Advanced Technology:  
Making Forecasts Better

John P. Schneider  
NOAA/ESRL/GSD

GSD Science Review  
3-5 Nov 2015
Advanced Technology

Finding & Delivering Technologies

Session 6: Advanced Technology Investigation
Session 7: Research to Applications and Outreach
Session 6: Advanced Technology Investigation

Session 7: Research to Applications and Outreach
National Strategic Computing Initiative

Relevance – Demanding GSD to

OMB Science & Tech Priorities FY17

NOAA Enterprise Objectives

NOAA’s Education Strategic Plan

NOAA FY16 Budget Priorities

OAR Annual Operating Plan

Transition/Strategic Plans

2010 Review
Relevance – *Inspiring* GSD to Explore

Opportunities for Advancement
- Deep Water Horizon
- Hurricane Sandy
- Leveling - Moore’s Law
- IT advances
- 4K Imagery

Technical Curiosity

Worldwide Sponsorships

Expectations of Quality
Relevance – *Inspiring* GSD to Explore

Technical Curiosity

Opportunities for Advancement
- Deep Water Horizon
- Hurricane Sandy
- Leveling of Moore’s Law
- IT advances
- 4K Imagery

Worldwide Sponsorships

Expectations of Quality
Our Focus – the Hard Technology Problems

• Enough compute at low enough cost
• Right info, right place, right time
• Blending disparate information
• Building science understanding
3 of 5 GSD’s Grand Challenges

- Fully Coupled Earth System Modeling & Prediction
- Global to Storm-Scale (<3km) Forecasting Capability
- Determine Best Enviro. Obs Systems
3 of 5 GSD’s Grand Challenges

**Foundational Effort**

- Fully Coupled Earth System Modeling & Prediction
- Advanced Computer Engineering
- Massively Parallel Fine Grain (MPFG)
- Global to Storm-Scale (<3km) Forecasting Capability
- Determine Best Enviro. Obs Systems
Central Solutions

Right People, Right Place, Right Form

Science On a Sphere

MADIS +

NEIS Data

Taiwan

Instant Insights to Information Meaning

NEIS Viz

SOS Explorer

TerraViz

GTAS

WIDA

VACT

3-5 Nov 2015

GSD Science Review
The 5 year Trajectory

2010

Google Earth

CPU

Segregated, Specialized, Limited

Specialized and Regional

SOS – venue based

2015+

NOAA TerraViz

MPFG

Anytime, anyplace, any platform

Global - NEIS

SOS Explorer - desktop based
GSD is First in NOAA

Data Management & IT Systems Firsts:
• 4D data cube with single authoritative source
• Consolidation of thousands of global obs into operational usage
• NOAA use of Amazon cloud computing

Computing Firsts:
• Only weather model running on CPU, GPU and MIC (2013)
• Weather model run on GPUs (2009)
• Weather model to run on Linux clusters in (2003)
• Weather model to run on massively parallel processors (1999)
Global Visualization and Outreach Firsts:

- Automated alignment for spherical displays
- Patented global visualization methods
- NOAA use of a twitter account
- First IPAD App in OAR

Specialized Warning Tool Firsts:

- Rapid Internet delivery of global forecast models
- Impact based weather mapping/forecaster tools
- Plume dispersion and satellite differencing
- Bi-directional data sharing
- Moving weather elements with rapid updates
Extraordinary people with extraordinary skill
Session 6:
Advanced Technology Investigations

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Real Performance

The NOAA Earth Information System (NEIS) data discovery, collection, and distribution
– Jebb Stewart

Advanced Visualization Development using Gaming Technology
– Eric Hackathorn
Real Performance

Massively Parallel Fine Grain (MPFG) Computing
– Mark Govett

Specialized Information and Warning Systems
- Greg Pratt

Science On a Sphere New Technology Innovations
Network Growth and Outreach
– Keith Searight & Shilpi Gupta
<table>
<thead>
<tr>
<th>Presenter</th>
<th>Title</th>
<th>Station</th>
</tr>
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<tbody>
<tr>
<td>Jebb Stewart</td>
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<td>1</td>
</tr>
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<td>2</td>
</tr>
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<td>3</td>
</tr>
<tr>
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<td>Specialized Information and Warning Systems</td>
<td>4</td>
</tr>
<tr>
<td>Keith Searight</td>
<td>Science on a Sphere: Technical Innovation</td>
<td>5</td>
</tr>
<tr>
<td>Shilpi Gupta</td>
<td>Science on a Sphere: Network Growth</td>
<td>6</td>
</tr>
</tbody>
</table>