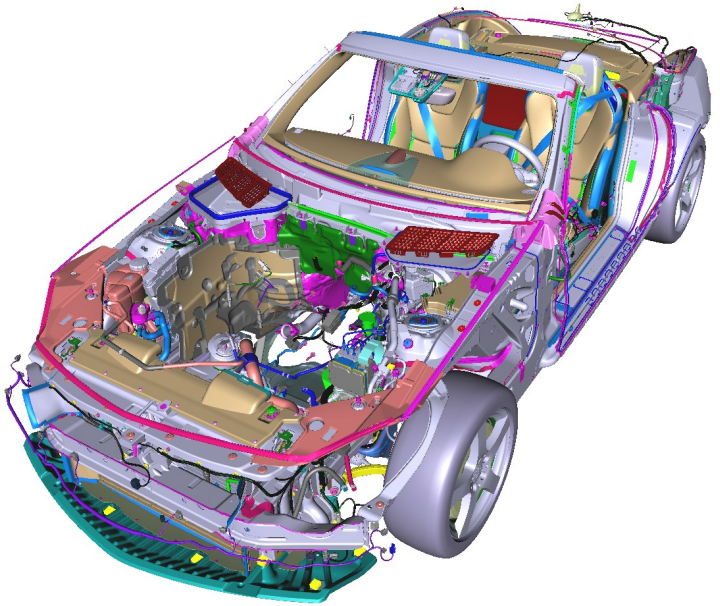
High-Performance Visualization of Massive CAD Data with WebGL

