

Count	Name	Value
1	Total	429
1	0 Polygons	0
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1	>4 Polygons	2
1	Unknown	0

Welcome to CS559!

Introduction to Computer Graphics

Fall Semester 2021

Brief answers to most pressing questions ...

- What about the class waitlist?

**If you had been waitlisted as of this morning
you *should* have been given permission to
enroll as of today (check your email)
(We'll consider later requests based on capacity)**

- Where do I find information about the class?

**<http://graphics.cs.wisc.edu/WP/cs559-fall2021/>
<http://piazza.com/wisc/fall2021/c559/home>**

- How do I communicate with you?

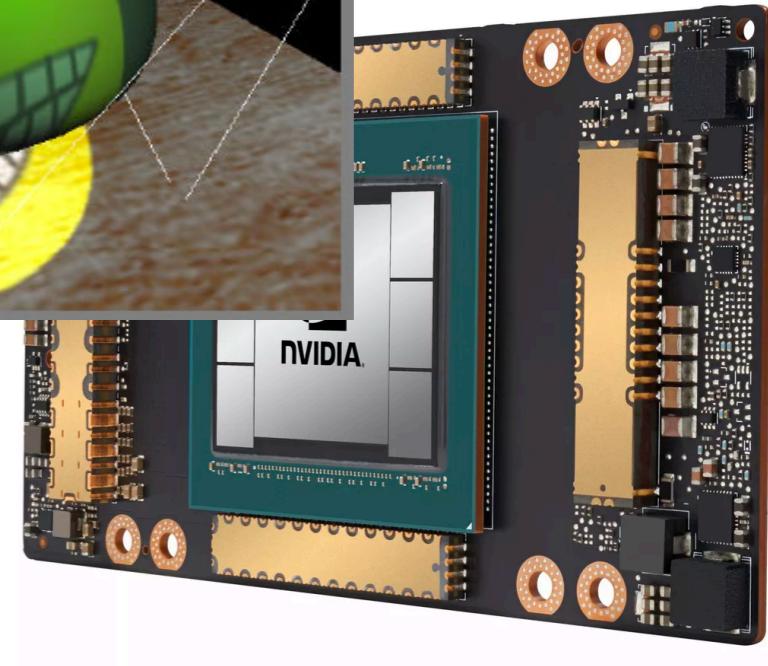
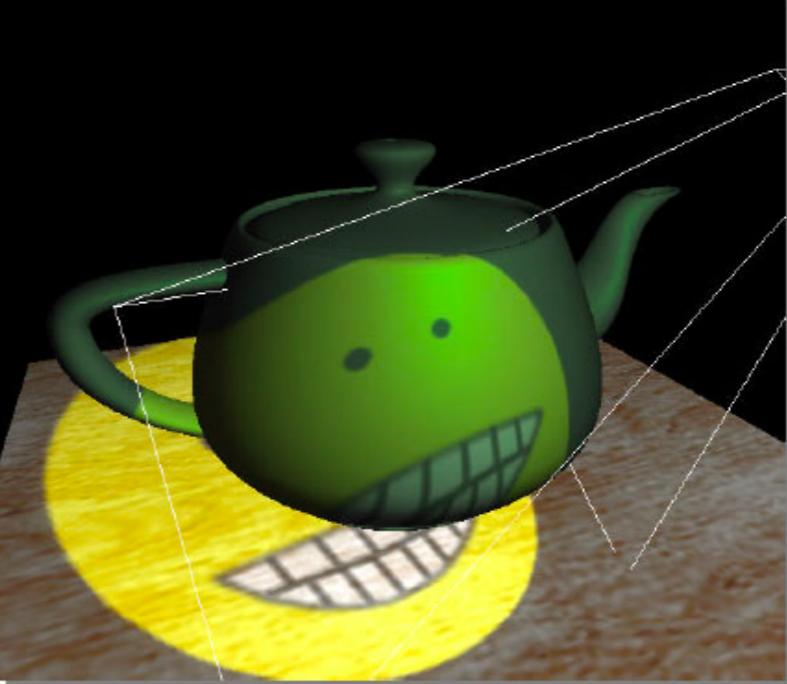
**Via Piazza (highly preferred)
Email at cs559.f2021@gmail.com (if necessary)**

Today's lecture

- Discuss scope of class, and indicative topics
- Clarify class logistics
 - Attendance protocol, office hours, etc.
 - Communication mechanisms
 - Assignments
 - Evaluation procedure
- A few details about your instructor
- Taking Piazza “Live Q&A” questions if applicable

Topics to cover in 559

- Graphics concepts, coordinates, geometry representations
- Transforms and the math of drawing in 2D and 3D
- Projections, viewing and visibility
- Graphics hardware, WebGL
- Lighting and texturing
- Meshes, Curves and Surfaces
- Elements of motion and rendering



Scope

- What is the class about?
 - How is computer-imagery created?
 - What are the building blocks we use? (triangles, points, etc)
 - Acquiring graphics *programming* experience
 - Textures, curves, color, etc ...
- Who is this class for?
 - Undergraduates excited about graphics & images
 - Prerequisite : being willing to learn to code in Javascript!
 - Be prepared to be a problem-solver, and dedicate 6-8hrs/week (on average) to crucial programming assignments
- Enthusiasm a must!

Website

- Your main source of information
 - Class webpage : graphics.cs.wisc.edu/WP/cs559-fall2021
 - Other support resources
 - Class discussion : piazza.com/wisc/fall2021/cs559/home
 - Piazza signup link: piazza.com/wisc/fall2021/cs559
 - Assignments and video recordings of lectures : [Canvas](#)
 - EMAIL : cs559.f2021@gmail.com
 - Be aware of communication policy ... use Piazza when possible!

Logistics

- Evaluation
 - (Mostly weekly) programming assignments (most important)
 - Midterm & final exam
 - Final exam : Check student center (currently: 12/20, 12:25-2:25pm)
 - **Midterm time/date: October 29th @ 7:15pm**
(we'll determine at later time if it will be in-person or online on Canvas)

Mode of instruction and safety protocols

- This will be an in-person course
- Last year: Lectures were delivered in-person, but attendance was either face-to-face, via live-stream, or asynchronously (recorded lectures); student's choice
- But last year, our classroom was equipped for lecture capture and livestreaming. Not the case this year. The intent is that in-person attendance will be the norm.
- In *truly* exceptional cases (e.g. today) I will make some accommodations for people that cannot attend. Please don't expect this on a recurring basis.

Mode of instruction and safety protocols

- Please abide by university statutes/guidelines.
(all of the instructional staff will do our part)
- Lecture slides will always be made available, in PDF form, to download via canvas. They tend to be pretty dense with information, and useful for review.
- All Office Hours will be virtual (via Google Meet).
- The instructor (only), will be available for in-person office-hour style consultations, only by appointment, and only if the topic warrants it.
(reserved for discussions about private concerns)

Mode of instruction and safety protocols

- Instructor will stick around for brief questions after class (not a substitute to office hours), but please be mindful to avoid crowding. On Thursdays, there will be office hour availability immediately after lecture for technical questions.

Evaluation

- Details on “Syllabus” Page
 - <https://graphics.cs.wisc.edu/WP/cs559-fall2021/syllabus/>
- All class components (assignments/exams) are important!
- Programming scores provide a Baseline
- Exams modify this baseline
- Grading on a curve, but you are guaranteed a “B” if :
 - Adequate performance on programs (“Satisfactory”, or 3.0 out of 4.0 on all)
 - Respectable performance on exams (\geq =“BC”)

Outcomes

- Historically, what have students gotten from 559?
 - Graphics theory and principles
 - Concepts and practice of graphics programming
 - Experience with *nontrivial* programming, at large

Expectations

- Math & Linear Algebra
 - Pre-req: Math 222 or Math 276, or instructor consent
 - May be waved for graduate students
 - Certain concepts to be reviewed again in class
- Programming (!!)
 - Pre-req: CS367 or CS 400, or instructor consent
 - You will learn a (new?) language - JavaScript
 - Must use online resources (pointers are provided)
 - Must be willing to sharpen development skills
 - Debugging
 - Formalizing programmatic tasks

Communication policy

- Typical reply turnaround time?
(typically 24-48hrs but may delay until next lecture)
- Use Piazza whenever possible
(and make sure to sign up!)
- Announcements on Piazza and Webpage
(you are responsible for monitoring it)
- For very rare occasions : broadcast via email
(reaches all enrolled students)

Early homework

- Programming assignments will be given starting next week (first one will be easier; be prepared for difficulty level to go up from 2nd assignment onwards).
- Review late policy on the Syllabus page of the class website. You are strongly encouraged to turn in assignments on-time; late submissions are penalized, and often trigger further delays down the line.

