Tips for Giving Clear Talks

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Disclaimer: This talk uses example slides pulled from actual research talks presented at conferences such as SIGGRAPH and HPG. There are cases where I use slides as negative examples for the purposes of instruction. I hope that no offense will be taken by the authors (see tip 13).

Credit: I've received many suggestions on clear thinking and speaking from many individuals (Pat Hanrahan and Kurt Akeley to name a few)

My motivation

- I have found I give nearly the same feedback over and over to students making talks
  - It is not profound feedback, it is just application of a simple set of techniques and principles that are consistently useful when making talks
- I am hoping that:
  - These slides will serve as a useful checklist that you can refer to vet your own talks before delivering them to others
  - I still make these mistakes all the time when creating first drafts of talks
- This talk is structured as a list of principles and related tips
  - It is not a comprehensive guide to making a talk
  - Keep in mind internal lab meeting talks and conference presentations require substantially different levels of polish. I will try and note when a tip pertains primarily to polished public presentations.

Who painted this painting?

Salvador Dali (age 22)

My point: learn the basic principles before you consciously choose to break them

Philosophy: why give talks?

Two reasons to give talks

1. **Convey what you have discovered in your research to your peers**

   (Goal: don't tell the room what you did, tell the room the most important things they <u>should</u> know, but probably do not.)

2. **Get feedback from others to advance your own research**

   (Goal: put smart people in the best position to help you.)

Two BAD reasons to give talks

1. You believe it is a reward for getting a paper accepted
2. You were signed up for lab meeting
   (Presenting at lab meeting is an opportunity, not an obligation.)

Consider the costs of a bad (unclear) talk

- To the audience:
  - 1 hour x 20 people = 20 person-hours of work
  - General unhappiness

- To you:
  - Missed opportunity for feedback or quality discussion
  - Missed opportunity for collaborations
  - Diminished impact of your work

Benefit TO YOU of a good (clear) talk

- Non-linear increase in impact of work
  - Others are more likely to read the paper
  - Others are more likely to come up to you after the talk

- Clarity is highly prized in the world: the audience remembers you
  - “Hey man, that was a great talk yesterday… are you looking for a postdoc anytime soon?”

1.

Achieving clarity tip 1:

Choose your audience

Strive for clarity within that audience

- You should aim for your target audience to understand <u>everything</u> you say in a talk

  (if they won't understand, why are you saying it?)

- This means you have to put yourself in your audience's shoes
  - Even if you are targeting experts (e.g., your advisors or peers), experts haven't been thinking about your problem 60 hours a week
  - The ability to analyze your own talk from the perspective of others is a skill young researchers struggle with tremendously. *

- It is reasonable to target two audiences
  - The experts that should understand everything
  - A broader audience that might understand all but the most technical 20%

* And so is it not surprising that most of the tips in this talk address how the audience will react

2.

The audience prefers not to think (much)

The audience has a finite supply of mental effort

- **The audience does not want to burn mental effort about things <u>you know</u> and can just tell them.**
  - **They want to be led by hand through the major steps of your story**
  - **They do not want to interpret any of your figures or graphs, they want to be told how to interpret them (what to look for).**

- **The audience <u>does</u> want to spend their energy thinking about:**
  - **Potential problems/limitations with what you did (did you consider all edge cases?)**
  - **Implications of your approach**
  - **Connections to their own work**

Examples of tip #2 are interspersed throughout this talk.

(so I'll move on and point them out as we go)

3.

A good principle for any talk (or paper): “Every sentence matters”

Assess the value of why you are saying something. If you can’t justify how it will help the listener, take it out.

4.

The intro: applying “every sentence matters”

Intros and background are often very poor

- Too many talks have rote introductions and related work
- In a talk these sections do not exist for academic completeness
  - Many people in graphics know that global illumination is important to realistic image synthesis.
  - No one cares if citations are comprehensive
- They exist to set the context for the technical components of the talk. Specifically…

The goal of the intro and background is to tell the listener: "Here is the right way to think about the problem I am trying to solve."

Bad example 1

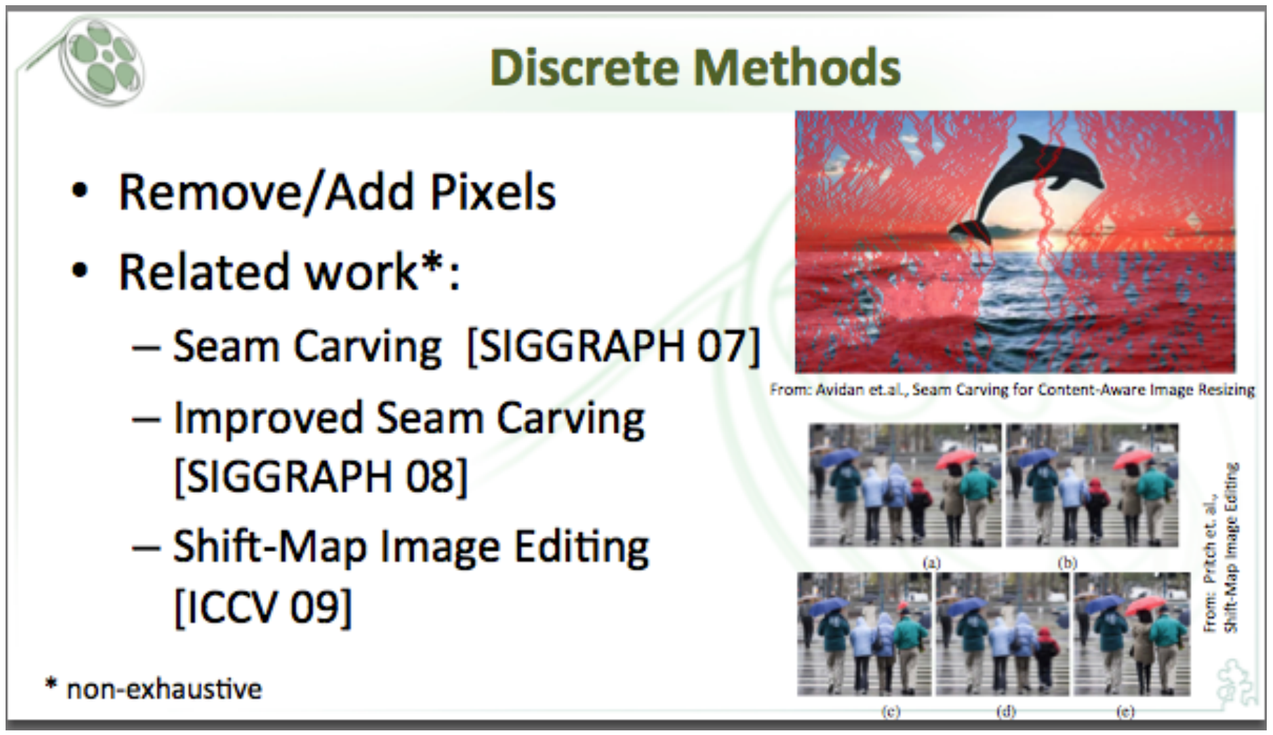
- Never ever, ever, ever do this!

Outline

- Introduction
- Related Work
- Proposed System Architecture
  - Basic design decision
  - Dedicated hardware for T&I
  - Reconfigurable processor for RGS
- **Results and Analysis**
- **Conclusion**

Bad example 2

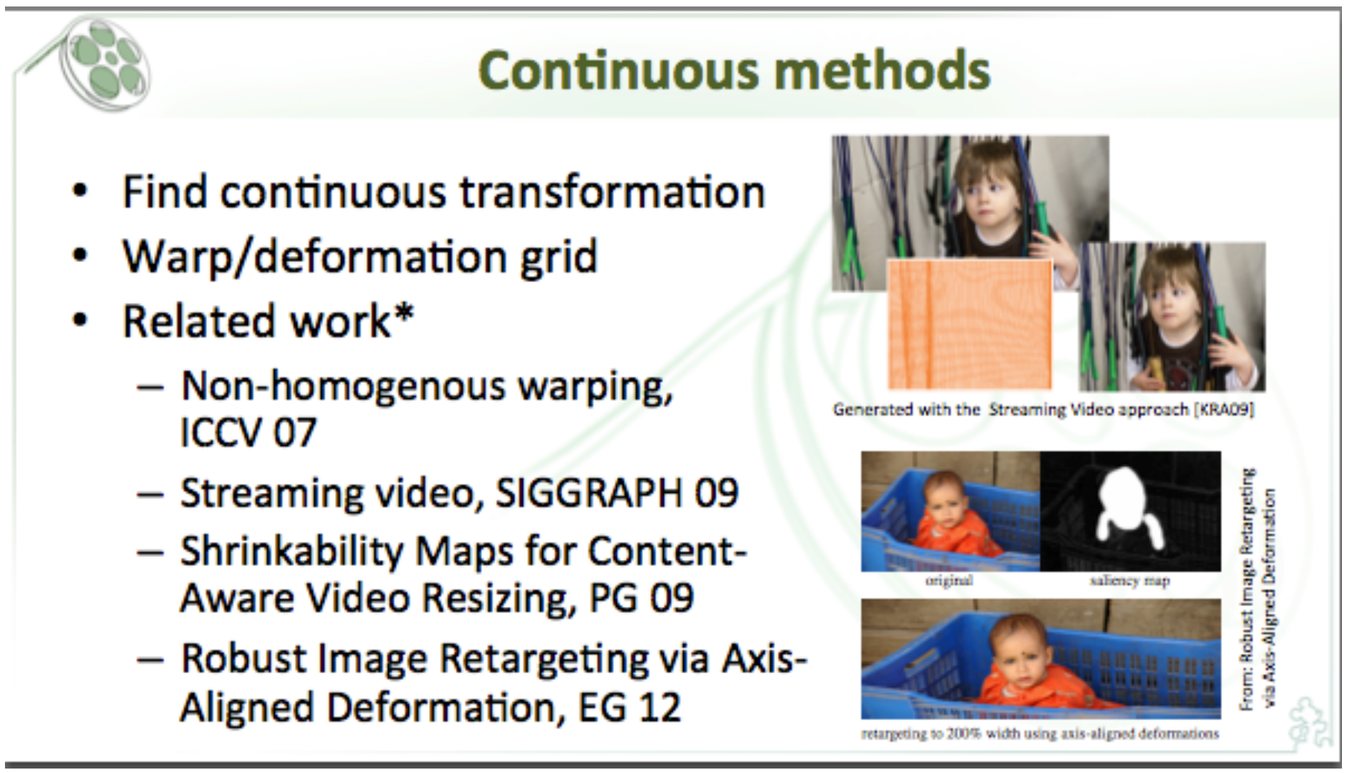
- **Who is the audience for this? (how does this benefit them?)**



- **Experts?**
  - **They likely know these papers exist. These slides don't tell them what about these papers is most relevant to this talk**
- **Non-experts?**
  - **They won't learn the related work from these two slides**

This type of related work section says little more than "others have worked in this area before".

- **I suspect your audience assumes this is the case.**
- **Every sentence matters: if it doesn't provide value, take it out (or replace it with comments that do provide value)**



The goal of the intro and background is to tell the listener: "Here is the right way to think about the problem I am trying to solve."

An excellent strategy to catch the audience's attention and frame the story is to make them aware that there is something they didn't know they didn't know.

