

Developing Graphics Tech for non-AAA games

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Unity / nesnausk!

Me

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- nesnausk! group

< caveat >

- Most of this talk based on Unity experience
- YMMV

Outline

- Hardware
- Features
- Cross platform
- Stability
- Testing

Hardware

The future is

- Your game needs DX11, so get started now!

So bright we'll have to

- 64 bit is here!

Wear Sunglasses

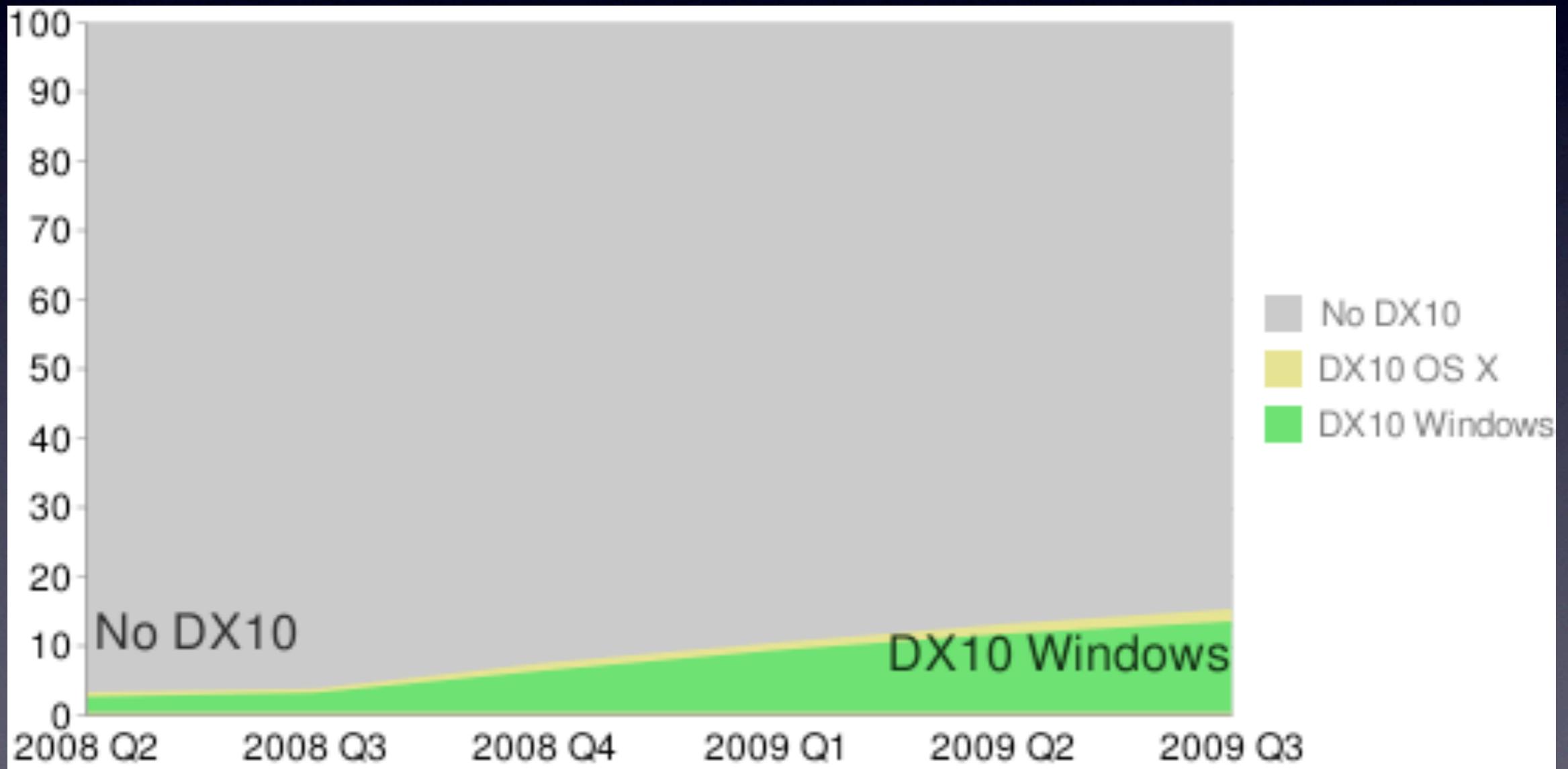
- Eww, GeForce 8600? That's low end now!