Special time constraints

- Midterm : Friday October 29th, 7:15pm-9:15pm
- Final : Monday December 20th, 12:25pm-2:25am
- It will be a later decision if exams will be in-person or online (if online, they will be Canvas quizzes).
- Check Syllabus for impact on final grade
(in summary: exams can boost you at most 1/2 letter grade from your programming assignment grade, or drop you at most 1/4 letter grade from it)

Office hours

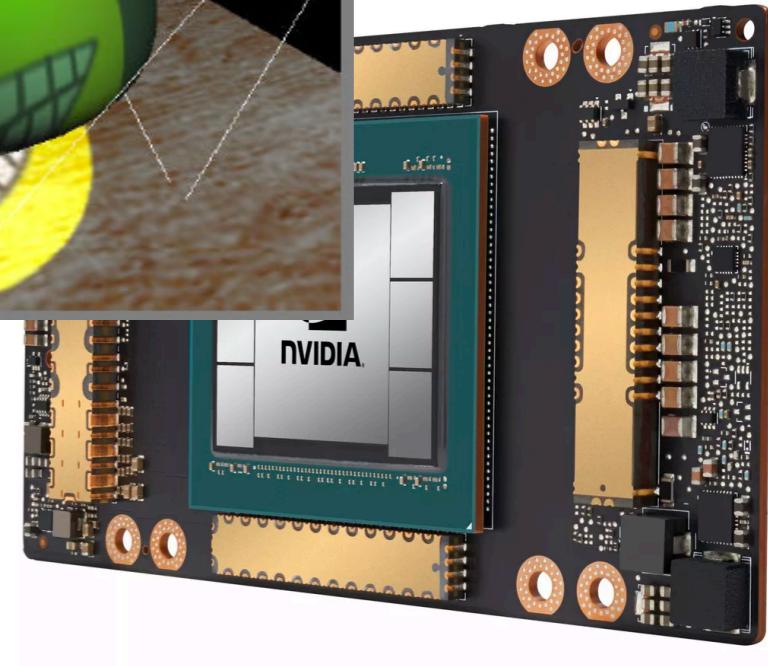
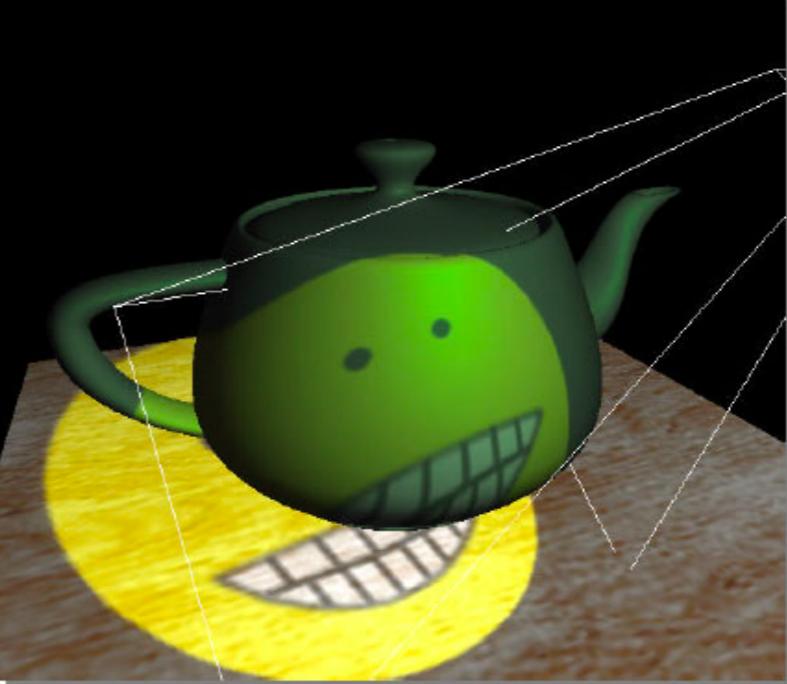
- Instructor (Eftychios Sifakis)
 - Office Hours :Thursday 4:00-5:00pm
(shortly after class; might be <5min late if held up w/ questions)
- TAs (Yutian Tao, Carter Sifferman, Hyojoon Park, Yiming Li)
 - Office Hours:
 - Monday 4:00-5:00pm (Carter Sifferman)
 - Tuesday 4:00-5:00pm (Yutian Tao)
 - Wednesday 4:00-5:00pm (Carter Sifferman)
 - Friday 1:30-2:30pm (Yutian Tao)
 - More office hours to be added if needed

Office hours

- All office hours to be held virtually
 - Via Google Meet, check this Piazza Posting to get the meeting link (not shown in these slides to avoid unsolicited attendees)
 - Please authenticate using your NetID and the UW Madison G-Suite
<https://it.wisc.edu/services/google-apps/> to be able to enter the Google Meet without the need to be explicitly granted admission.

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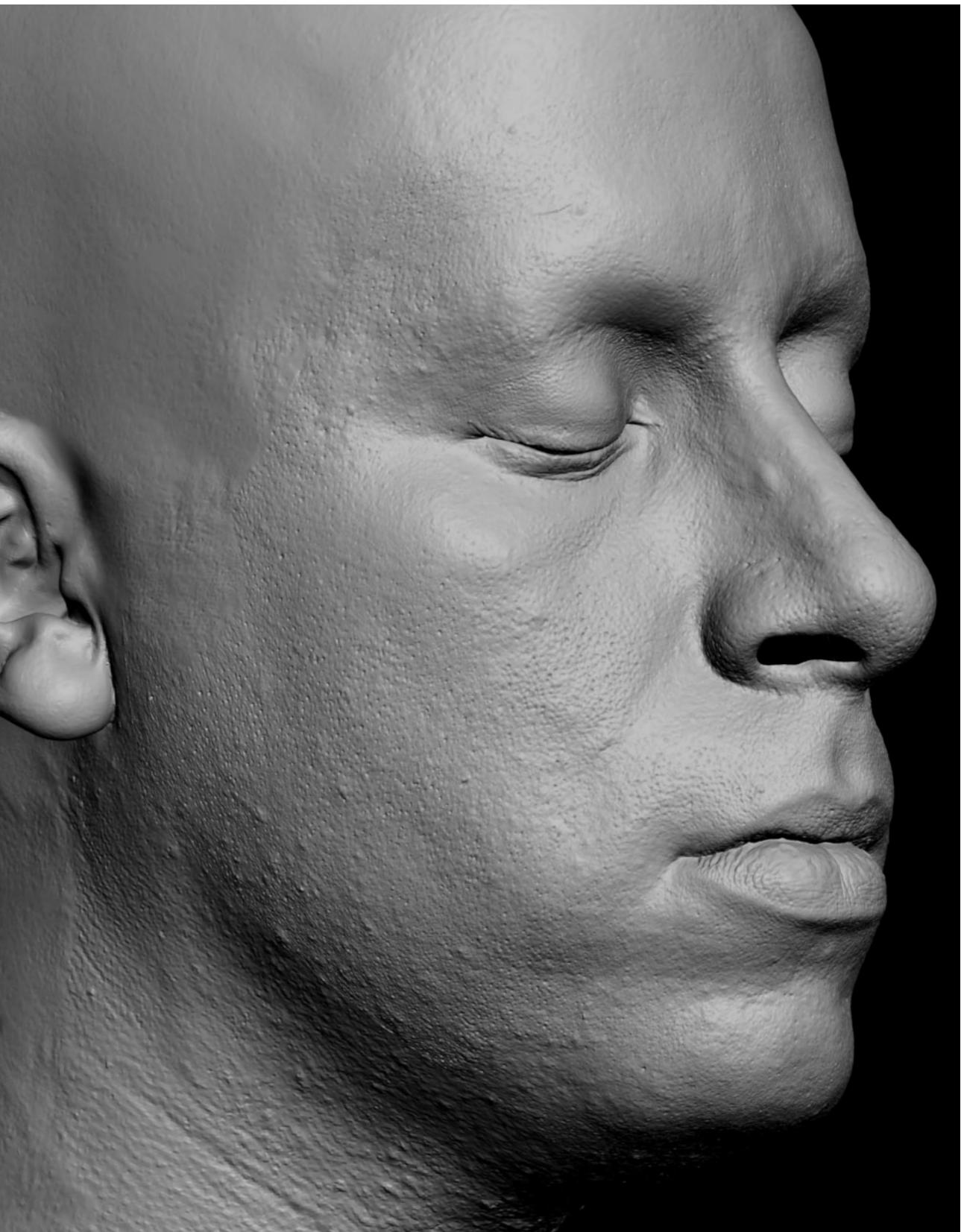
About your instructor ...