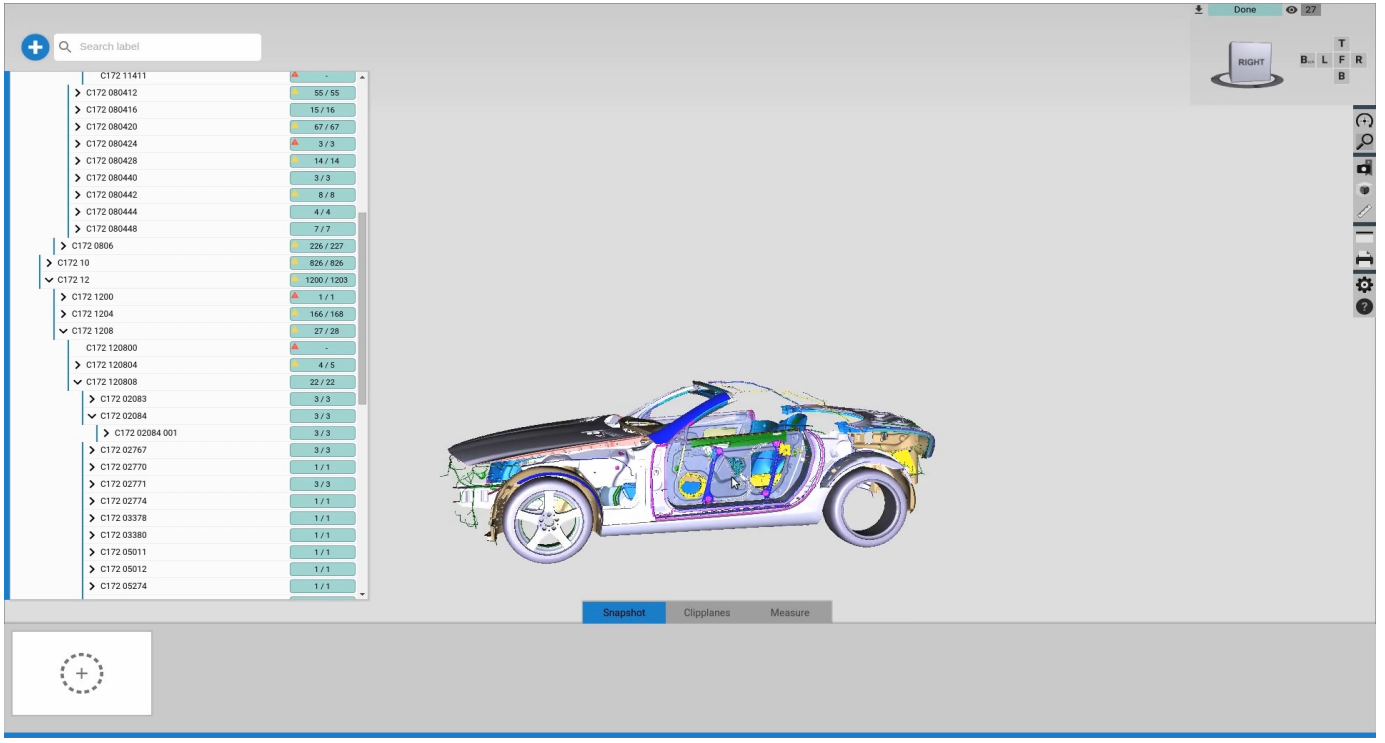


WebGL and glTF BOF @ SIGGRAPH 2015

Christian Stein, Maik Thöner, Max Limper, Johannes Behr
VCST Group, Fraunhofer IGD

Fraunhofer IGD

webVis / instant3Dhub



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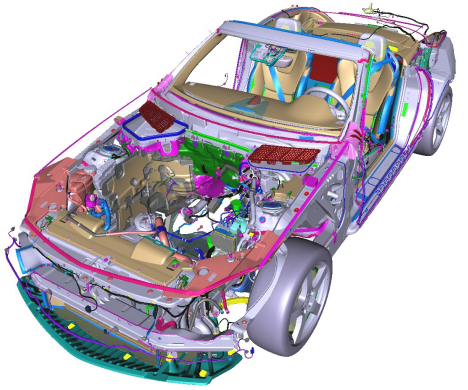
Data Transcoding

Typical Automotive CAD Data Set:

- 20-60 Mio. triangles
- **8-12 GB** in orig. CAD format (e.g., OpenJT)



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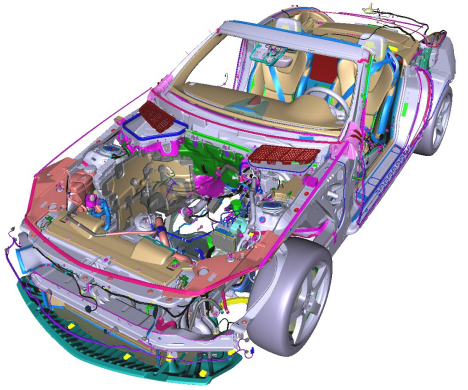

Geometry After Transcoding:

- Quantized, Stripified, GPU-friendly encoding
- **150-700 MB, ~8-12 bytes / triangle**

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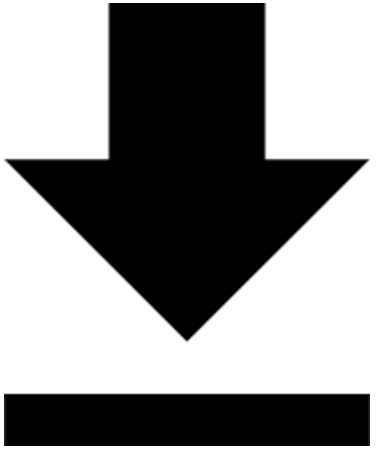
Parsing, Culling, Loading

Still: How can we conveniently process a 500MB* data set?

(* transmission: ~250MB using gzip)

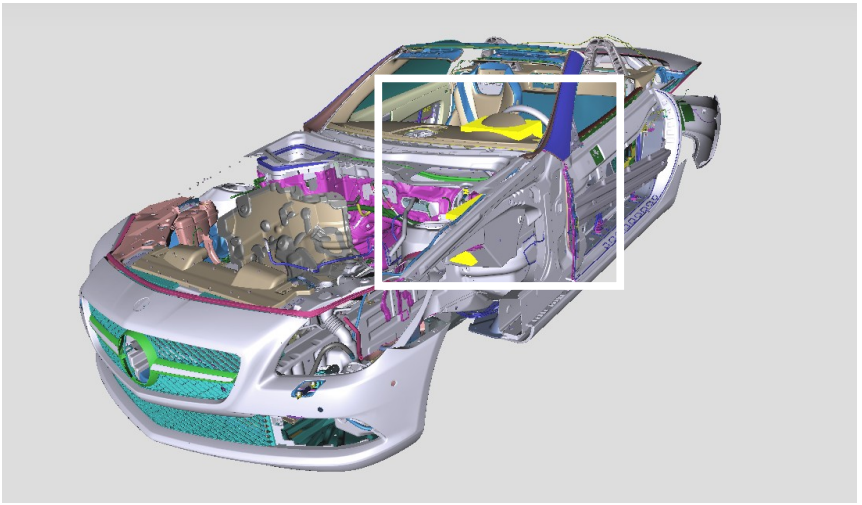
- Do *everything* on a budget
  - structure parsing
  - spatial index traversal
  - GPU uploads
  - rendering