The grim reality

- Data to the rescue
- Steam:
 - store.steampowered.com/hwsurvey
- Unity:
 - unity3d.com/webplayer/hwstats

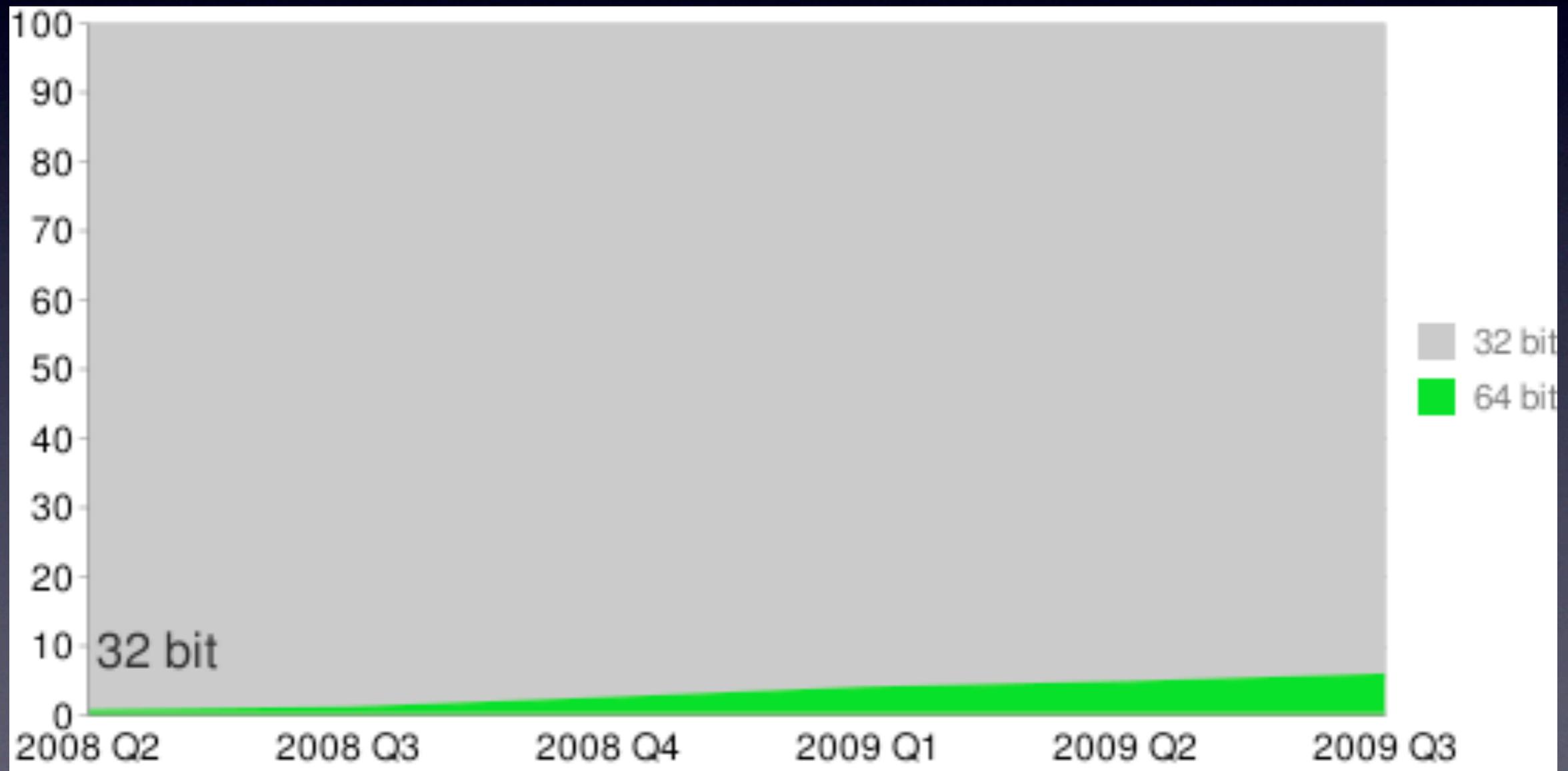