Research interests:

- Physics-based modeling
- Digital humans
- Simulated elastic objects
- Fluid animation
- Fracture & destruction
- Fast math in general

Industry affiliations

- NVidia, Weta Digital,
Disney Research|Studios



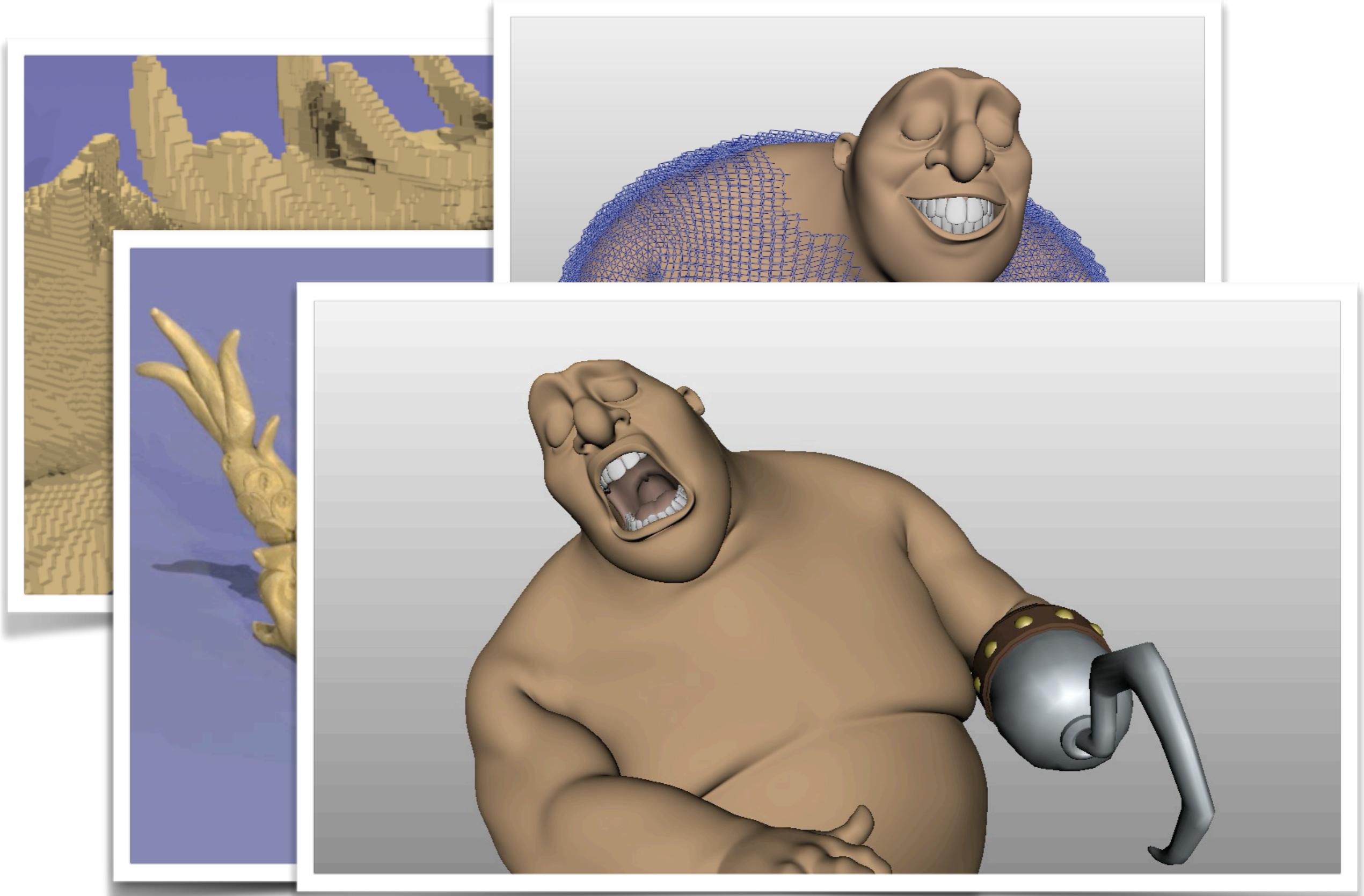
Animating models of human bodies