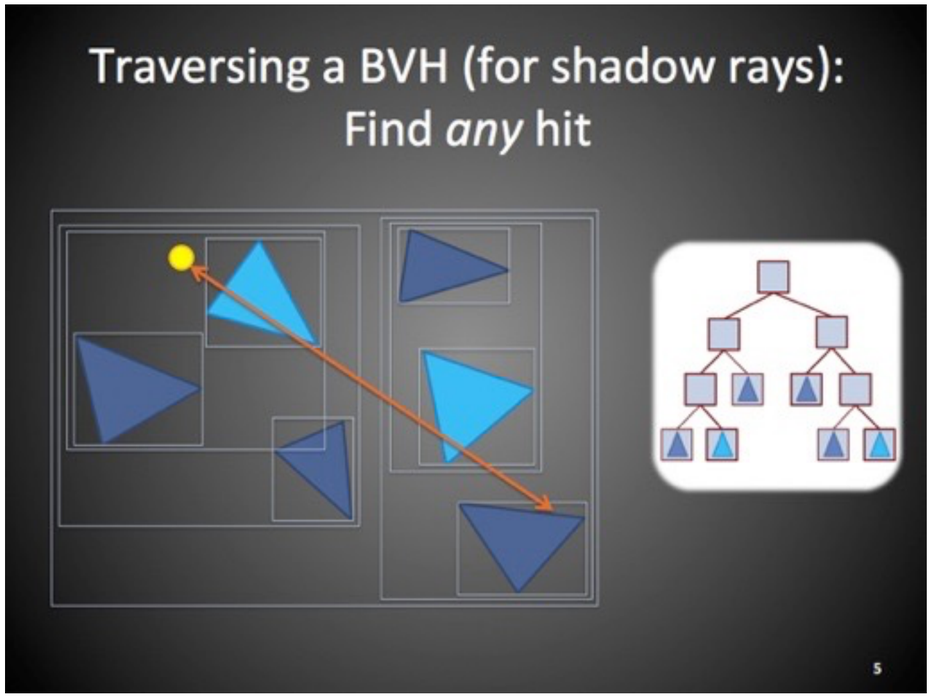
("You might think you know this, but here's a new angle on it")

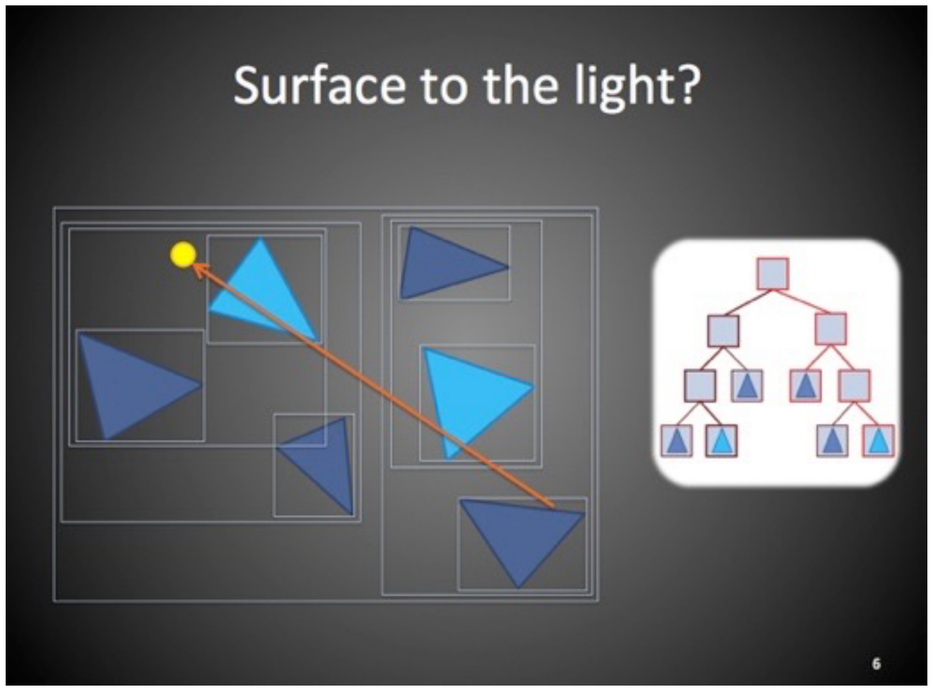
The goal of the intro and background is to tell the listener: "Here is the right way to think about the problem I am trying to solve."

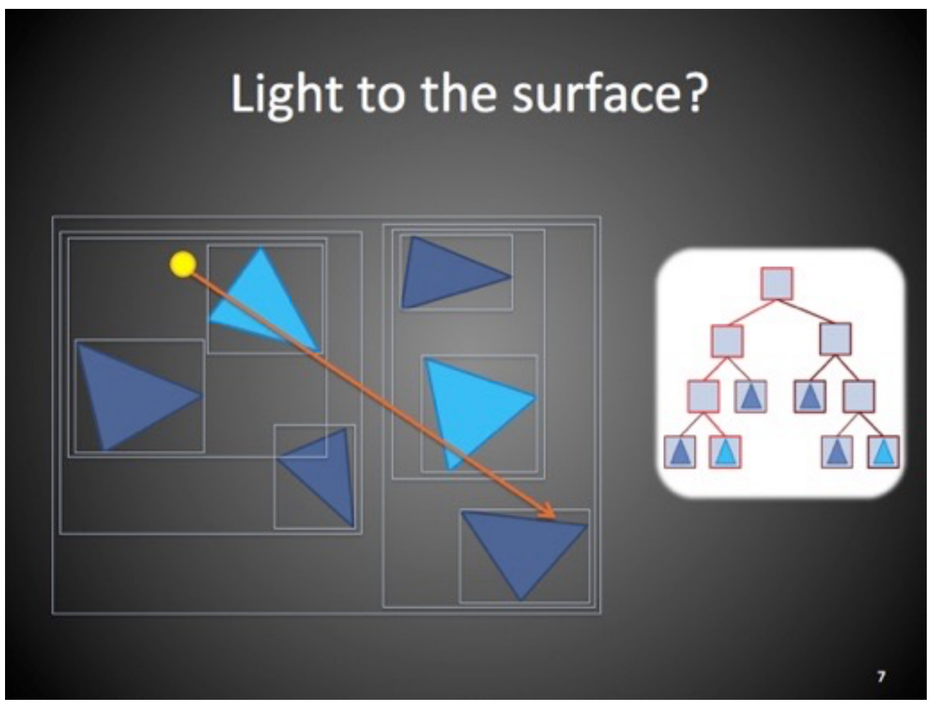
Example: Feltman et al. 2012:

Talk intro simply asked the question: "Do you know whether it is more efficient for a shadow ray to be traced from the light source to the surface or from the surface point towards the light? It's not so obvious is it?"

Do you know whether it is more efficient for a shadow ray to be traced from the light source to the surface or from the surface point towards the light? It's not so obvious is it?

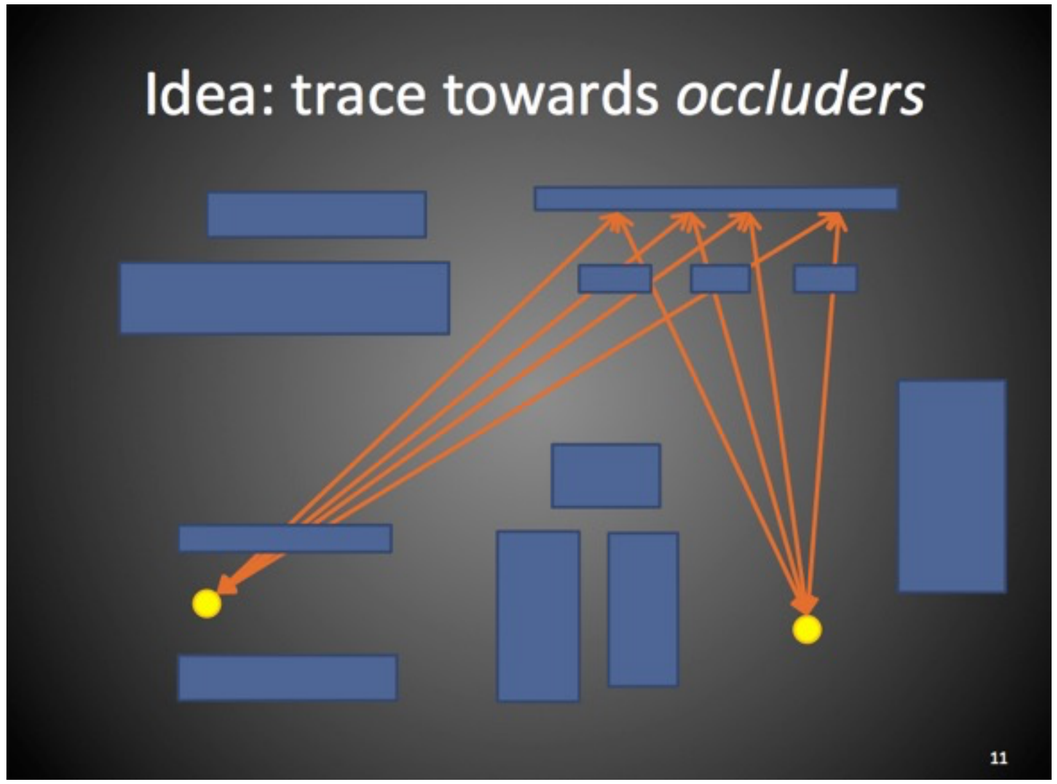






Opening three slides
[Feltman et al. 2012]

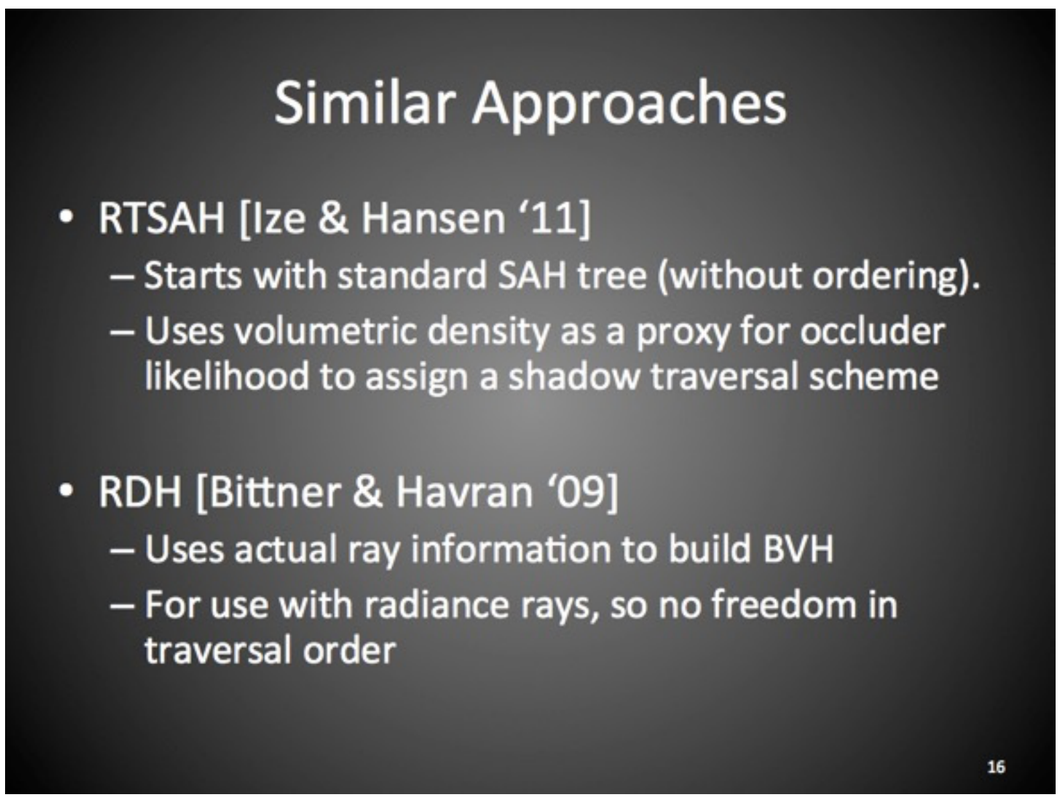
The goal of the intro and background is to tell the listener: "Here is the right way to think about the problem I am trying to solve."



Key insight of the work:

It's not a question of front-to-back or back to front, it's a question of understanding where the occluders likely to be? So the real question to ask is: how do we guess where the occluders might be?

Audience: "Gee, that's a good point, this person has something to say. I should not check email."



And here's how prior work attempts to "guess where the occluders are" …

(note: this framing made the specific details of prior work less important than the fact that they are all different ways of addressing the problem of guessing where occluders are in a scene)

The goal of the intro and background is to tell the listener: "Here is the right way to think about the problem I am trying to solve."

An excellent strategy to catch the audience's attention and frame the story is to make them aware that there is something they didn't know they didn't know.

("You might think you understand this, but here's a new angle on it")

Regardless of whether you adopt the above technique to define how to think about the problem...

Related work should be discussed in your framing of the space.

Establishing this framing is the primary value of the intro.

(If done well, your solution will seem obvious given this framing. And that's a good thing!)

5.