2009 Q3: DX10

- DX10 (GPU+Vista): 13.2%



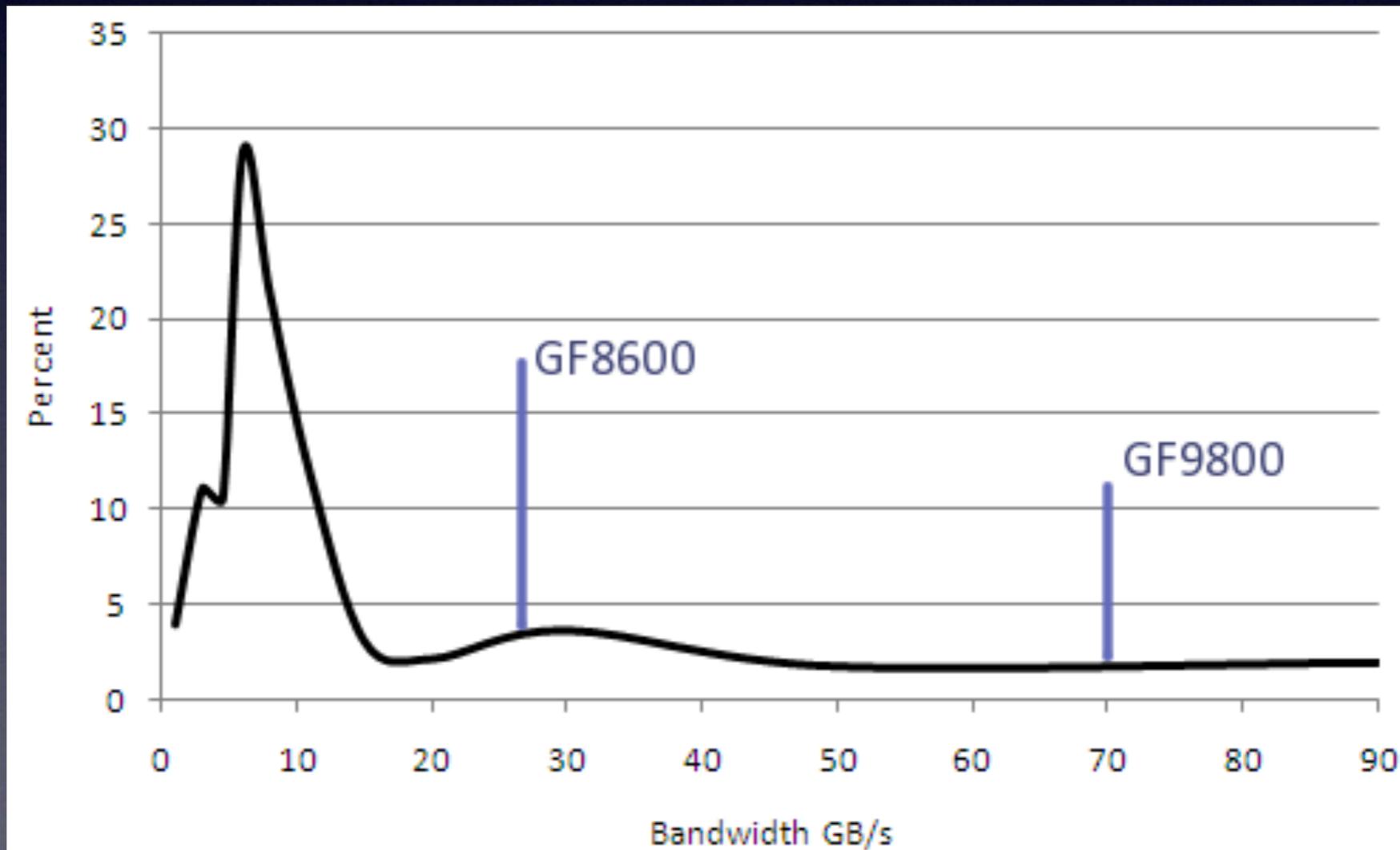
2009 Q3: 64 bit

- 64 bit Windows: 5.7%



2009 Q3: low end