Detailed anatomy and complex environments



Jiggly deformable models & fast simulation



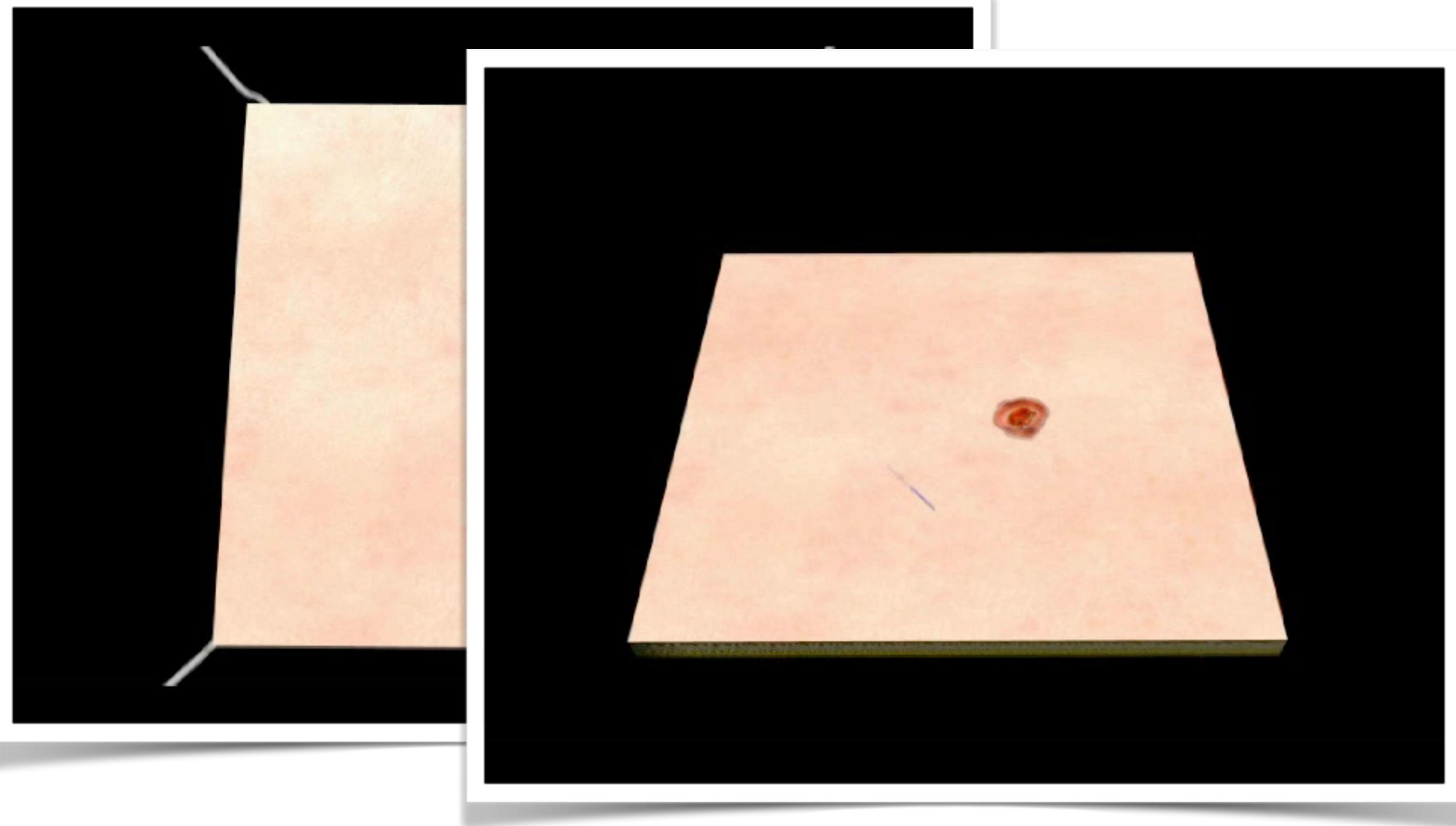
Hairy & messy collisions



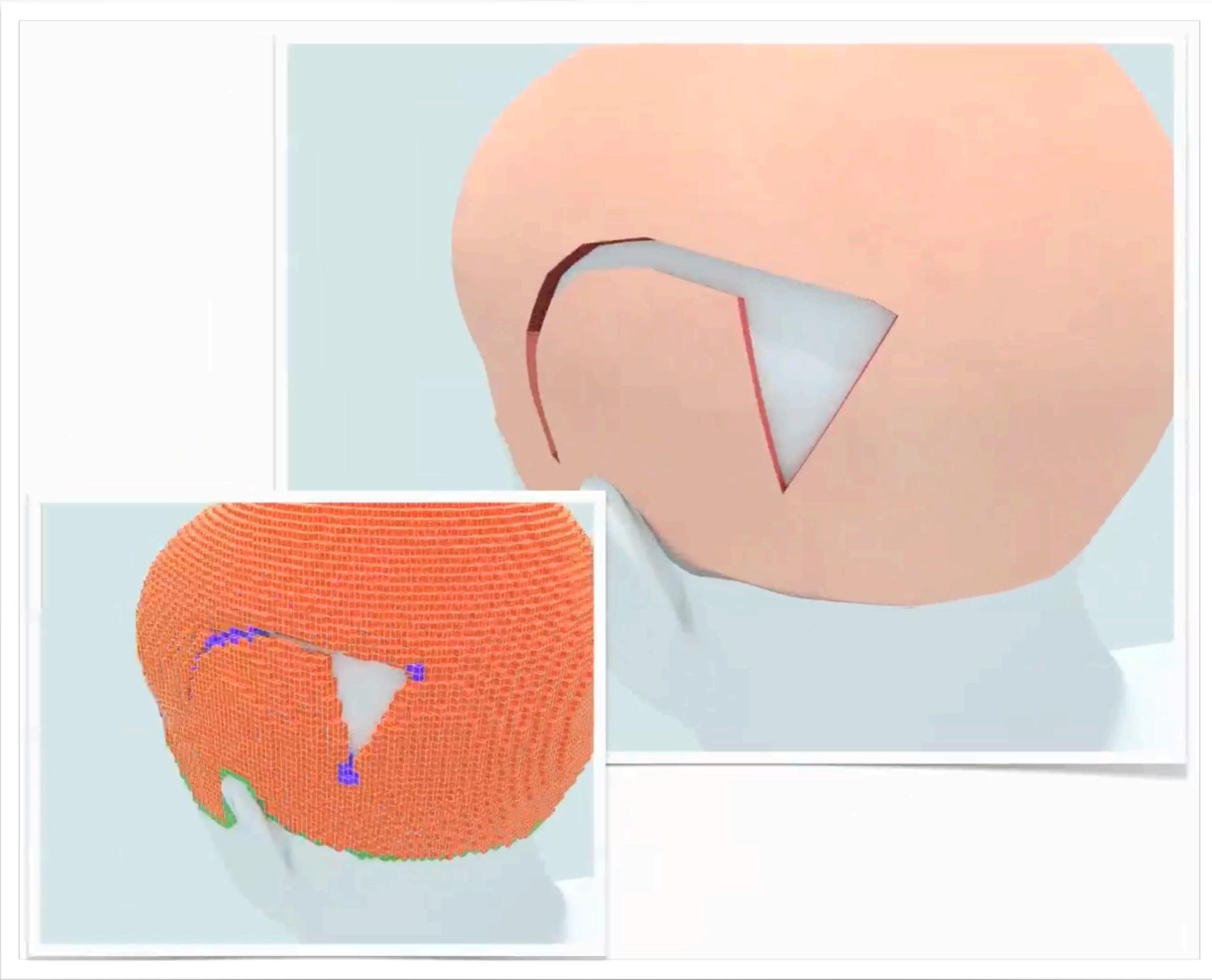
Fracture, destruction & mayhem



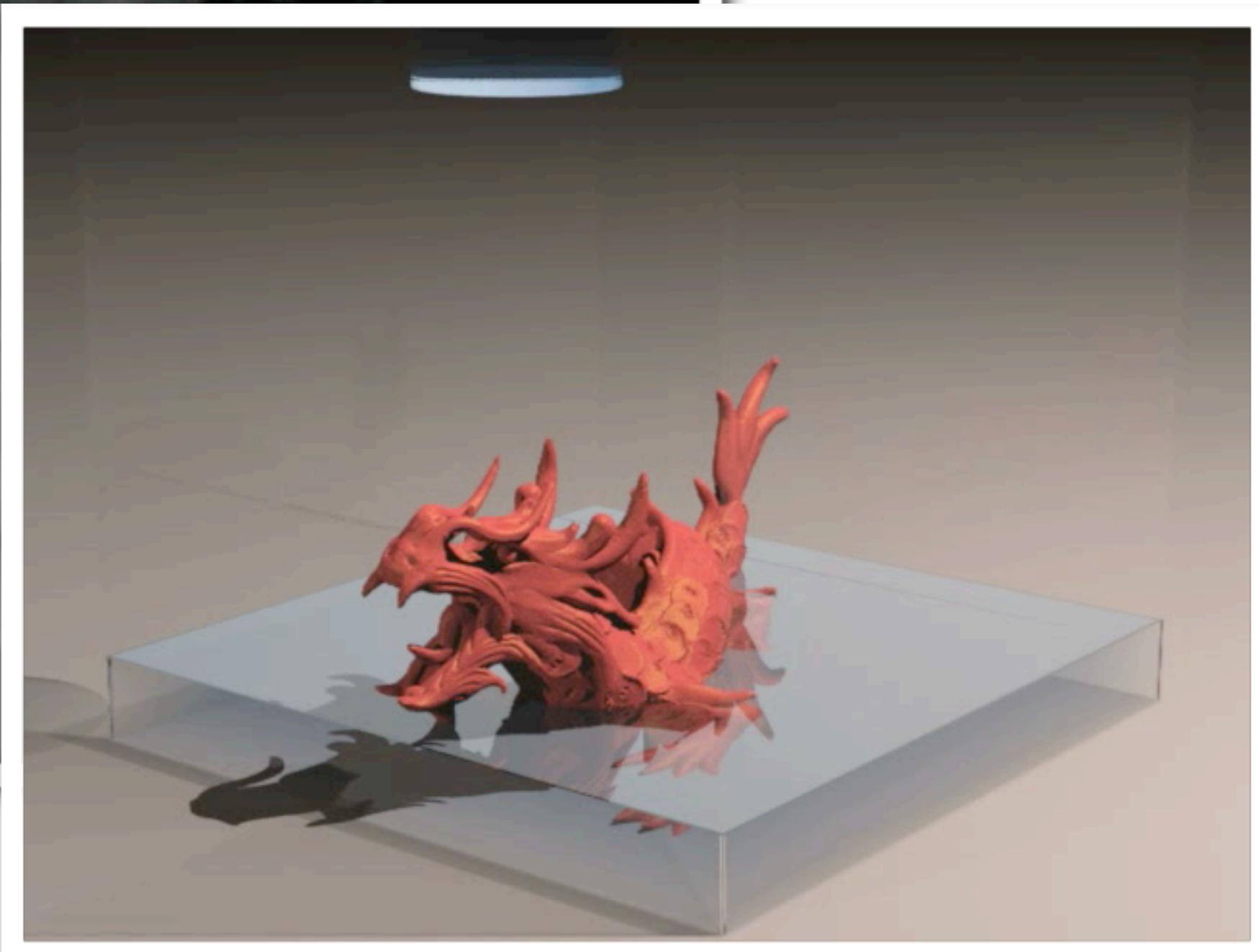
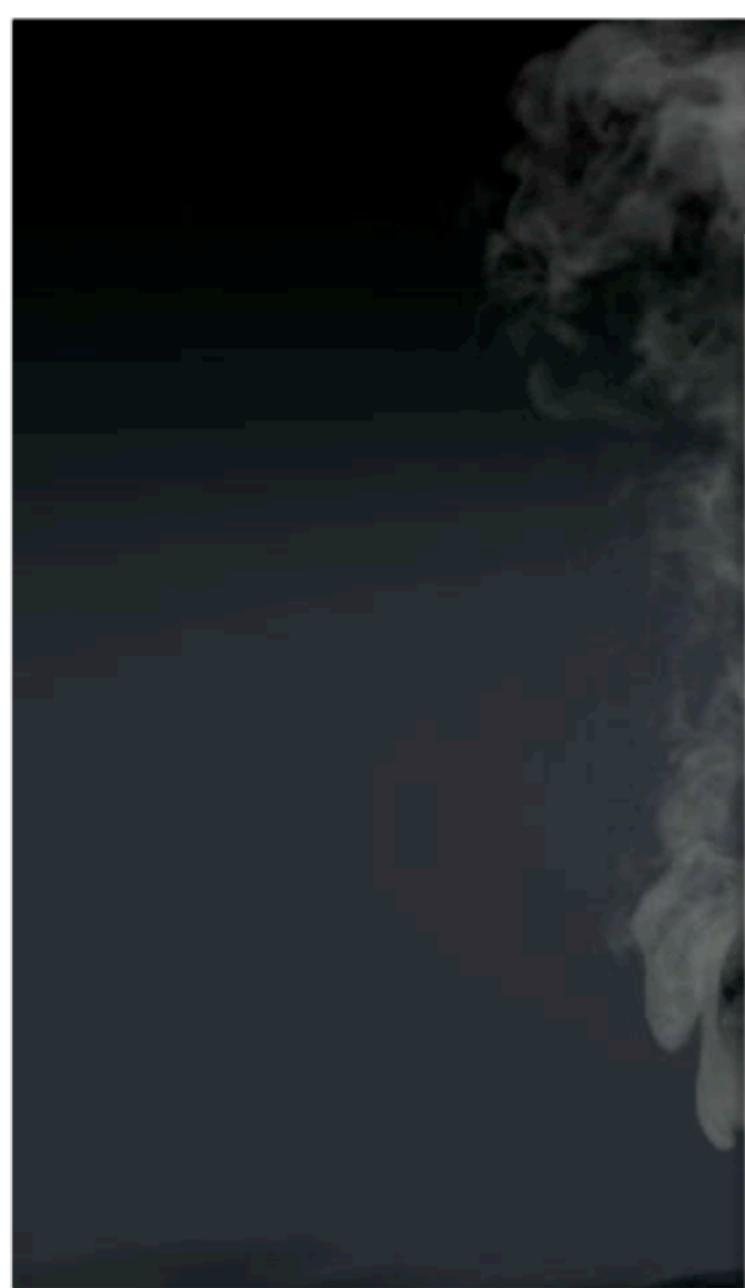
Clinical “skill simulators”