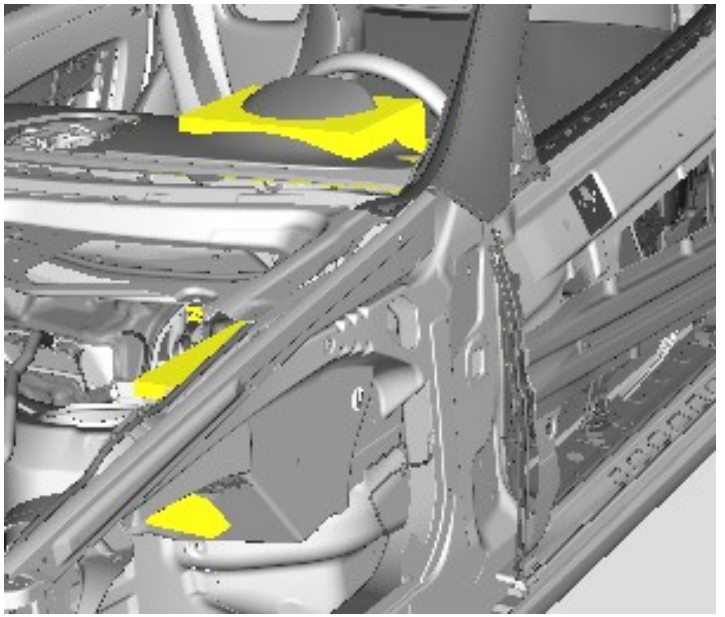


- Load largest visible parts first (→ bounding volumes)

- Visual feedback, provide usable intermediate results

Visual Feedback: Example





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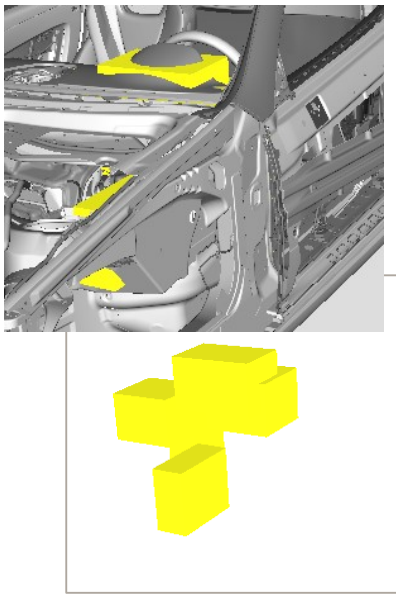
Flexible Rendering Pipeline Configuration

- Always try to avoid re-drawing from scratch



- Challenge: Dynamic auxiliary geometry
  (user enables / disables, downloads finish, ...)

- hare3d: Flexible configuration of pipeline stages / slots

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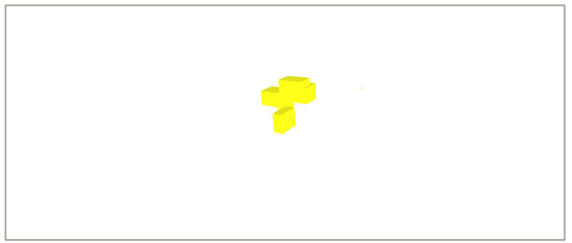
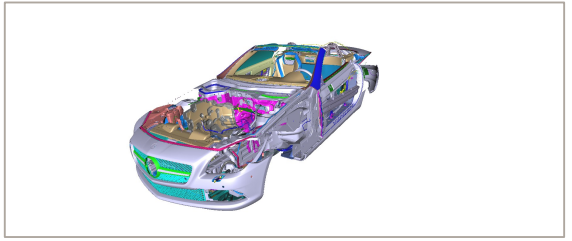
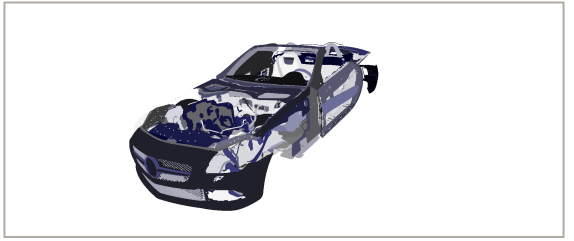
Flexible Rendering Pipeline Configuration