Establish inputs, outputs, and constraints (goals and assumptions)

Establish goals and assumptions early

- Given these inputs, we wish to generate these outputs
- We are working under the following constraints
  - Example: the outputs should have these properties
  - Example: the algorithm…
    - Should be real-time
    - Should be parallelizable
    - Cannot require artist intervention
    - Must be backward compatible with this content creation pipeline

Your contribution is typically a system or algorithm that meets the stated goals under the stated constraints.

6.

Surprises* are almost always bad:

Say <u>where</u> you are going and why you must go there before you say <u>what</u> you did.

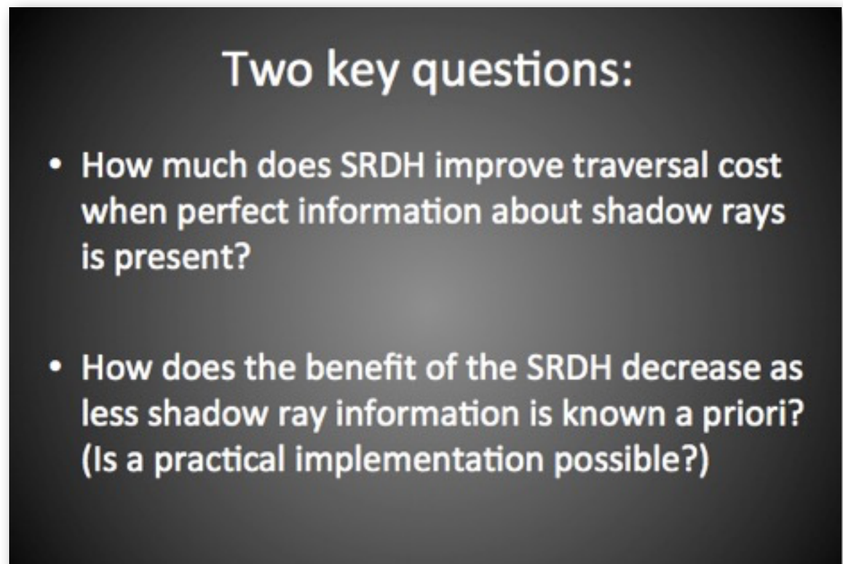
* I am referring to surprises in talk narrative and/or exposition. A surprising result is great.

Give the <u>why</u> before the <u>what</u>

- **<u>Why</u> provides the listener context for…**
  - Compartmentalizing: assessing how hard they should pay attention (is this a critical idea, or just an implementation detail?). Especially useful if they are getting lost.
  - Understanding how parts of the talk relate ("Why is the speaker now introducing a new optimization framework?")

- **In the algorithm description:**
  - "We need to first establish some terminology"
  - "Even given X, the problem we still haven't solved is…"
  - "Now that we have defined a cost metric we need a method to minimize it…"

- **In the results:**
  - Speaker: "Key questions to ask about our approach are…"
  - Listener: "Thanks! I agree, those are good questions. Let's see what the results say!"



* This slide is an example of "audience does not want to waste mental effort on things you can tell them"

Big surprises in a narrative are a bad sign

- **Ideally, you want the audience to always be able to anticipate* what you are about to say**
  - **This means: your story is so clear it's obvious!**
  - **It also means the talk is really easy to present without notes or text on slides (it just flows)**

- **If you are practicing your talk, and you keep forgetting what's coming on the next slide (that is, you can't anticipate it)…**
  - **This means: you probably need to restructure your talk because a clear narrative is not there.**
  - **It's not even obvious to you! Ouch!**

*** Credit to Abhinav Gupta for suggesting the term anticipation, and for the example on this slide**

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Organize your talk with section slides

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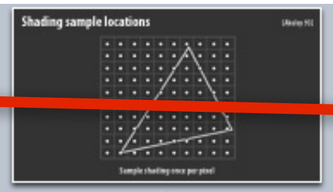

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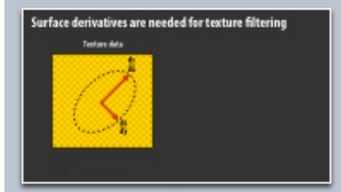

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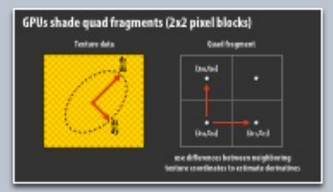

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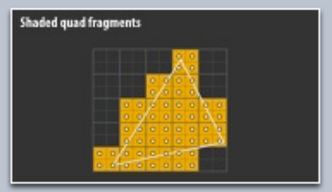

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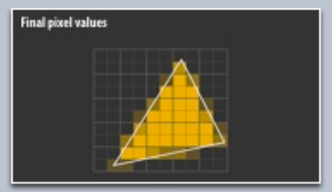

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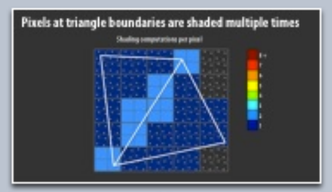

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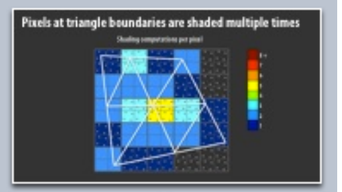

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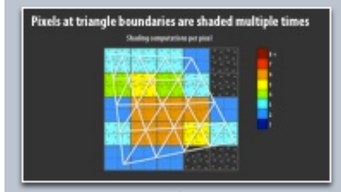

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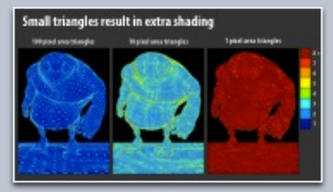

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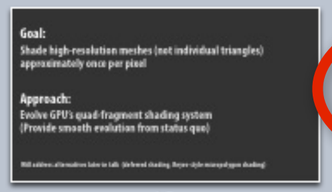

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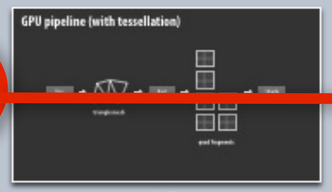

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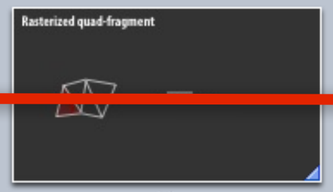

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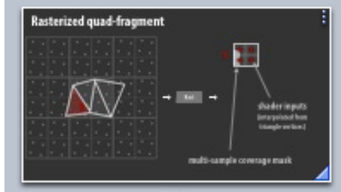

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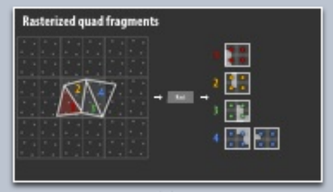

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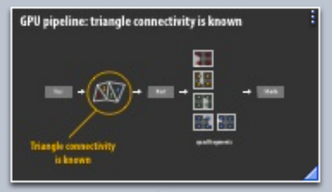

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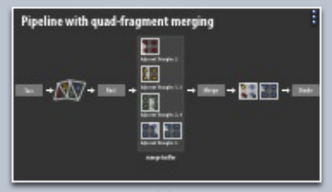

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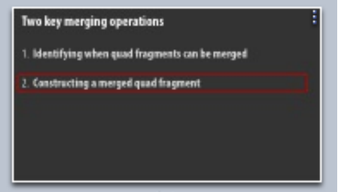

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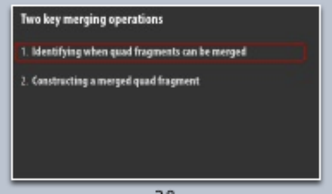

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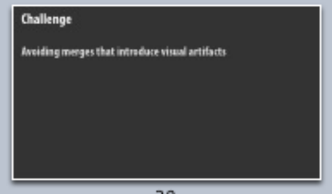

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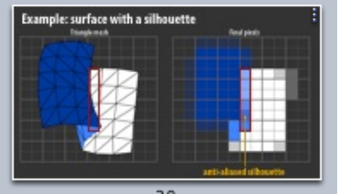

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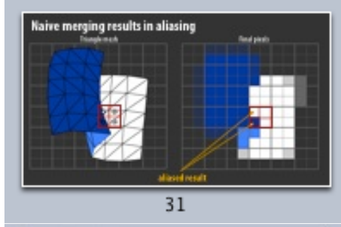

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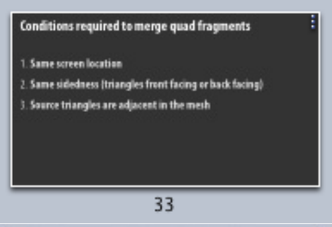

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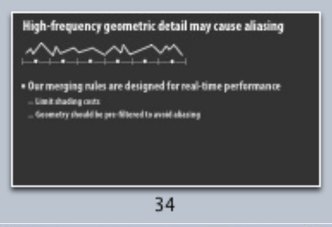

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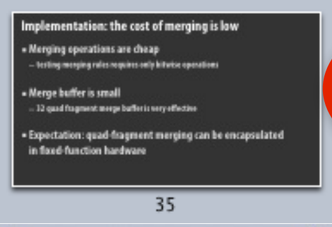

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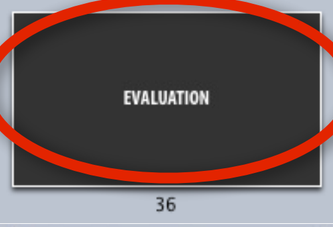

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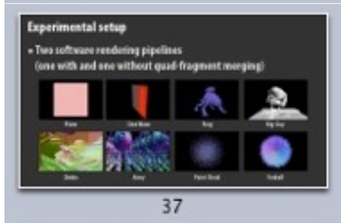

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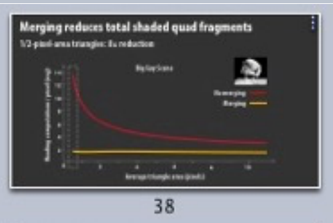

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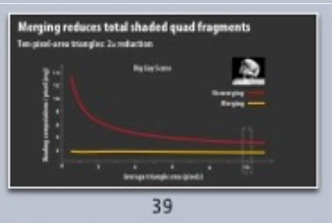

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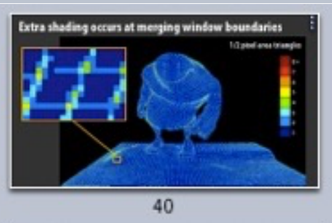

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I'm about to frame the problem in my terms

Ok, let's talk about our solution

Let's take a look at how well it works

Of course there are some potential alternatives that we didn't go with

Let me wrap up

Stage your talk with section slides

- **Useful for your audience**
  - It provides guidance for <u>what</u> you hope to achieve next (no surprises!)
  - Compartmentalization: it's absolutely clear where the shifts are
  - If a listener got lost, it's a good place for them to re-engage
  - It's a place for the audience to take a breath
  - It gives the talk a more colloquial tone

- **Useful for you**
  - It's a chance for you to pause and take a breath
  - It's a great breakdown of the talk for practicing subsections