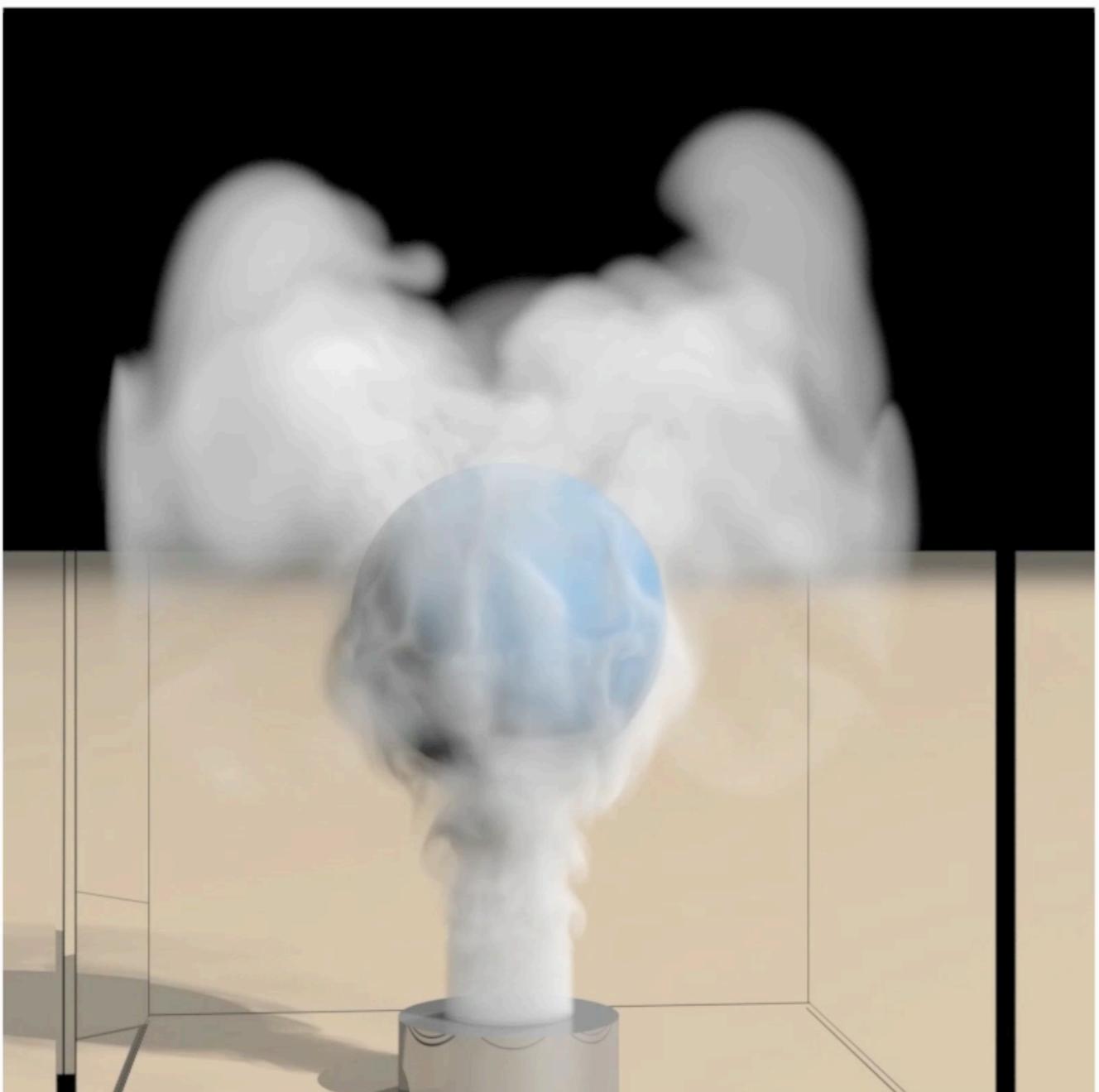
Clinical “skill simulators”