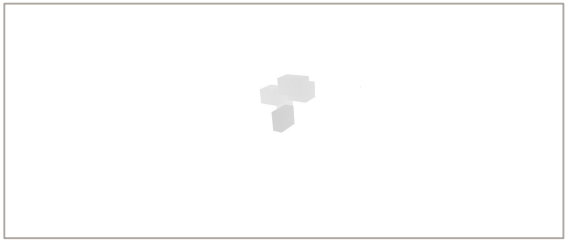
Auxiliary Color



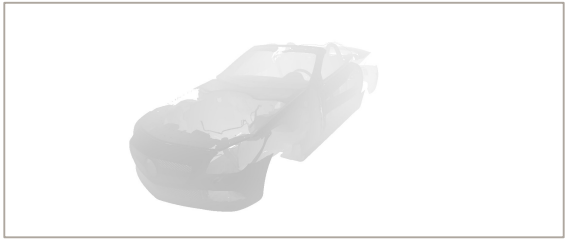
Main Color



Part IDs



Auxiliary Depth



Main Depth

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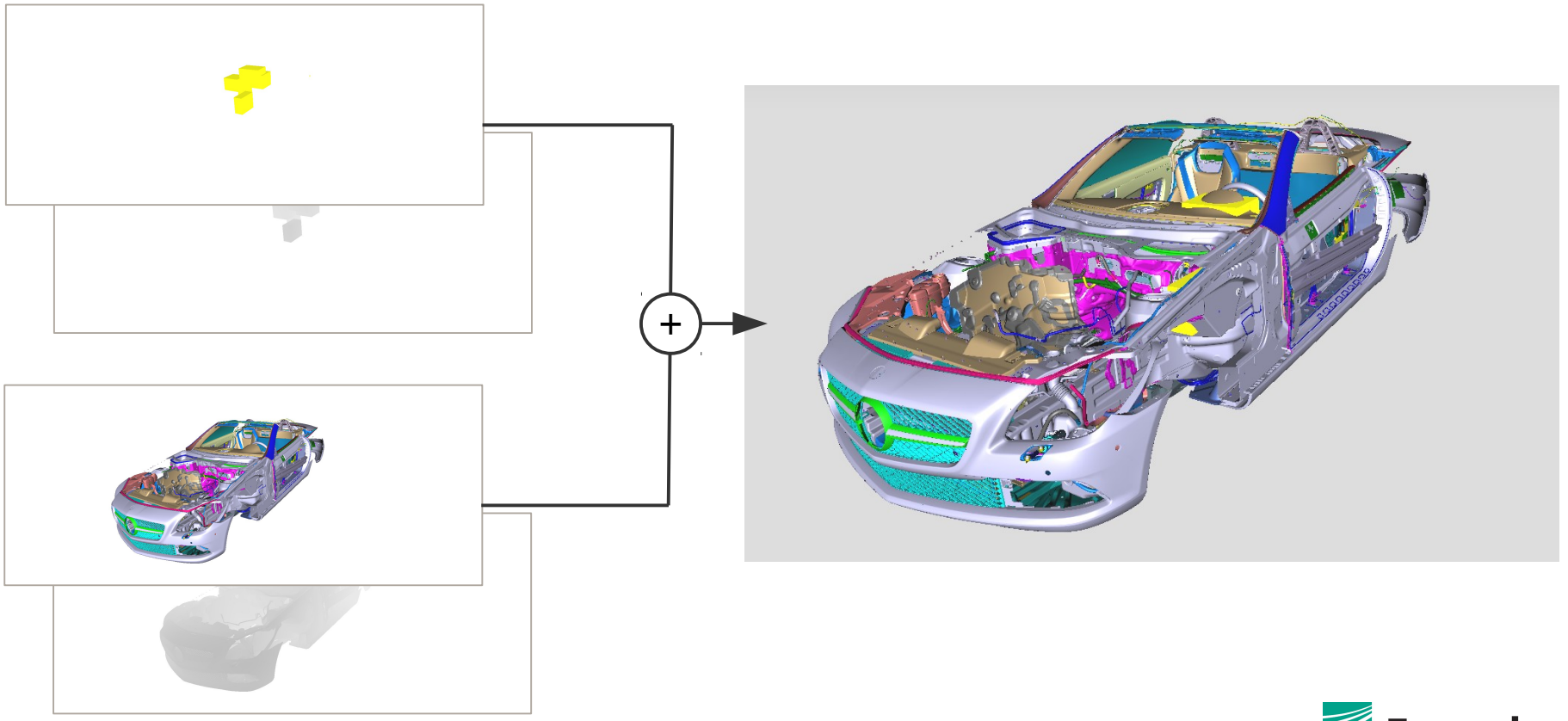
Flexible Rendering Pipeline Configuration