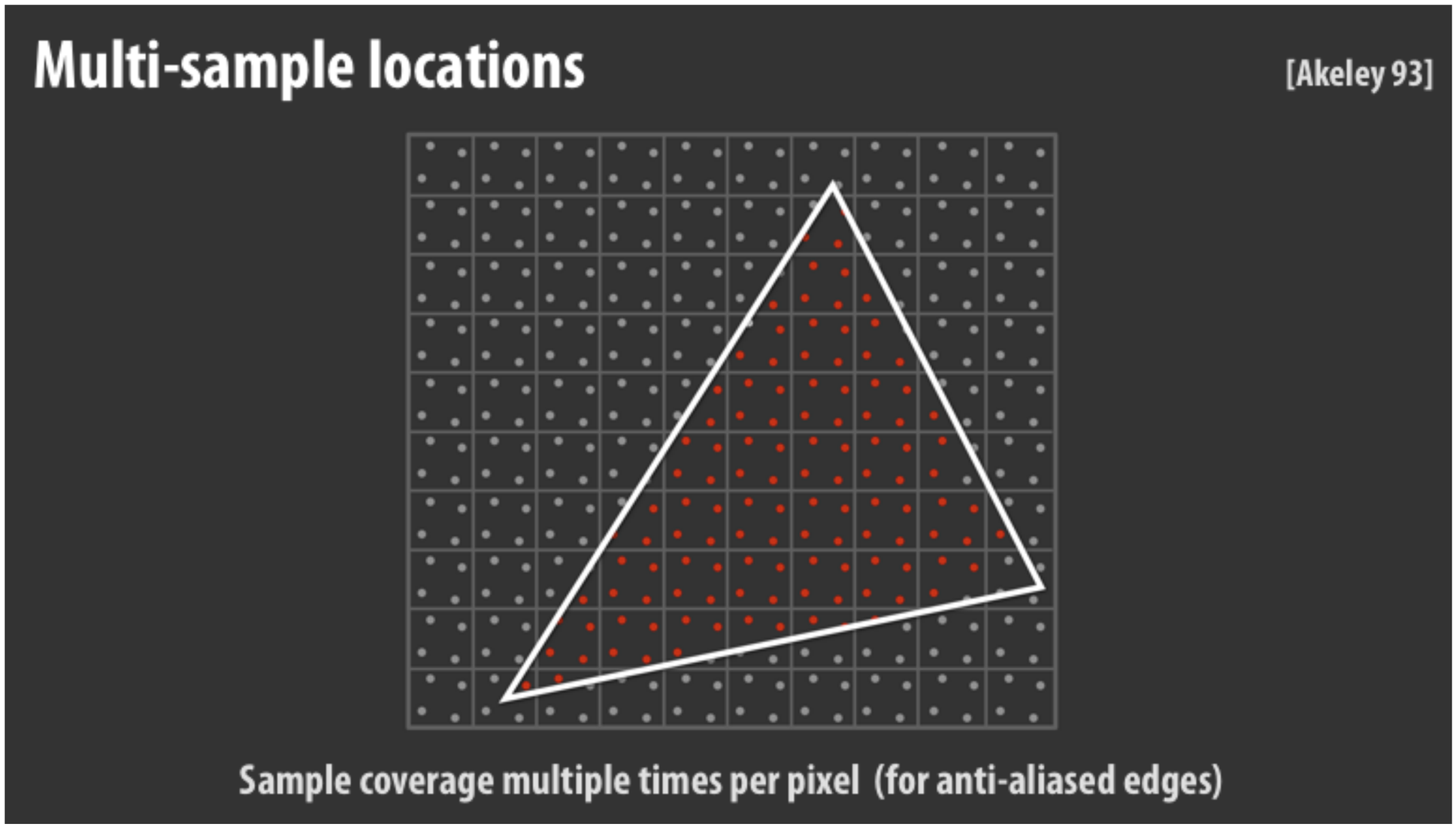
8.

Always, always, always explain any figure or graph

(remember, the audience does not want to think about things you can tell them)

Explain every figure

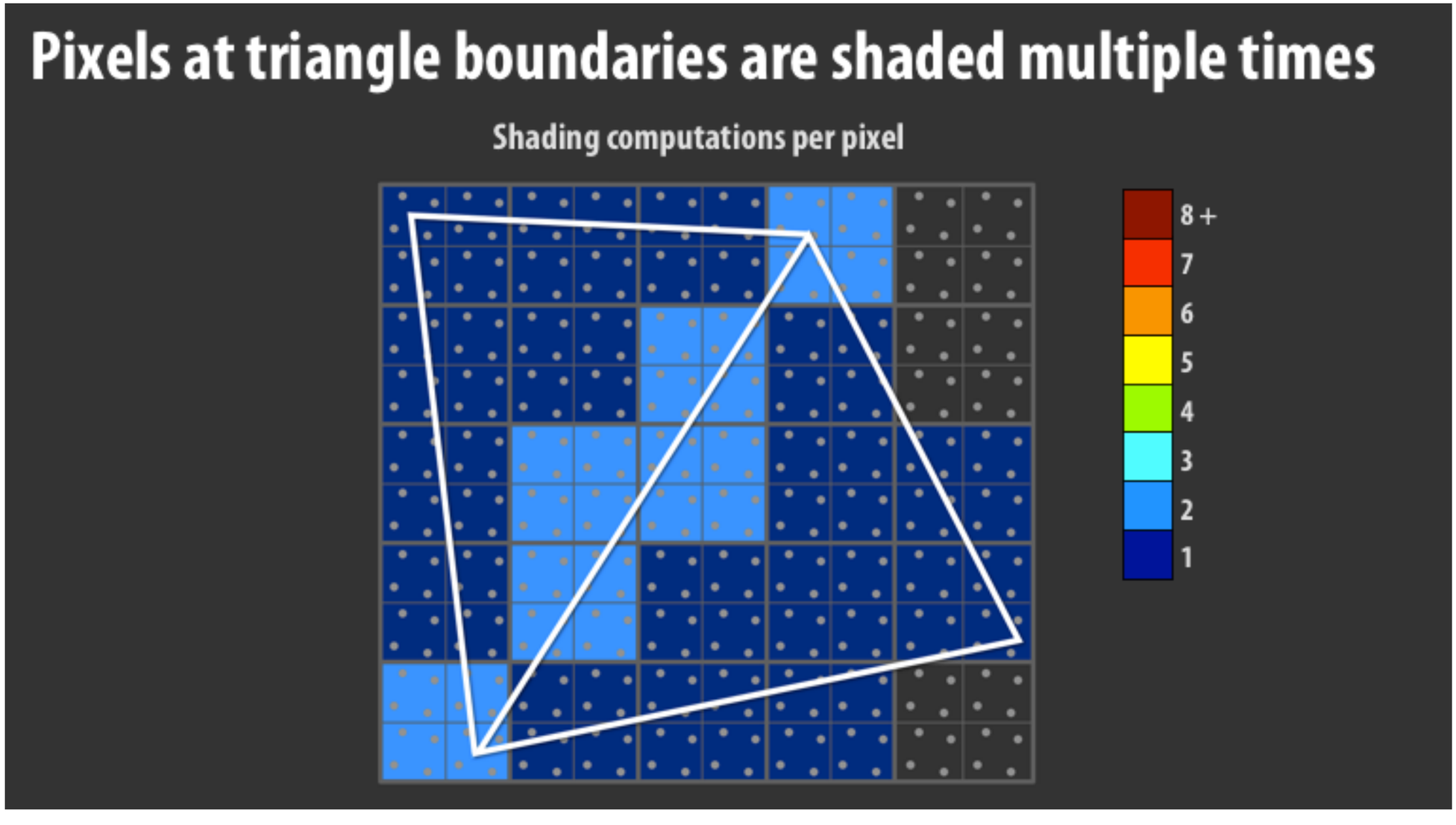
- Explain every visual element used in the figure (don't make the audience decode a figure)
- Refer to highlight colors explicitly (explain why the visual element is highlighted)



Example voice over: "Here I'm showing you a pixel grid, a projected triangle, and the location of four sample points at each pixel. Sample points falling within the triangle are colored red.

Explain every figure

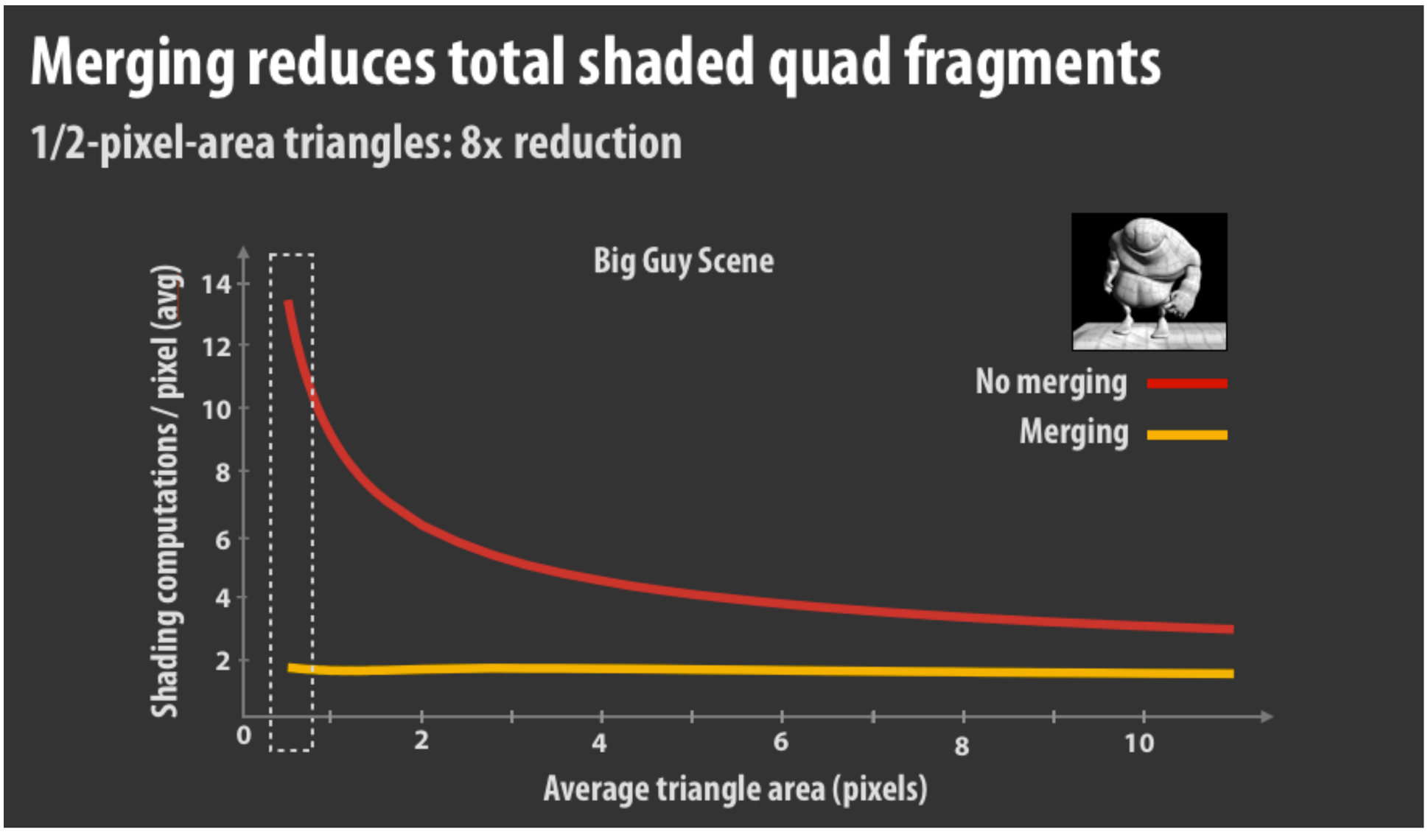
- Lead the listener through the key points of the figure
- Useful phrase: "As you can see…"
  - It's like verbal eye contact. It keeps the listener engaged and makes the listener happy… "Oh yeah, I can see that! I am following this talk!"



Example voice over: "Now I'm showing you two adjacent triangles, and I'm coloring pixels according to the number of shading computations that occur at each pixel as a result of rendering these two triangles. As you can see from the light blue region, pixels near the boundary of the two triangles get shaded twice.

Explain every results graph

- May start with a general intro of what the graph will address (anticipate result)
- Then describe the axes (and your axes better have labels!)
- Then describe the <u>one point</u> that you wish to make with this results slide (more on this later!)



Example voice over: "Our first questions were about performance: how much did merging reduce the number of the shaded quad fragments? And we found out that the answer is a lot. This figure plots the number of shading computations per pixel when rendering different tessellations of the big guy scene. X-axis gives triangle size. If you look at the left side of the graph, which corresponds to a high-resolution micropolygon mesh, <u>you can see</u> that merging, shown by yellow line, shades over eight times less than the convention pipeline.

9.

In the results section:

One point per slide!

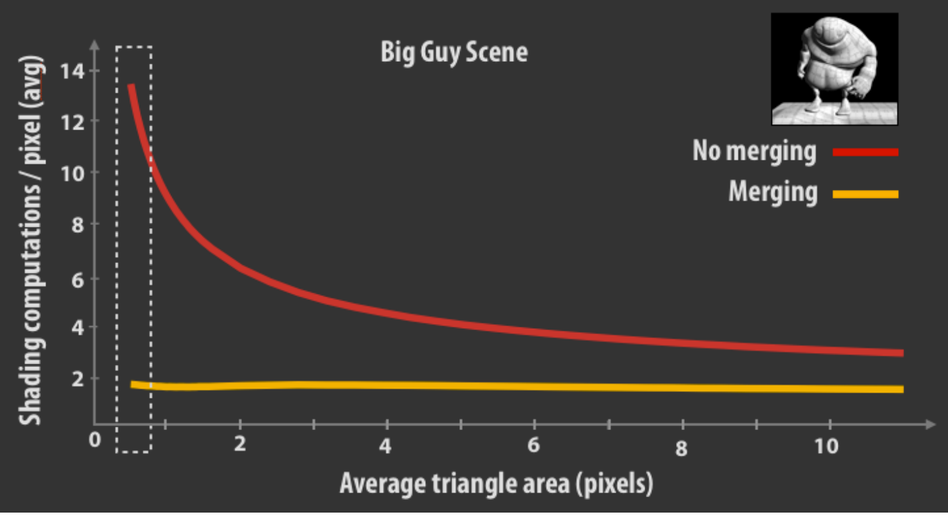
One point per slide!