Smoke on the water



... and as much detail we can afford

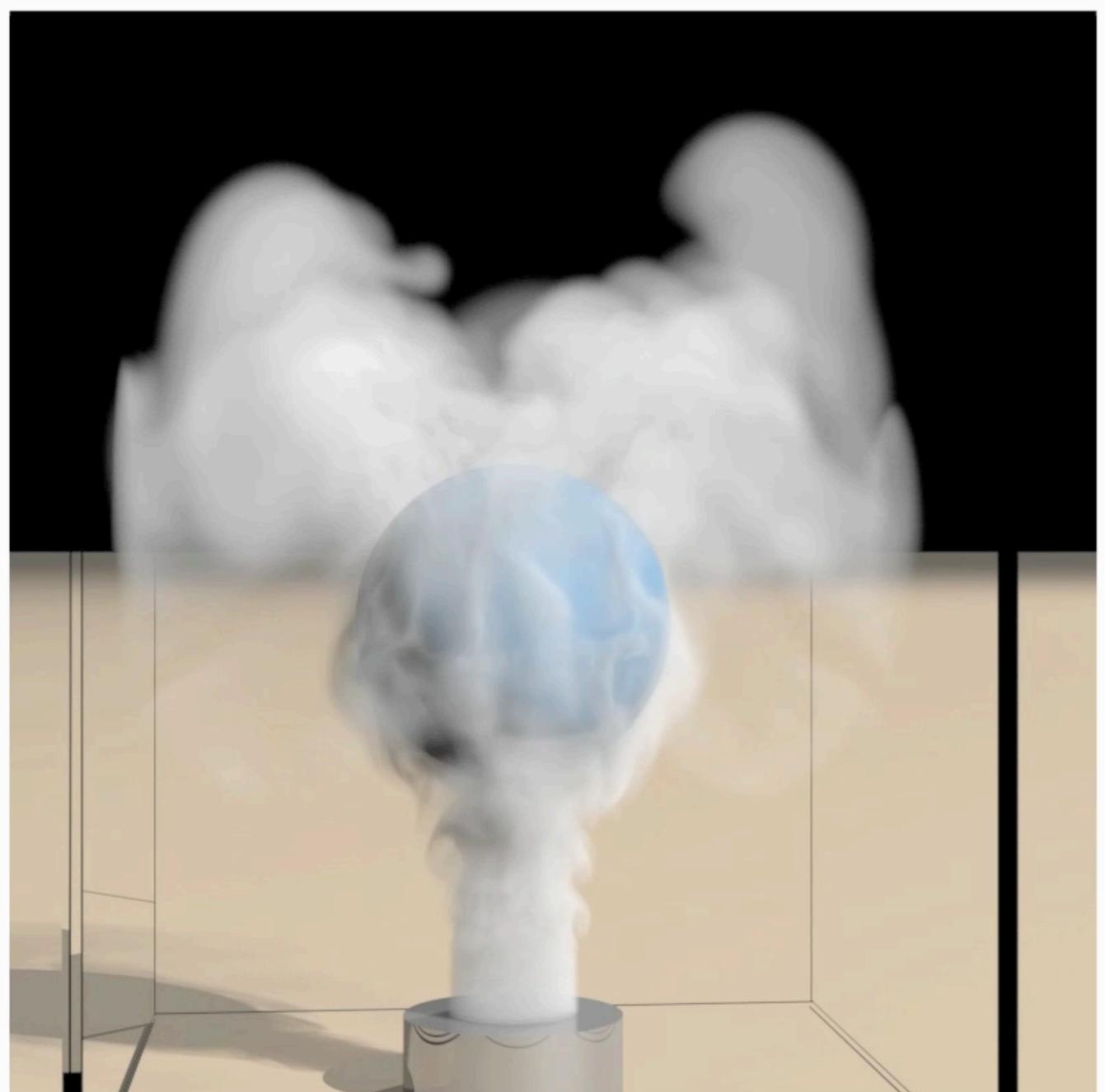


Smoke flow
past sphere

Effective
resolution:
 $1K \times 1K \times 2K$

135M active
voxels

... and as much detail we can afford

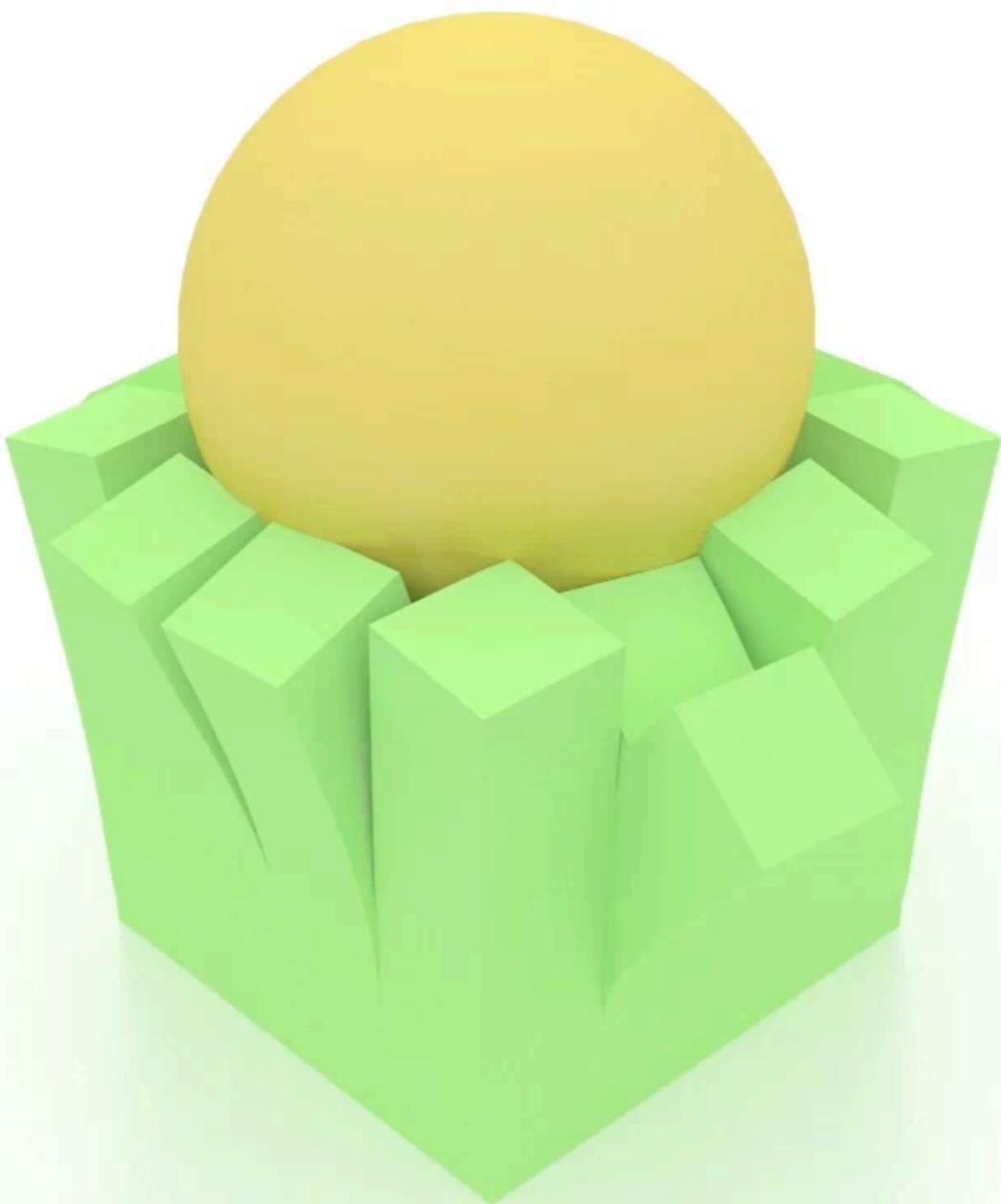


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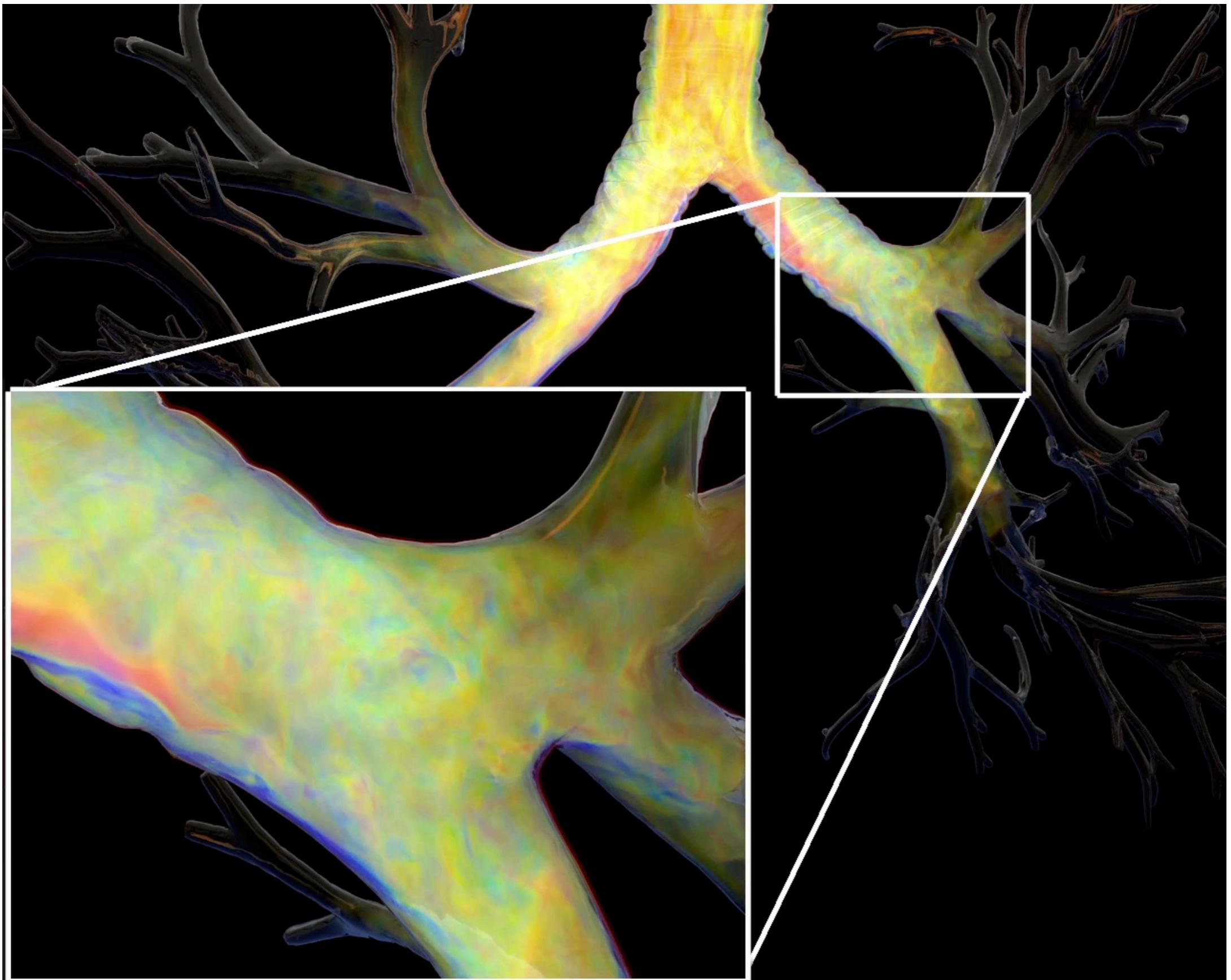
Present-day stuff : Contact in fracture



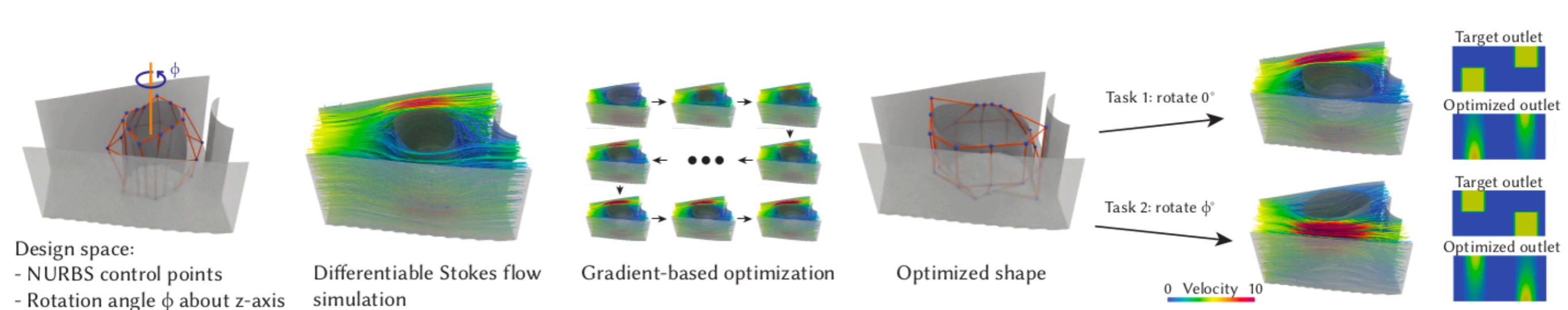
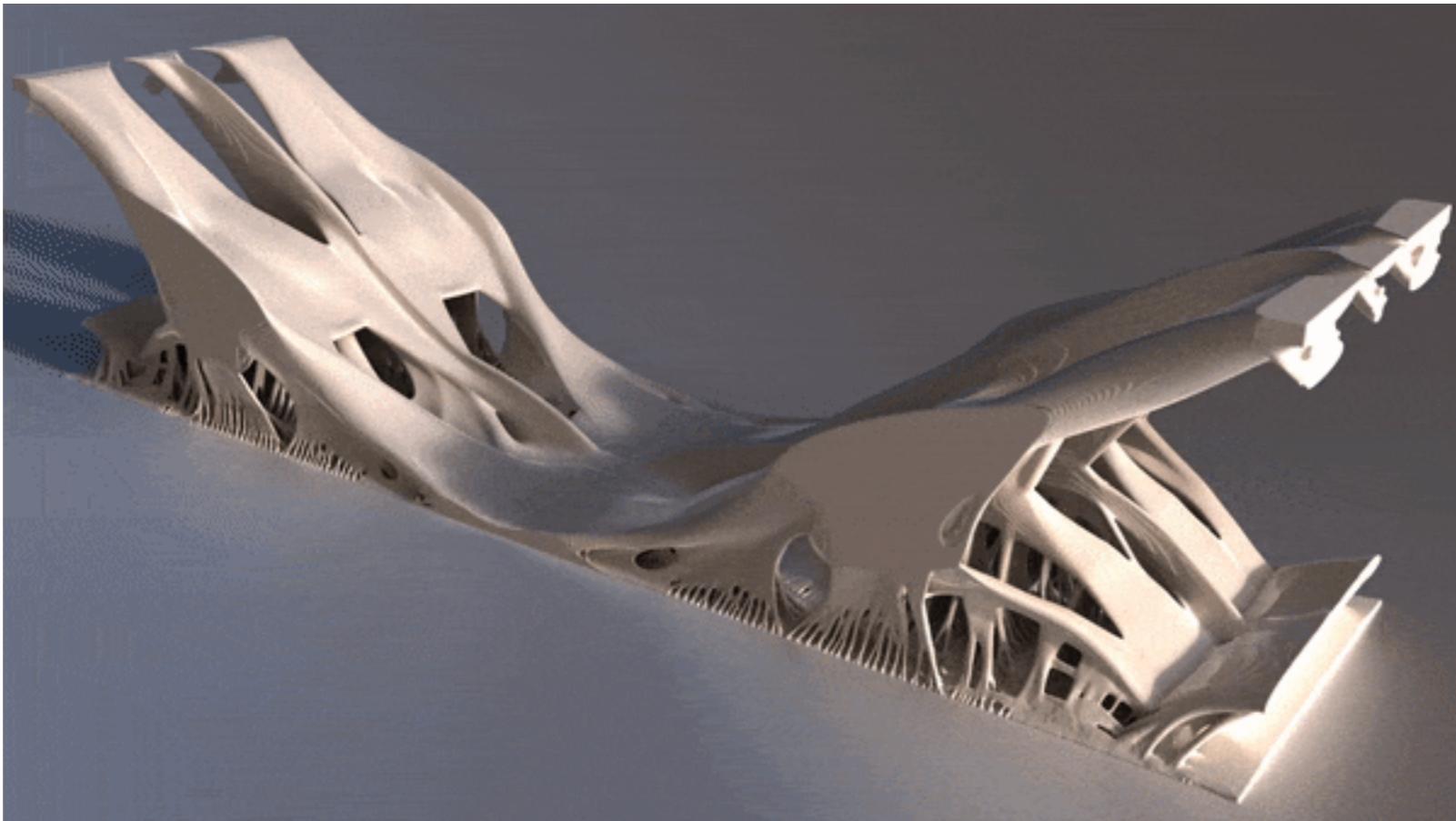
Present-day stuff : Cache optimized skinning