- 90% of the market is worse than GeForce 8600



Unhappy stats

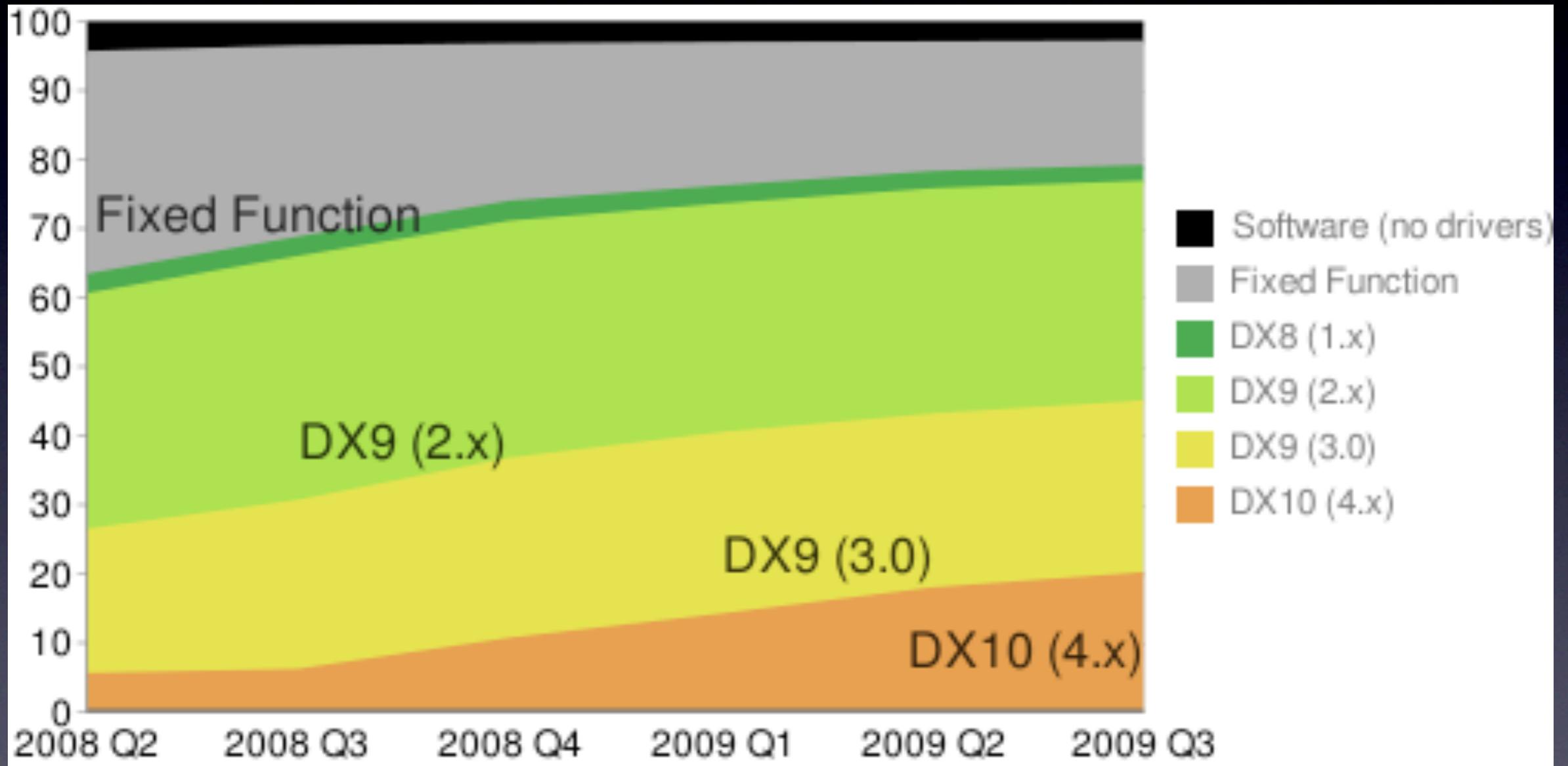
- Netbook with a crappy GPU
- Is your typical user