One point per slide!

(and the point is the title of the slide!!!)

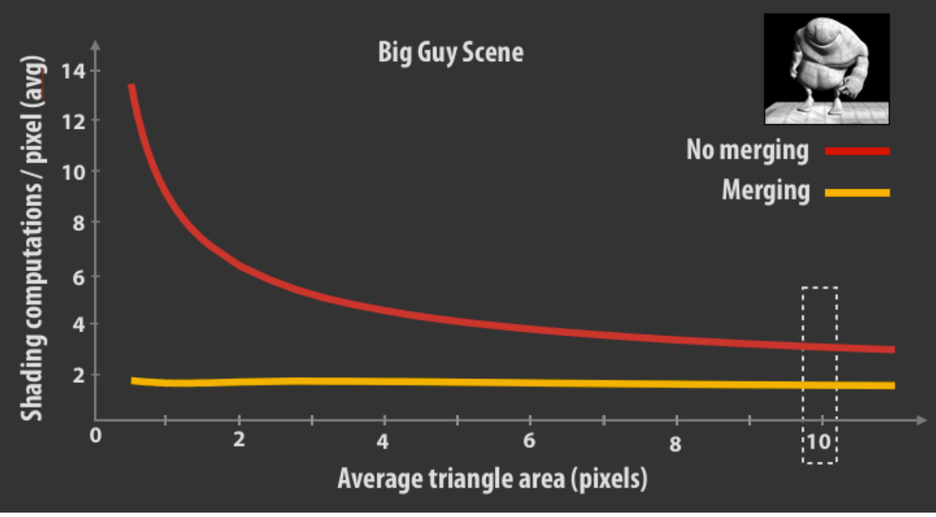
Merging reduces total shaded quad fragments