Present-day stuff : Fluids on heterogeneous computers

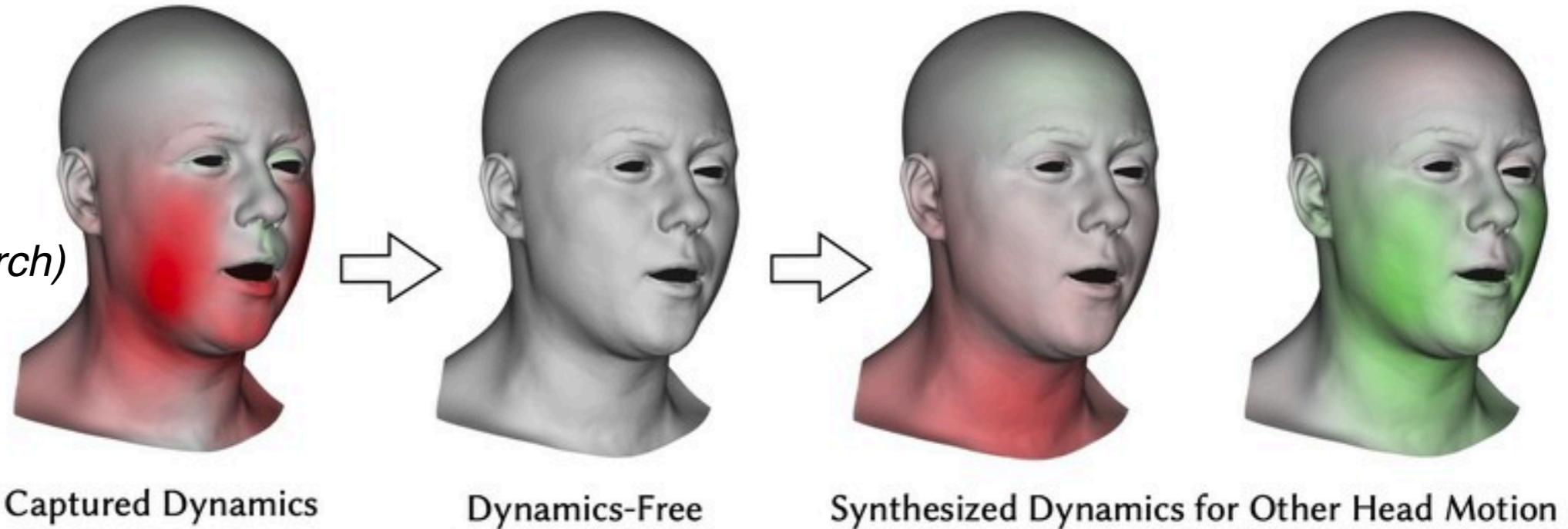


Present-day stuff : Computational Optimization of Structures



Present-day stuff : Facial animation for VFX (simulation & capture)

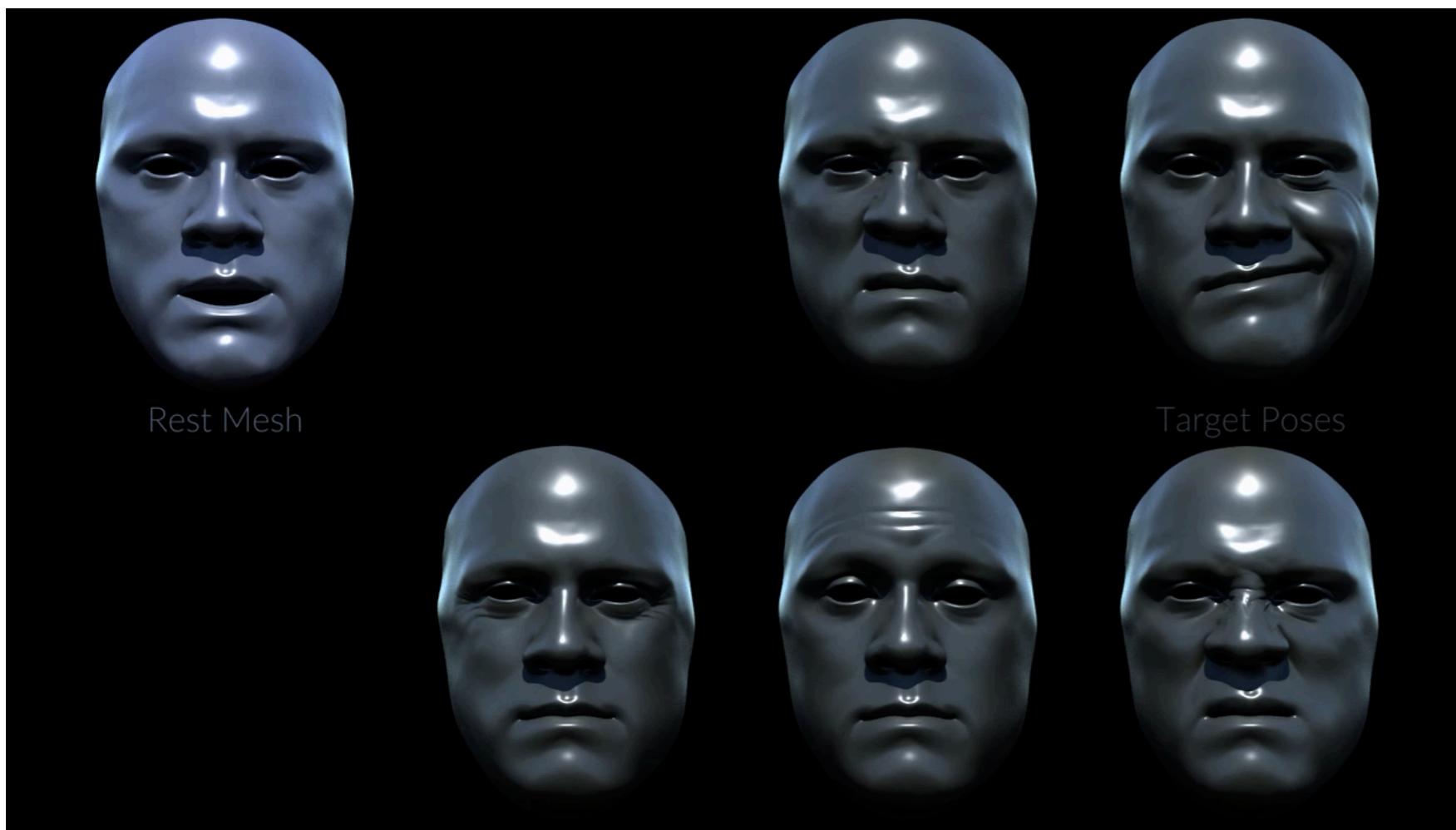
(With Disney Research)