The upside

- Buying a netbook is cheap
- Going mobile/handheld is easier
- Turn-key bullet points for high end
 - e.g. SSAO

Gfx Features

Stats again



Features

- Fixed function still 20%
- and iPhone, ...
- SM1.x is dead

Features

- SM2.0 is okay! 75%!
- Careful with FP, MRTs etc.
 - Intel

Render paths

- “It displays something”
- Fixed function
- Vertex lighting, two textures
- GPUs too slow for fancy multipass stuff anyway

Render paths

- “I see dead shaders”
- Shader Model 2.0
- No float textures
- No MRT
- Some post-fx
- Most Intel, low end NV/ATI

Render paths

- “Oooh, look at that pixel shader!”
- Shader Model 2.0+
- FP, MRT
- Decent bandwidth/fillrate!
- Do the usual bullet points

Cross Platform

Do you care?

- Yes?
- No?
- Both answers are okay!

OpenGL myth

- No, OpenGL is not the answer
- Unless “platforms” mean OS X / Linux

OpenGL myth

- Windows: unusable
- Consoles: yeah right
- Mobile: GL ES is not OpenGL

Cross platform

- API does not matter
- Hardware is similar
- Everything is data

Platform abstraction

- Abstract/wrap what you need
- At granularity you need
- Don't try to emulate whole GL on D3D

Stability

Gfx Drivers

- #1 problem on PC
- No one updates their drivers
- OpenGL/Windows is unusable
- OpenGL/OSX breaks from time to time

Gfx Drivers

- Some seriously broken

```
if (vendorString == "SiS")
{
    if (rendererString.find("Mirage") != string::npos)
    {
        printf ("GL: SiS Mirage, broken OpenGL\n");
        m_TotallyBroken = true;
    }
}
```

- Yet Mirage is 1.2% of the market!

Bad News

- IHVs won't fix drivers for you
- IHVs won't optimize drivers for you
- IHVs won't fix the game for you