1/2-pixel-area triangles: 8x reduction

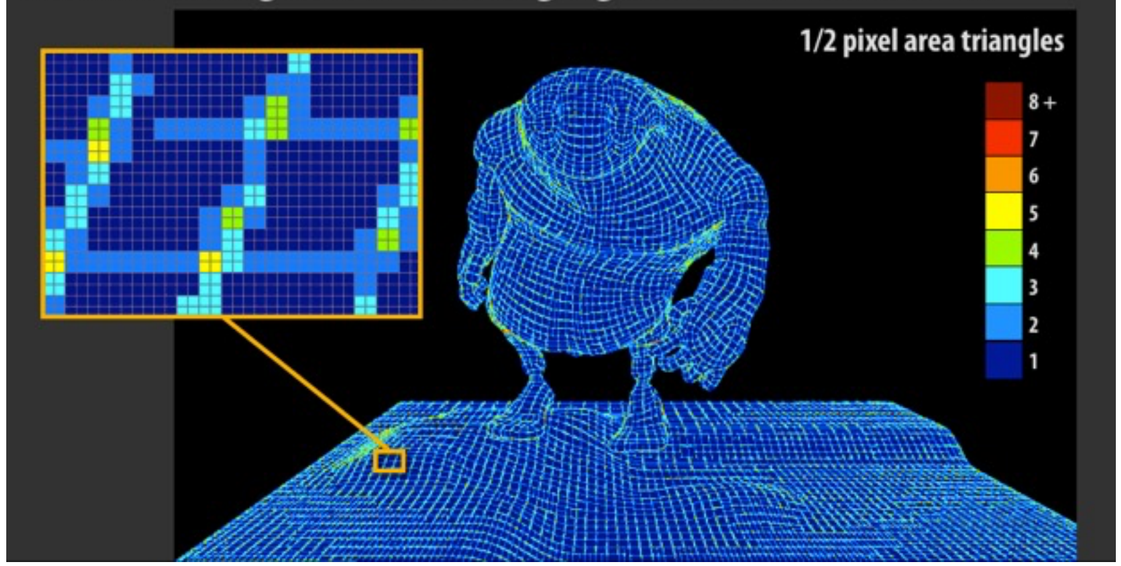


Merging reduces total shaded quad fragments

Ten-pixel-area triangles: 2x reduction

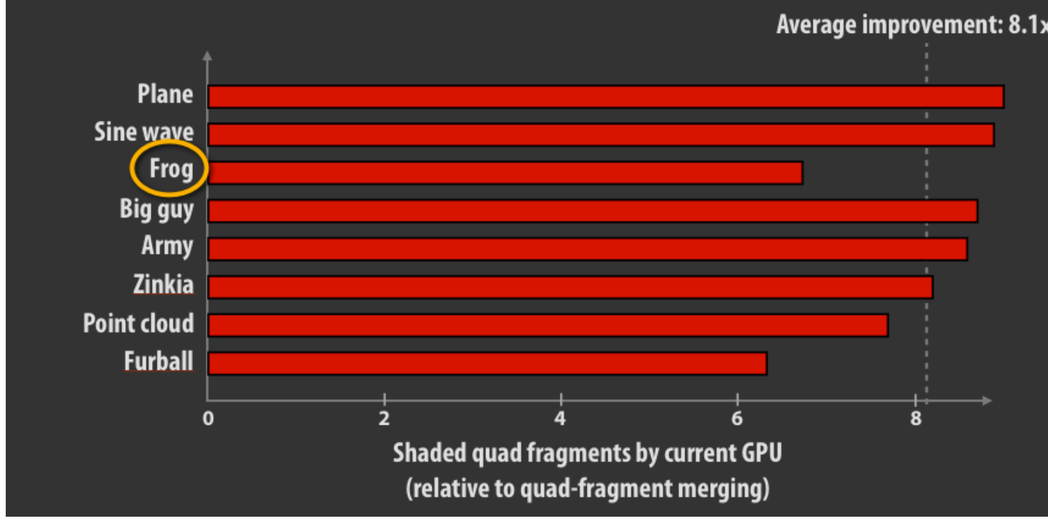


Extra shading occurs at merging window boundaries

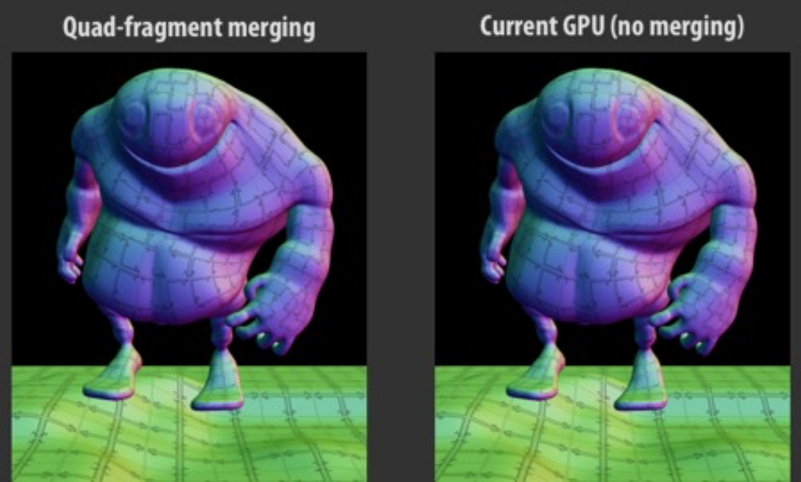


For micropolygons: factor of eight across scenes

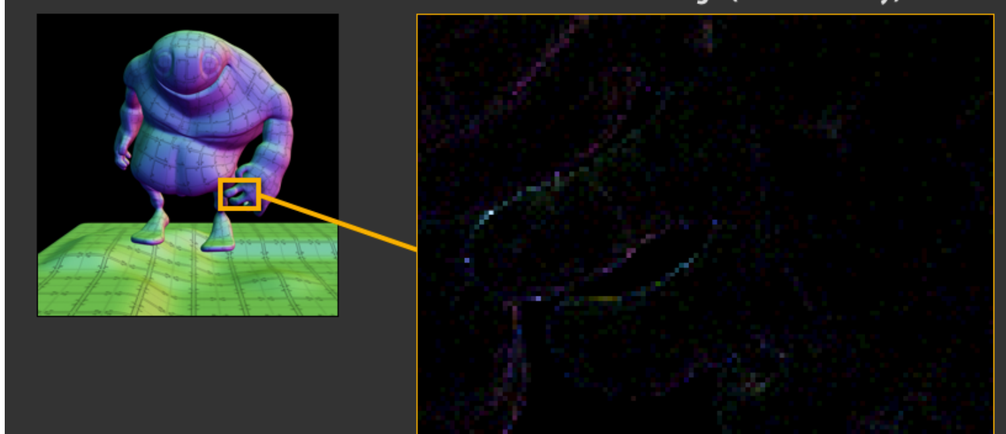
1/2 pixel area triangles

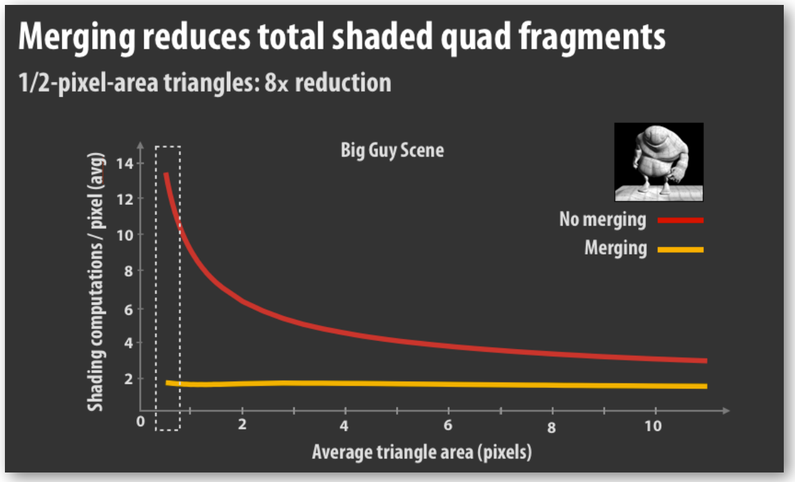


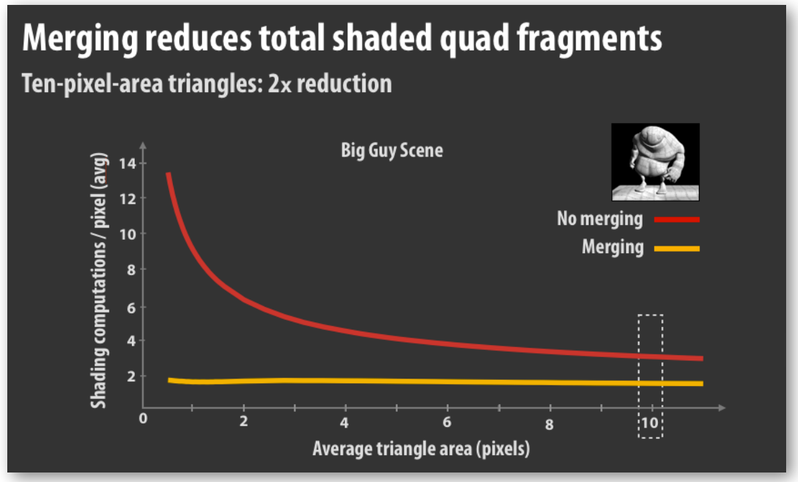
Nearly identical visual quality

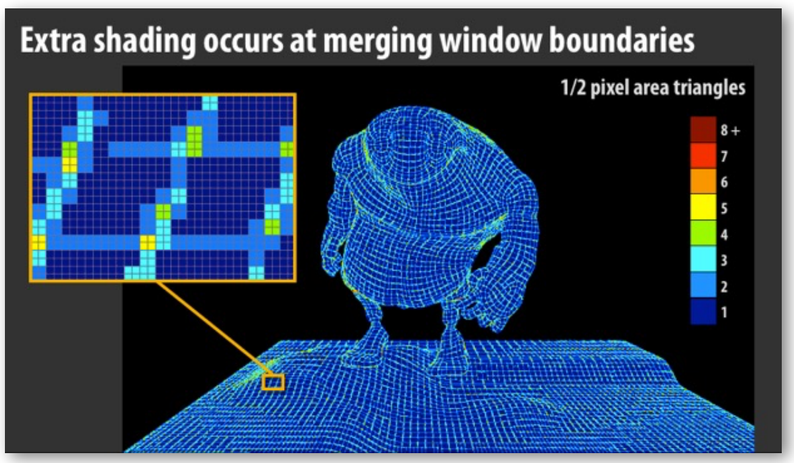


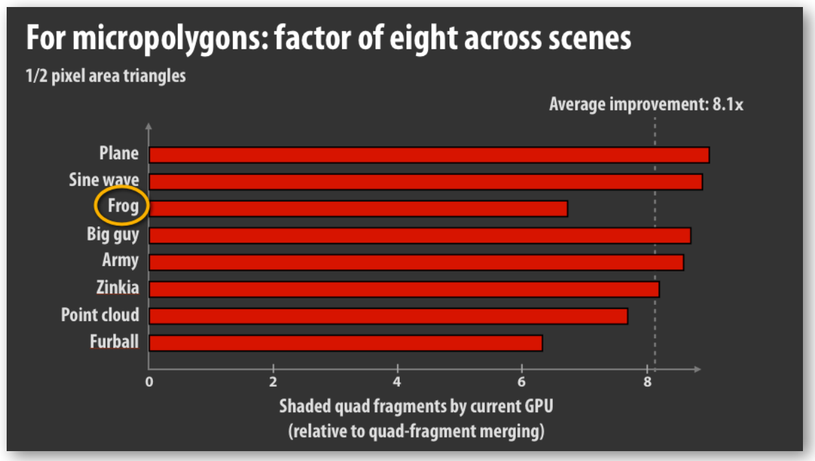
Differences exist near silhouettes

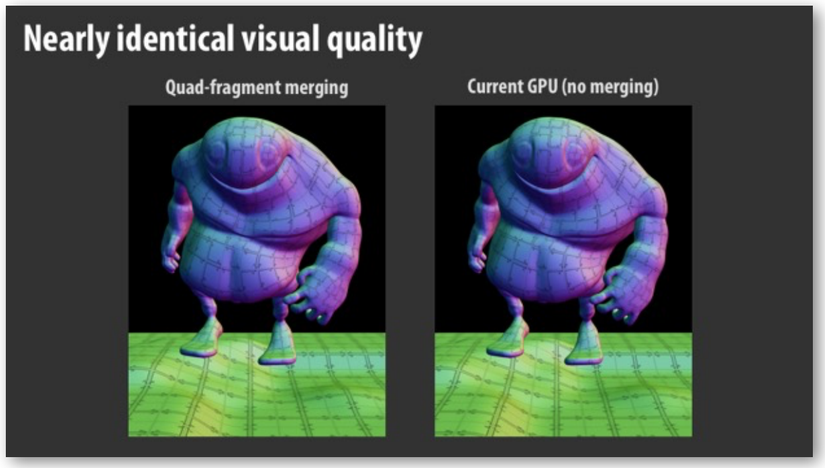


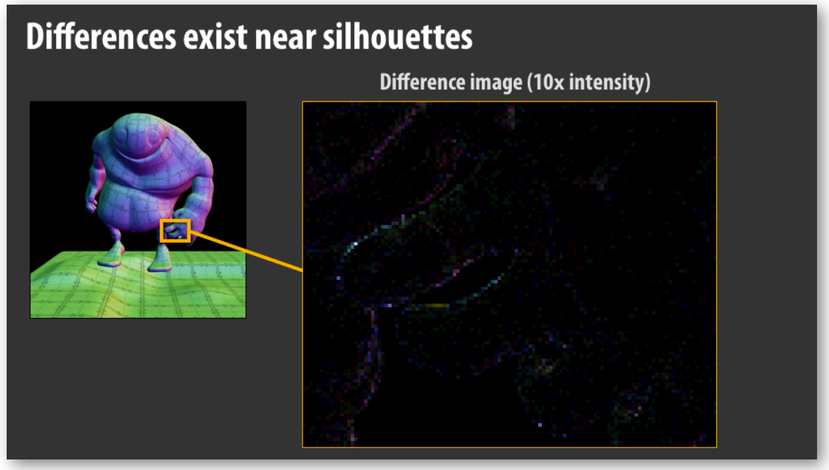










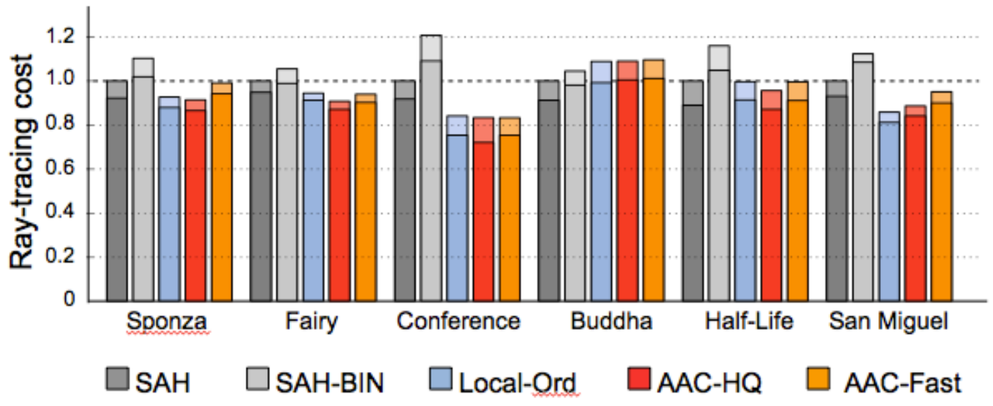


- **Place the point of the slide in the title:**
  - **Provide audience context for interpreting the graph (“Let me see if I can verify that point in the graph to check my understanding”)**
  - **Another example of the “audience prefers not to think” principle**

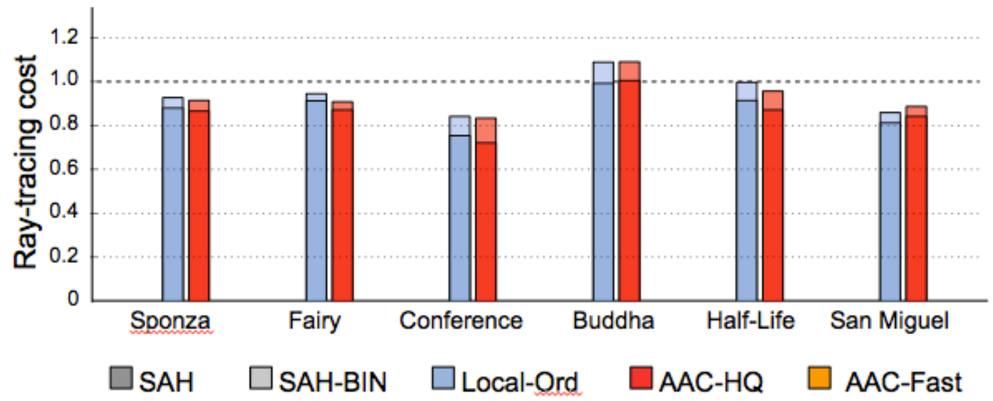
One point per results slide: a second example

TREE COST COMPARISON

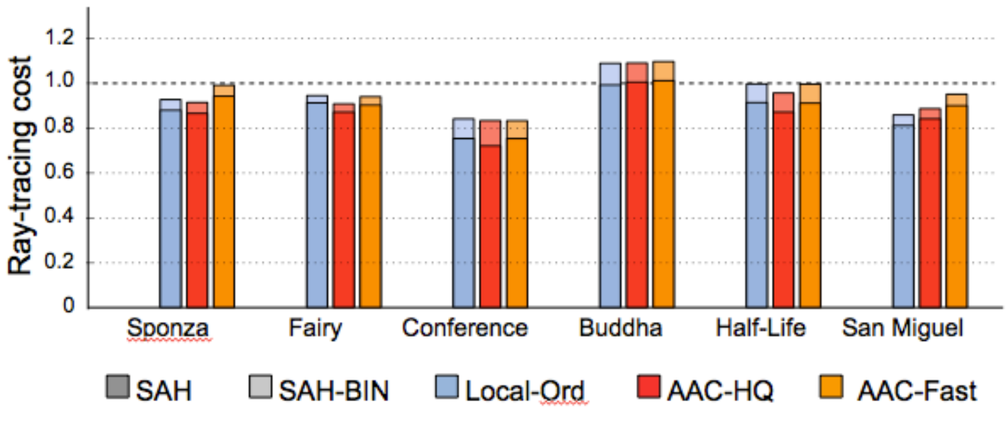
- Cost = number of traversal steps + intersection tests during ray tracing.



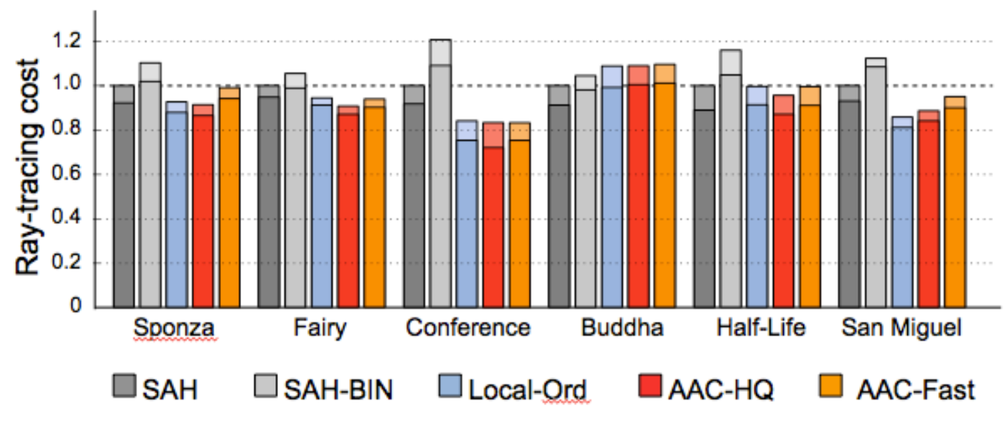
AAC-HQ produces BVHs that have similar cost as those produced by true agglomerative clustering builds.



AAC-Fast produces BVHs with equal or lower cost than the **full sweep build** in all cases except Buddha.



AAC-Fast produces BVHs with equal or lower cost than the **full sweep build** in all cases except Buddha.