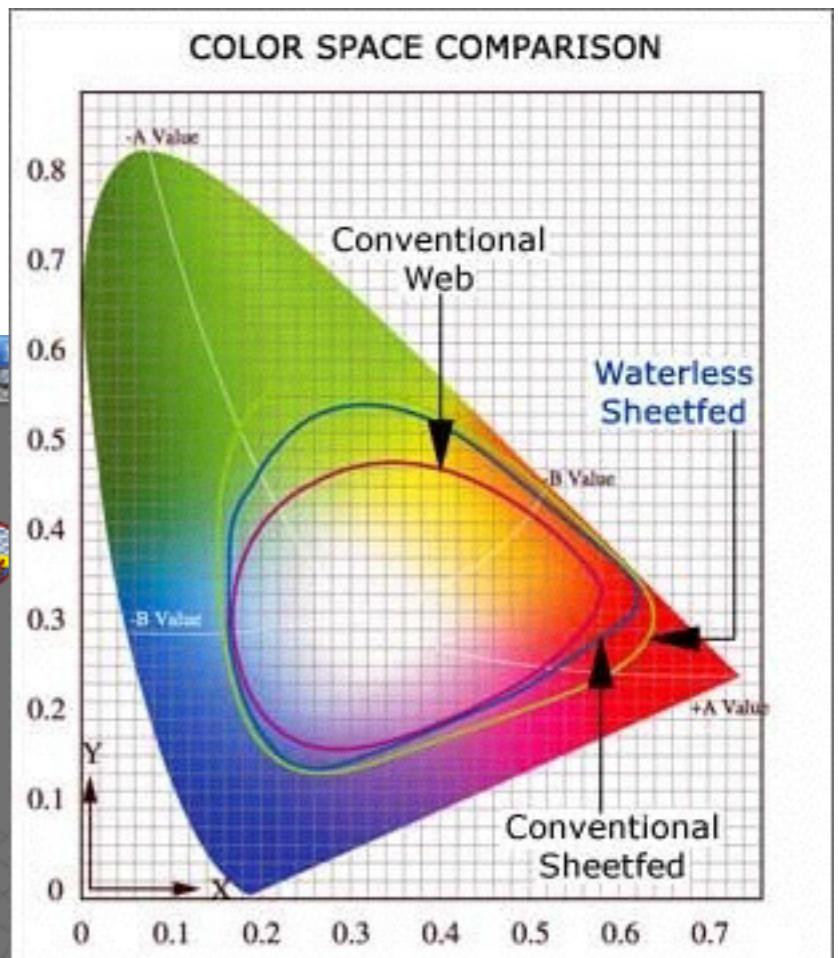
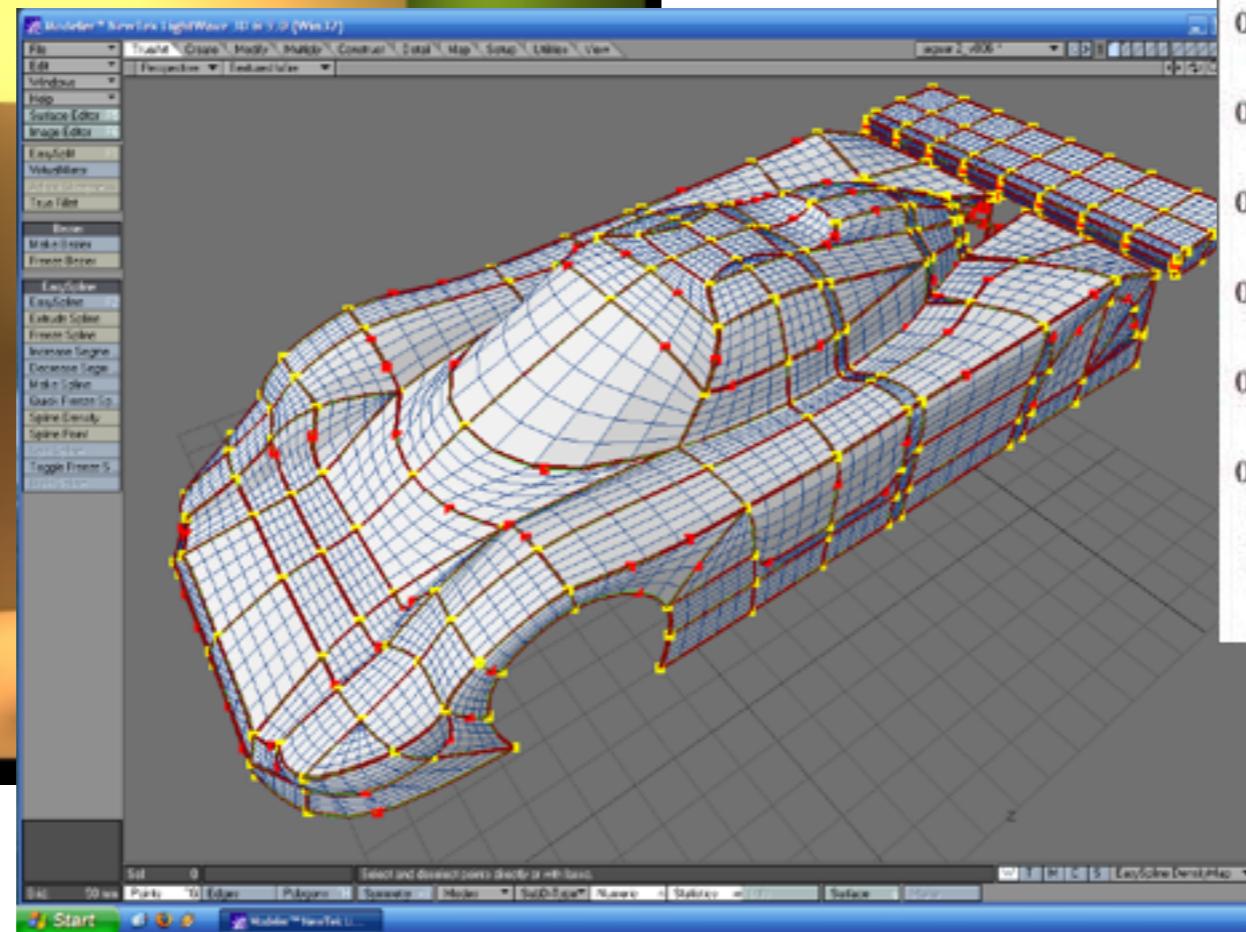
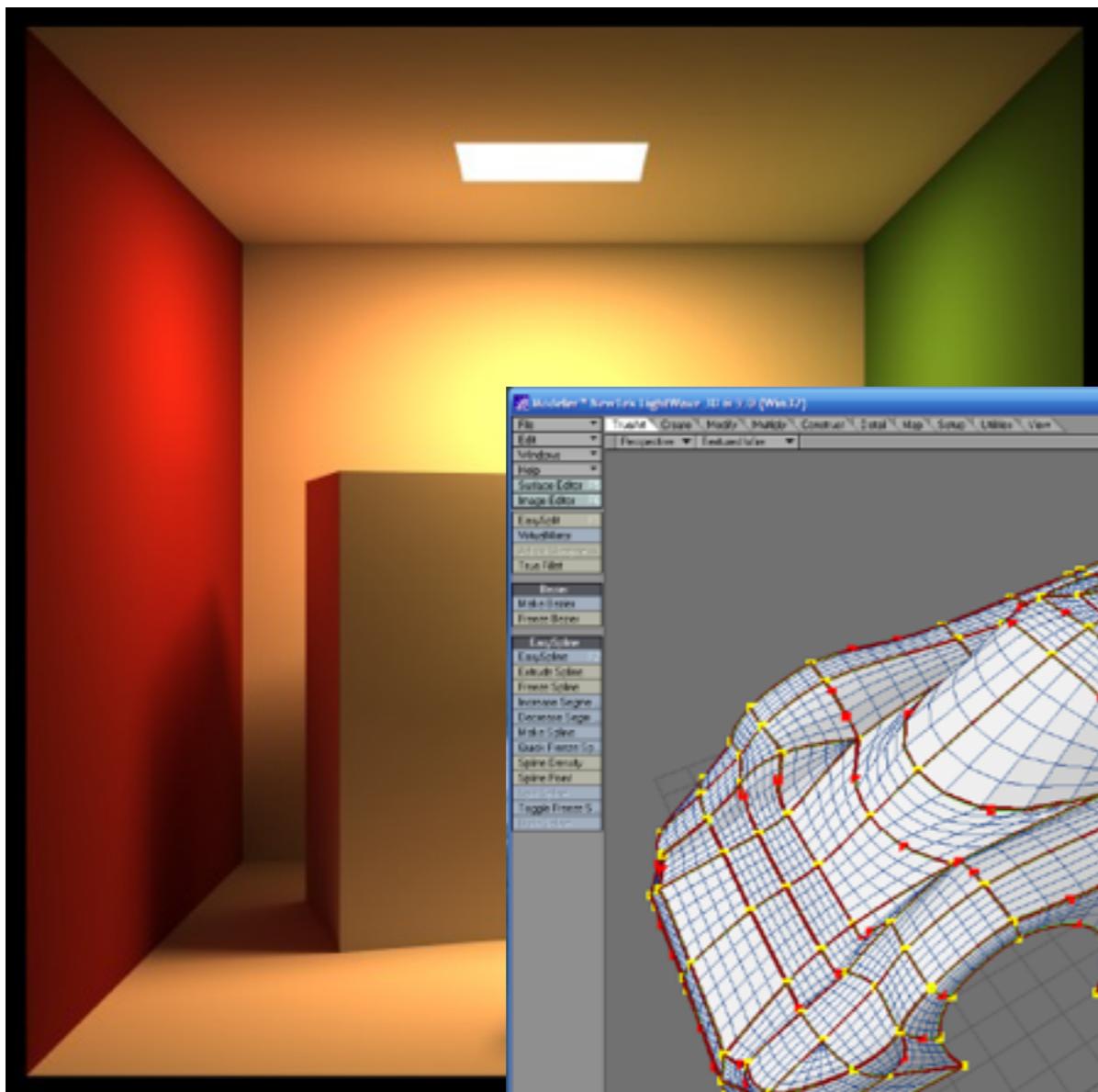


Rest Mesh

Target Poses

(With Weta Digital)





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