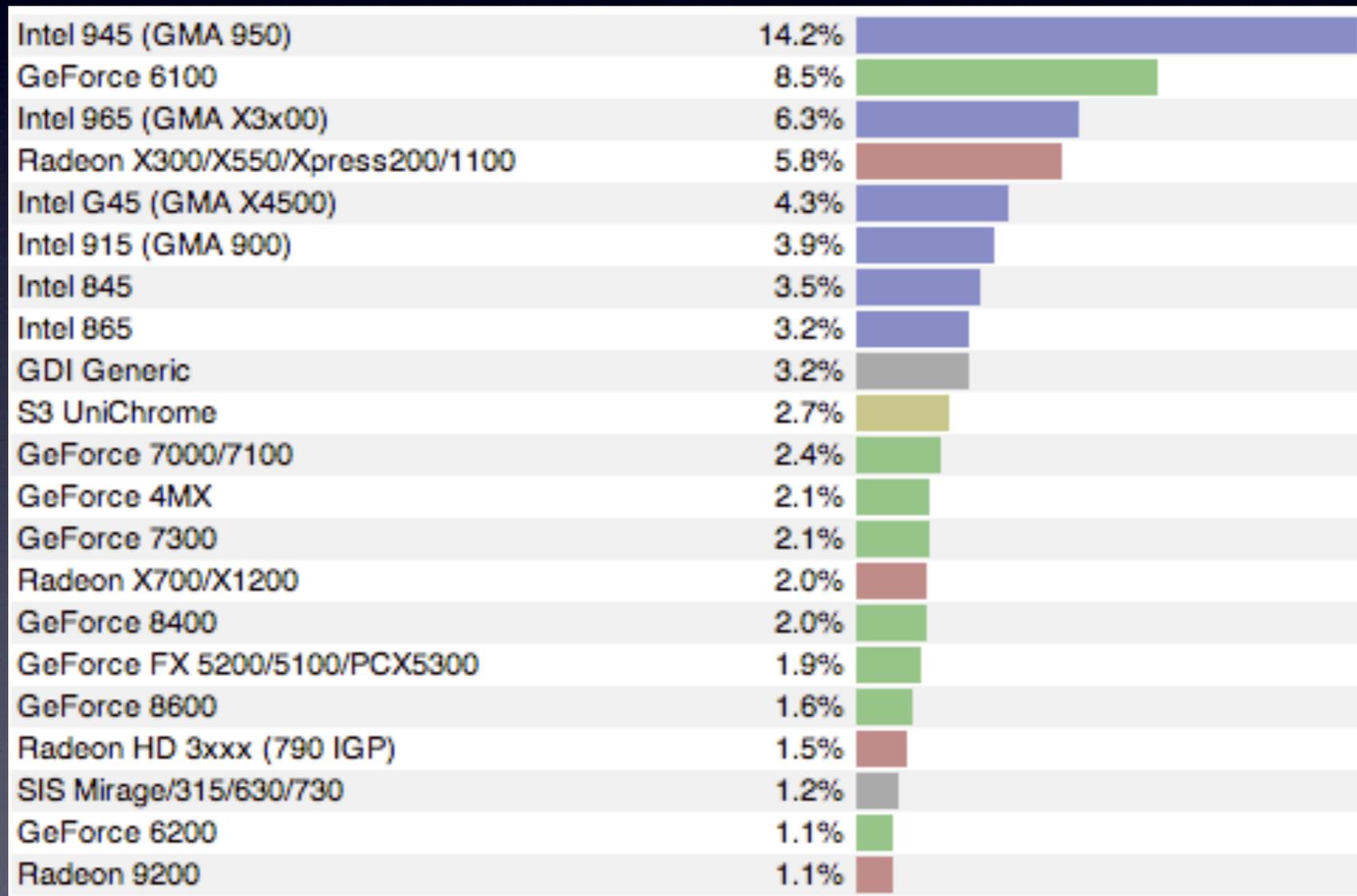
Good news

- Drivers are not that bad
 - If don't try OpenGL/Windows
- Quality is getting better