[Gu et al. 2013]

Corollary to the one point per slide rule

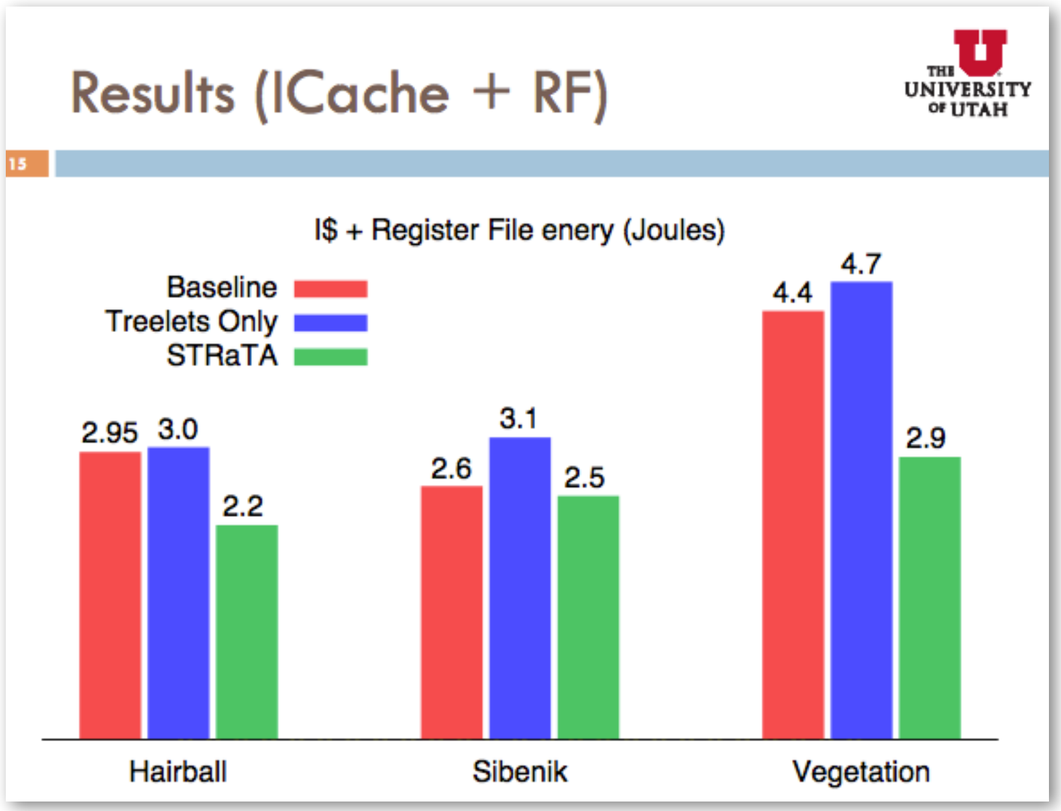
- In general, you don't want to show data on a results slide that is unrelated to the point of the slide

- This usually means you need to remake the graphs from your paper (it's a pain, but sorry, it's important) *

- This is the "every sentence matters" principle applied to visual details on a slide

* This is an example of a tip for conference talk polish: not necessary for informal graphics lab talks

Bad examples of results slides



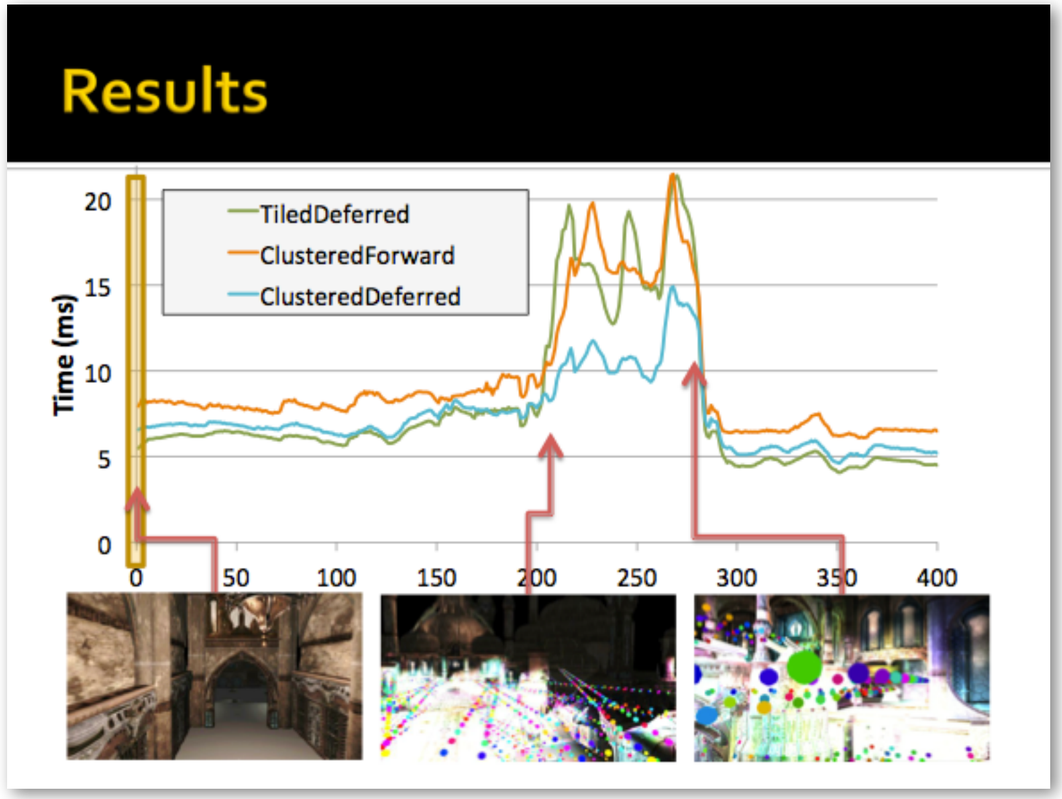
- Notice how you (as an audience member) are working hard to interpret the trends in these graphs
  - You are asking: what do these results say?

- You just want to be told what to look for

Simulation Results : RGS

- RGS Performance
  - 147-198 Mray/sec
  - Texture cache concerns : Mip-mapping & Compression

Test scene	Ray type	Cache hit rate (%) Texture	Data	Bandwidth (GB/s)	Performance (Mrays/sec)
Sibenik (80K tri.)	Primary	-	96.76	0.5	182.11
	FSR	-	91.24	1.9	172.25
Fairy (179K tri.)	Primary	93.25	96.87	0.8	175.66
	FSR	81.49	94.91	1.9	147.45
Ferrari (210K tri.)	Primary	86.12	98.09	0.6	183.28
	FSR	75.95	95.71	2.0	163.67
Conference (282K tri.)	Primary	-	98.44	0.2	198.32
	FSR	-	95.72	0.8	158.79



10.

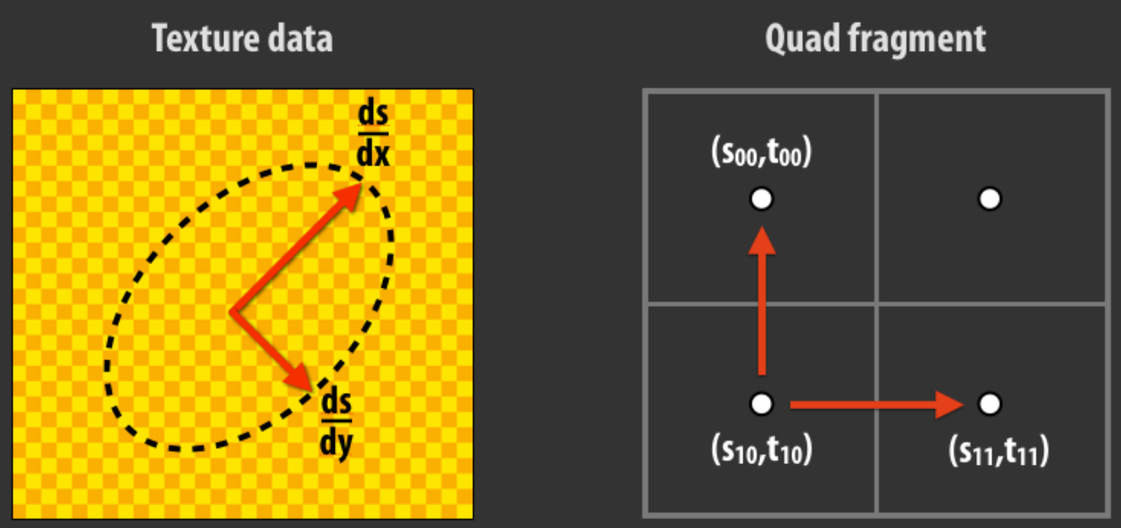
Titles matter.

If you read the titles of your talk all the way through, it should be a great summary of the talk.

(basically, this is “one-point-per-slide” for the whole talk)

Examples of good slide titles

GPUs shade quad fragments (2x2 pixel blocks)



use differences between neighboring texture coordinates to estimate derivatives

Greedy SRDH build optimizes over partitions and traversal policies

SAH:

```
forall (partitions in set-of-partitions)
    …evaluate SAH and pick min…
```

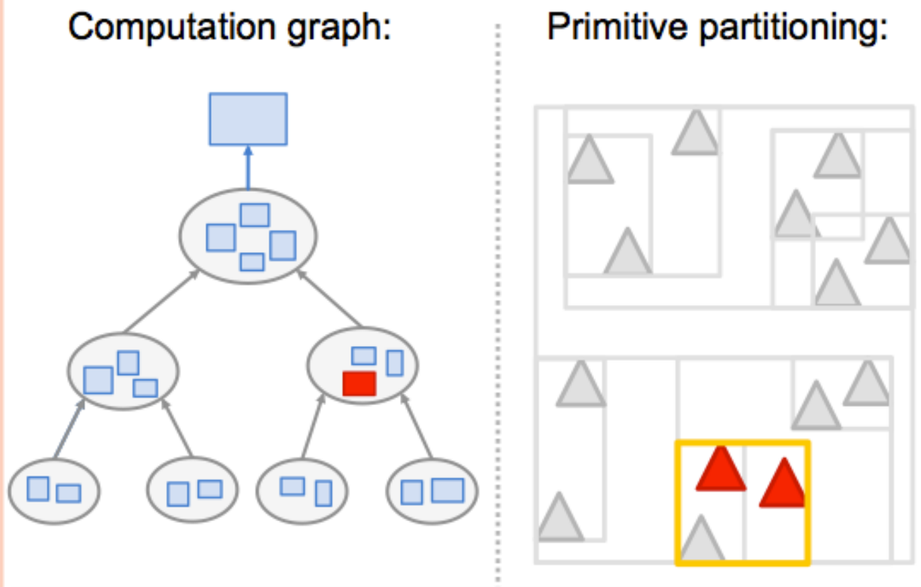
SRDH:

```
forall (partitions in set-of-partitions)
    forall (traversalKernels in set-of-kernels)
        …evaluate SRDH and pick min…
```

$$SRDH(R,L,\kappa,r)=(1-\kappa(r)H(L,r))|R|+(1-\kappa(r)H(R,r))|L|$$

51

AAC IS AN APPROXIMATION TO THE TRUE AGGLOMERATIVE CLUSTERING SOLUTION.



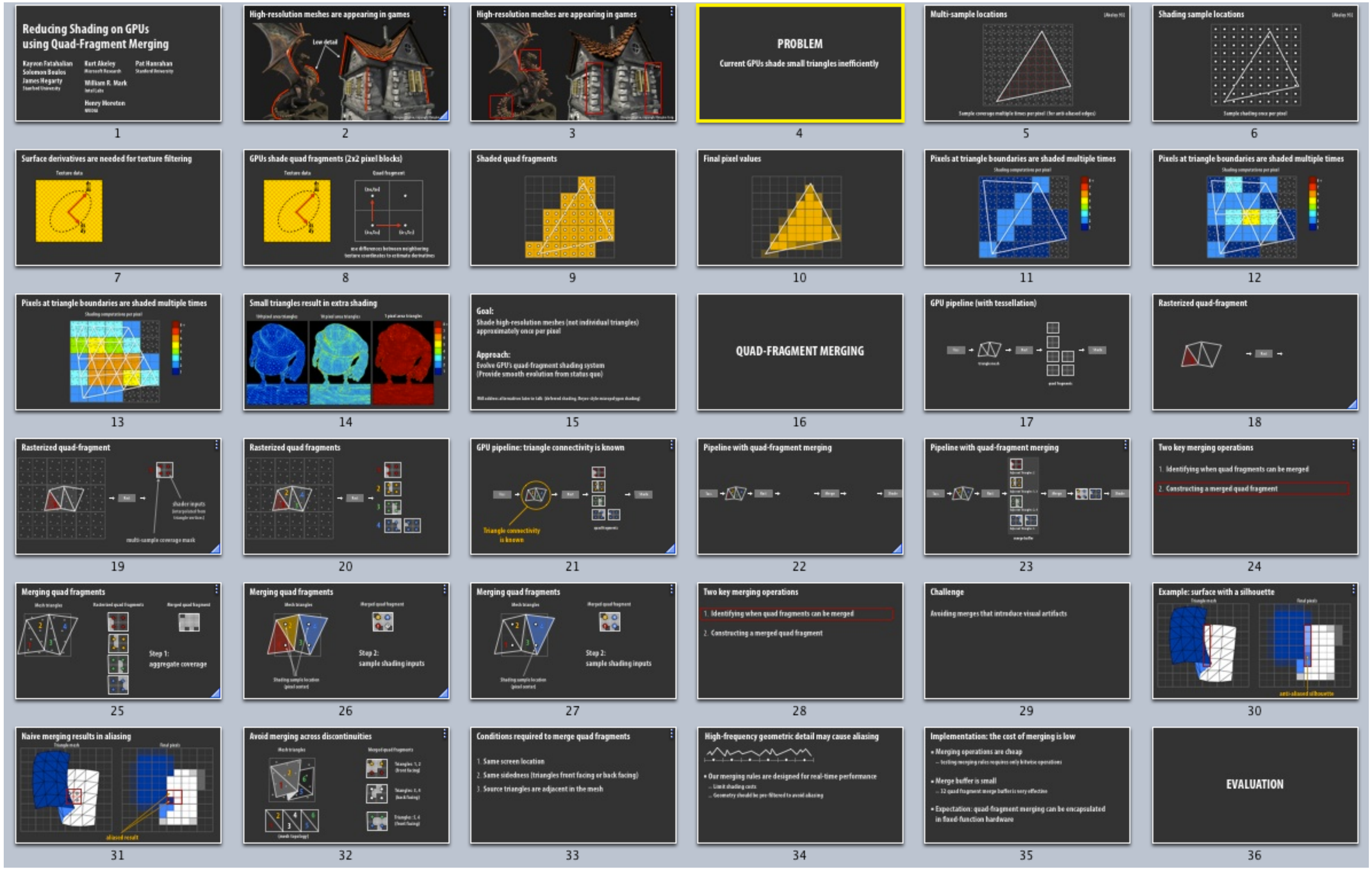
The reason for meaningful slide titles is convenience and clarity for the audience

"Why is the speaker telling me this again?"