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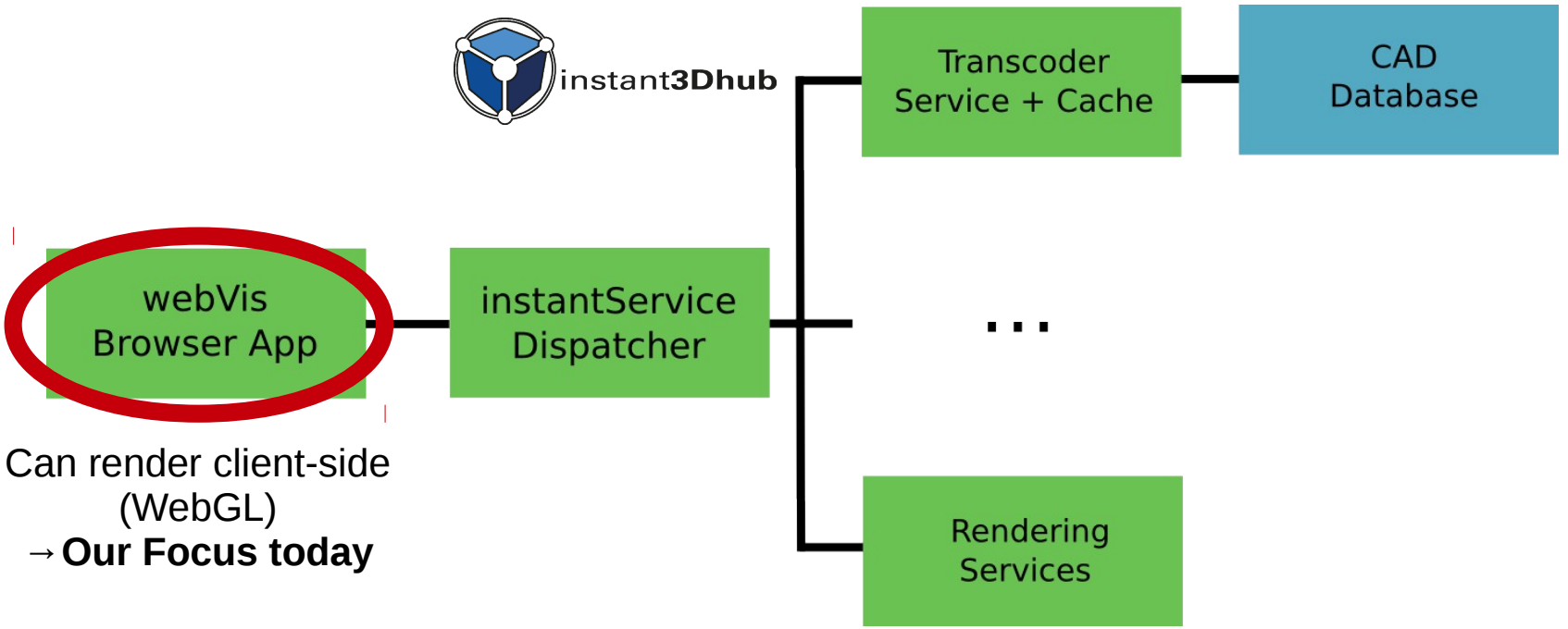
Work in Progress

- Memory management / replacement strategies
- Use hardware occlusion queries with iterative rendering
- Screen-space techniques
  (e.g., deferred shading / highlighting)

Demo Time!

Context: webVis / instant3Dhub



Can render client-side
(WebGL)
→ **Our Focus today**

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