Testing

Testing Gfx

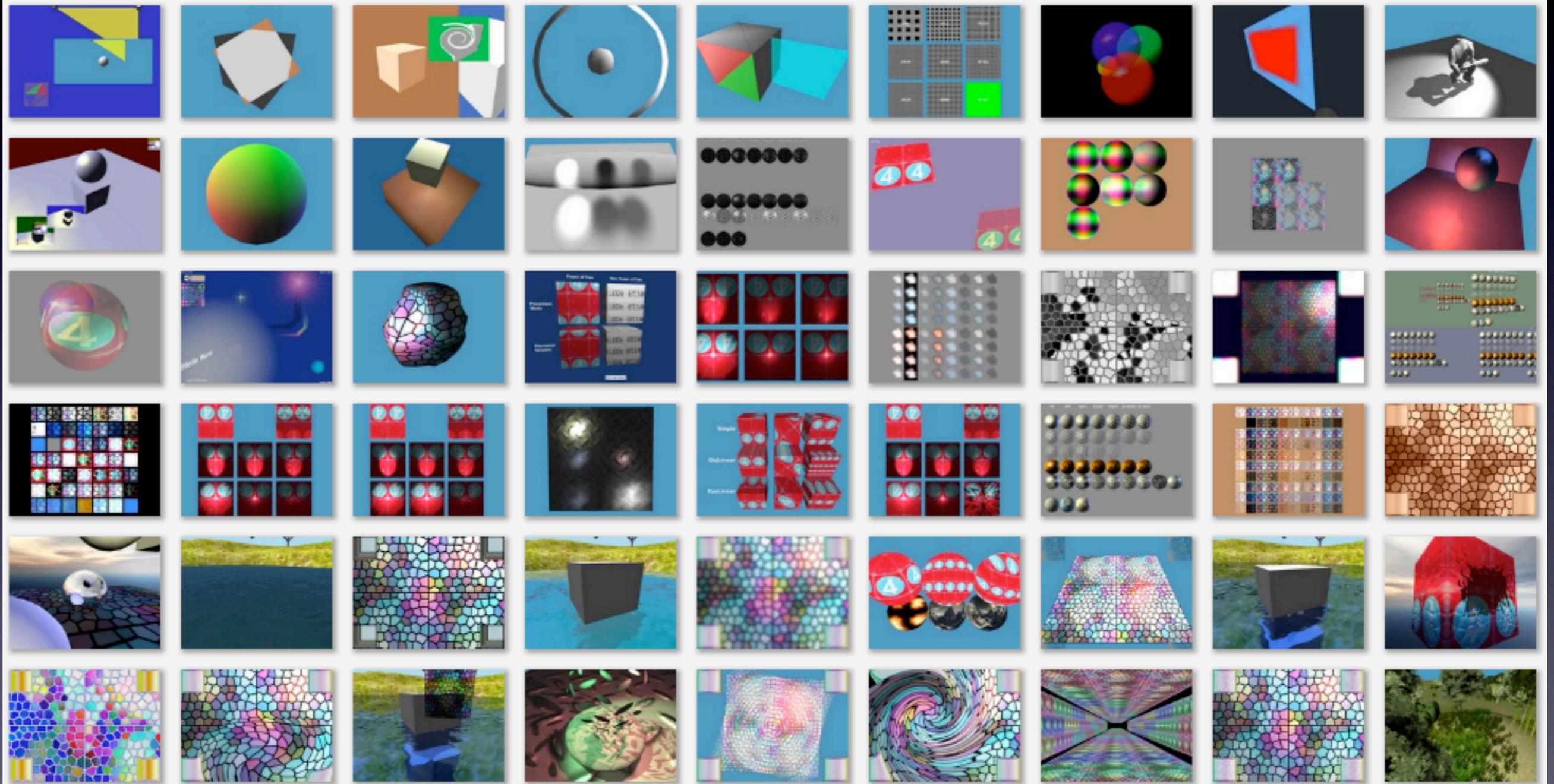
- Buy GPUs you target



Test Farm



Functional Tests



Regression Tests

- Run on D3D REF
- Dump screenshots
- Continuous Integration server

Regression Tests

Hudson search ?

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Project GraphicsFunctionalTest

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[Latest Test Result \(1 failure / ±0\)](#)

Test Result Trend

Build #	Count
#143	40
#145	40
#147	15
#150	0
#152	0
#154	25
#156	10
#160	10
#164	10
#166	10
#169	10
#176	10
#178	10
#180	10
#182	10
#184	10
#189	95
#191	10
#197	10
#202	10
#208	10
#212	10
#214	10
#216	10

Build History [\(trend\)](#)

- #218 [Jul 28, 2009 1:01:41 AM](#)
- #216 [Jul 26, 2009 1:41:29 AM](#)
- #215 [Jul 25, 2009 7:16:45 PM](#)
- #214 [Jul 25, 2009 6:27:42 PM](#)
- #213 [Jul 25, 2009 12:04:26 AM](#)
- #212 [Jul 24, 2009 1:26:14 PM](#)
- #211 [Jul 24, 2009 8:05:46 AM](#)
- #208 [Jul 21, 2009 8:02:55 PM](#)
- #207 [Jul 21, 2009 9:07:47 AM](#)
- #202 [Jul 17, 2009 9:50:39 AM](#)
- #198 [Jul 15, 2009 7:50:57 AM](#)
- #197 [Jul 15, 2009 12:04:16 AM](#)
- #196 [Jul 14, 2009 3:02:37 PM](#)
- #191 [Jul 14, 2009 12:04:16 AM](#)
- #190 [Jul 13, 2009 1:29:10 PM](#)
- #189 [Jul 13, 2009 12:15:27 PM](#)

Permalinks

- [Last build \(#218\), 8 hr 35 min ago](#)
- [Last stable build \(#152\), 1 mo 17 days ago](#)
- [Last successful build \(#218\), 8 hr 35 min ago](#)
- [Last failed build \(#214\), 2 days 15 hr ago](#)

Summary

In short

- Don't believe the hype
- Run on low end
- SM2.0 is okay
- Test yourself

Q?