(Why before what.)

Read your slide titles in thumbnail view

Do they make all the points of the story you are trying to tell?



11.

End on a positive note!

End on a positive note!

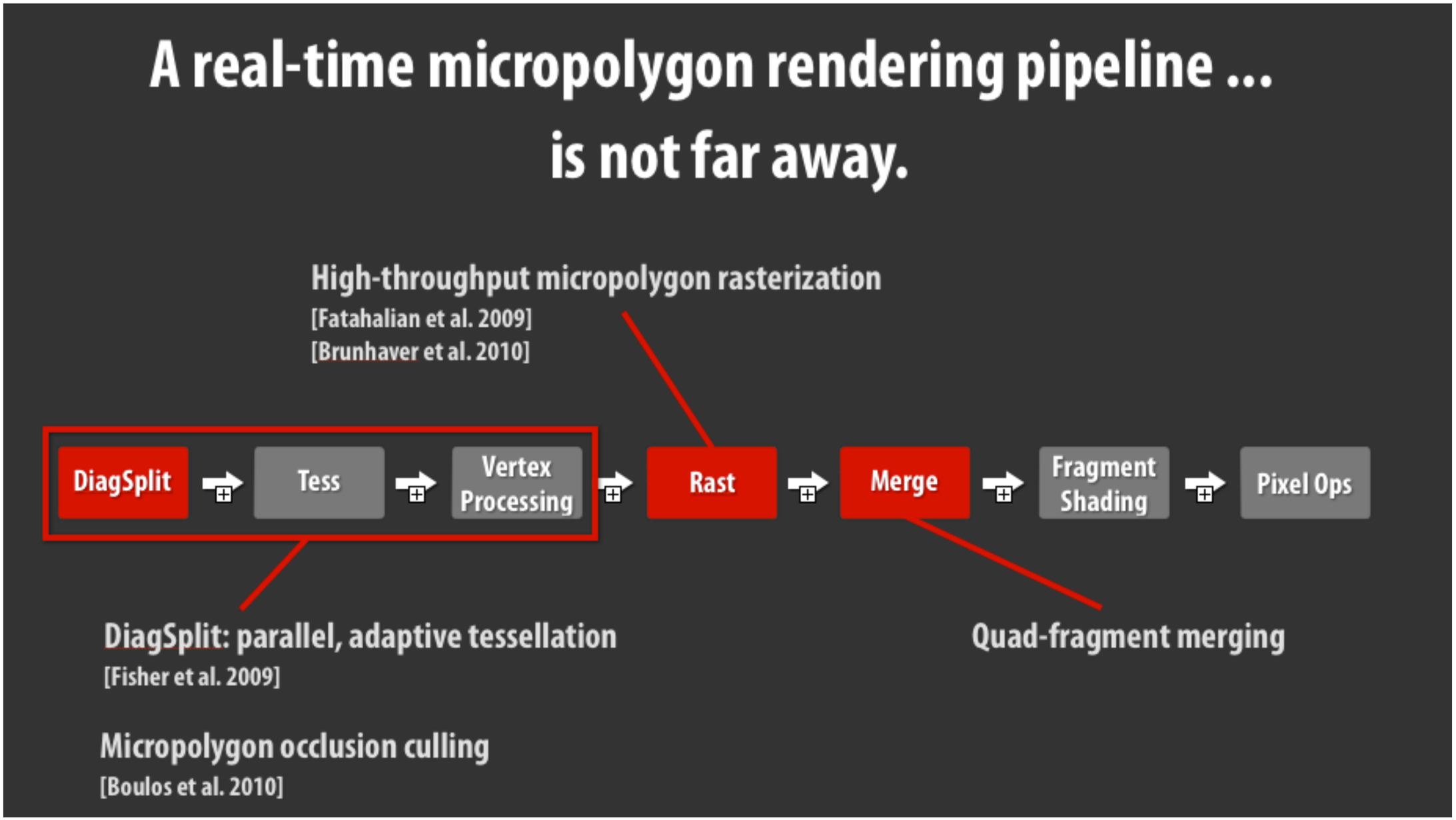
The future is bright!
Lots of new work to do, here are some ideas!
This is one part of something bigger!

Many talks end on future work in a manner that stresses problems with the current work or enumerates obvious next steps

- **It's boring and sort of a bummer for everyone involved.**
  (Audience: "well, that was a bit incremental.")
- **It's a lost opportunity to impart critical intellectual thought to the field ***
  - **Recall: introduction was where you contributed critical intellectual thought in how to think about the problem being solved today.**
  - **Conclusion is where you contribute intellectual thought that reflects on what you have done, or about the future.**

* **Every sentence matters**

Final SIGGRAPH slide as a Ph.D. student



An earlier draft had a very simple future work slide ("we could do X, Y, Z"). I was told by my advisor that it was a let down and to think about how to end on a broader note. This slide took about four hours to come up with.

Result: Tony DeRose got it! He realized the point wasn't just the one particular optimization that was the contribution of the SIGGRAPH paper, but a broader line of work on rethinking the graphics pipeline for high-quality rendering: his comment was of the effect, "I'm glad someone's finally figured the big pieces of this out."

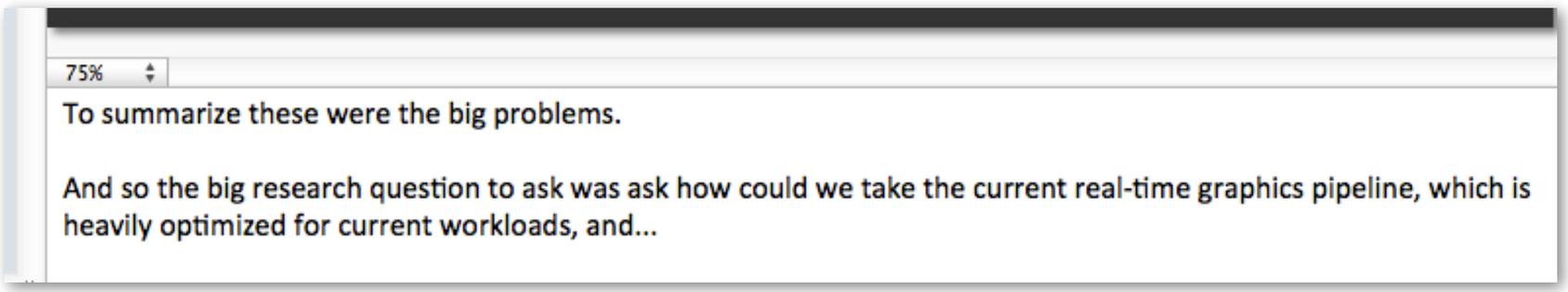
12.

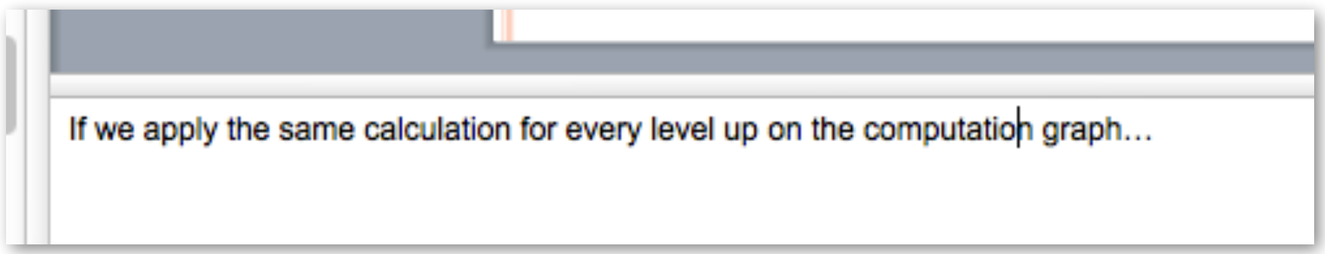
Use speaker's notes for transitions *

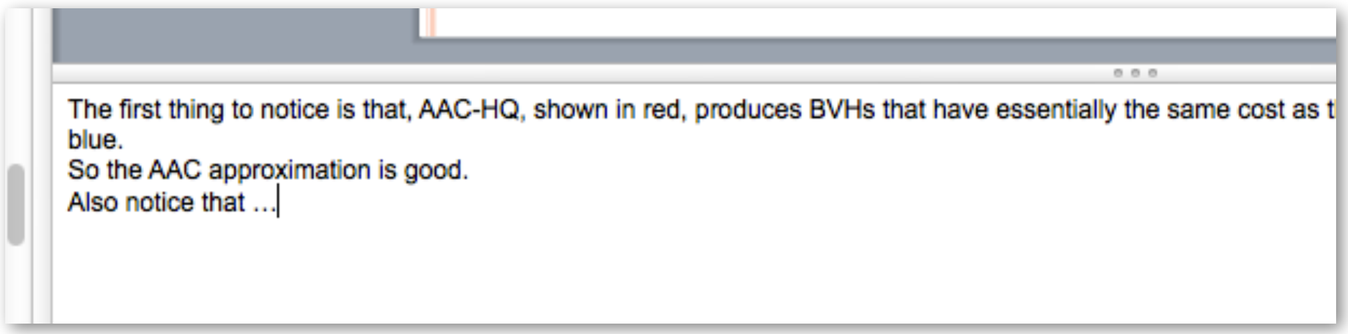
* This is an example of a tip for conference talk polish: not necessary for informal graphics lab talks

A good use of speakers notes

- It is unlikely I will forget how to explain a figure or graph (and it's bad to sound scripted for these parts of the talk anyway)
- But sometimes the word-smithing of the voiceover during key slide transitions is important, and you might forget under pressure.
- Tip: put the first half of a sentence about slide X in the speaker's notes for slide X-1 (click happens in the middle of the sentence)







13.

The audience is always right:
When receiving feedback on a practice talk, do not be defensive!

The audience is always right

- Your tendency will be to be defensive when someone claims an idea in your talk was not explained well or was not clear
- You will find yourself turning to the relevant slide in your talk and saying "I mentioned that here".
- The customer (the audience) is right in this situation. Sure, you might have mentioned it, but if it wasn't understood, it's your fault not theirs.
  - Find a way to make it more clear!
- The correct response is to turn to the appropriate slide and say:
  - "I tried to explain that idea here. And this is what I was thinking. What could I have said to make that point more clear?"
- The complainer should then work with you to explain what they interpreted instead, and offer suggestions on what information they would require to have better understood.

Wrap Up

Useful reminders

- **In general**
  - Every sentence matters. Pick your target audience level and aim for them to understand everything. If it's not clear to this audience take it out.

- **In your introduction**
  - Your goal is to tell the audience how you want them to think about the problem. You provide information necessary for audience to understand everything in the talk.

- **In the remainder of the talk (in particular, the evaluation)**
  - Always explain every figure, graph, or equation
  - One point per slide
  - Place point in title of slide

General principles to keep in mind

Choose your audience, and strive for perfect clarity.

“Every sentence matters”

“The audience prefers not to think” (about things you can just tell them)

“Surprises are bad”: say <u>why</u> before what
(indicate why you are saying something before you say it)

Explain every figure, graph, or equation

When improving the talk, the audience is always right