



Visual Analytics:



An Agenda in Response to DHS Mission Needs



Jim Thomas

Director, U.S. Department of Homeland Security National Visualization and Analytics Center

Pacific Northwest National Laboratory Fellow

<http://NVAC.pnl.gov>

Jim.thomas@pnl.gov



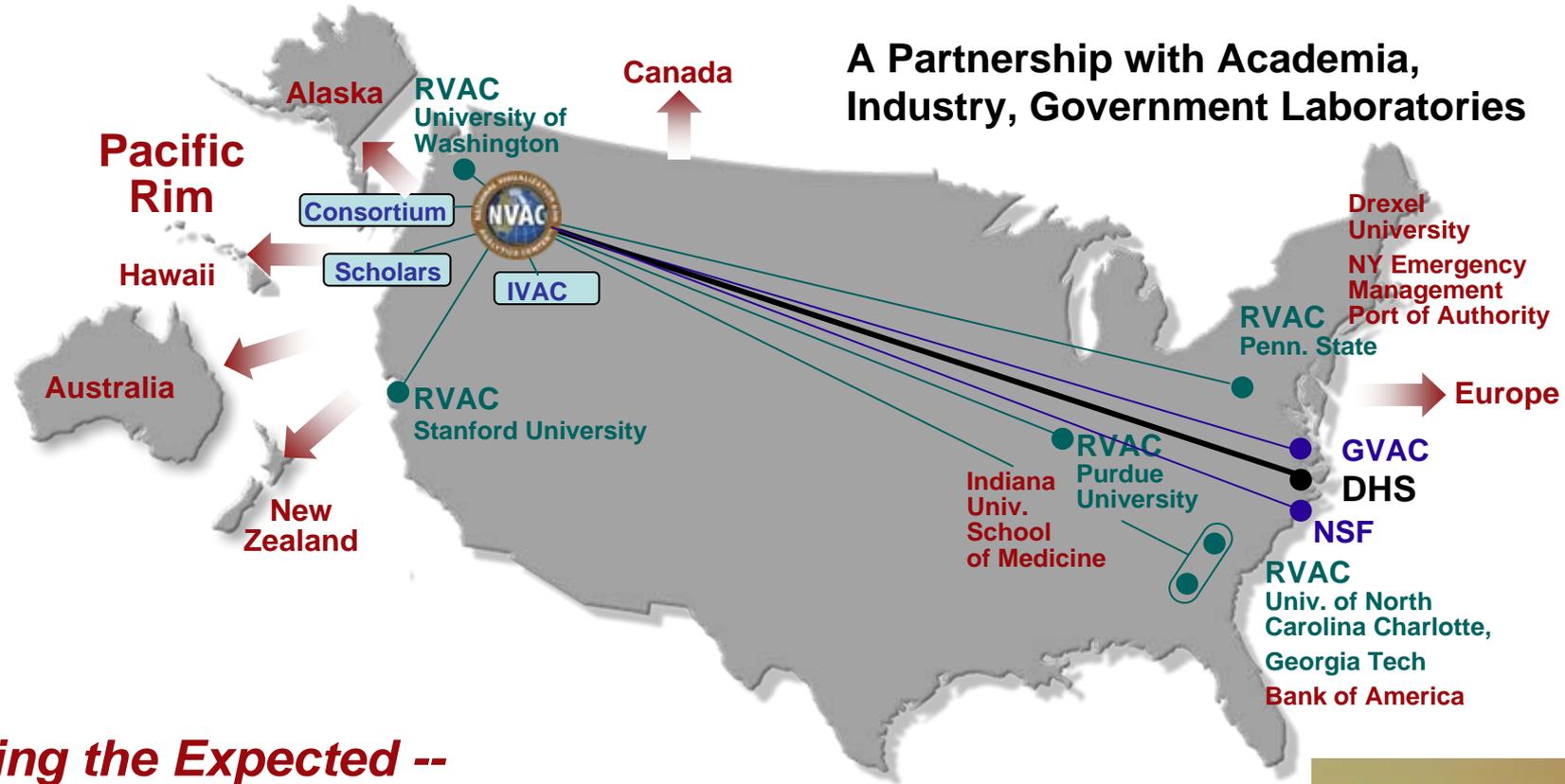
Capabilities Desired



- **Reduce the threat of terrorism** through the invention, development, evaluation, and deployment of technology to analyze masses of data in different formats and types, from different sources, with highly varying degrees of confidence levels, within time frames required for rapid decision making.
- Better **understand the risks and vulnerabilities of our critical infrastructures**, trade, ports, and immigration by combining sensor, computational and visual analytics technologies for in-the-field and strategic decision making.
- Enable **rapid visual communication technology for response teams** for clear understanding of the situation assessment and alternate options for response with geospatial, and multi-jurisdictional situations for WME and natural disasters.
- Ensure **effective information communication methods** and technologies throughout DHS missions of analysis, risk, levels of alerts, and response, in unwrappable levels of assessment with evidence and communication styles aimed within audience-centric applications for rapid understanding and action.
- Provide an **enduring talent base** of educated professionals supporting future developments requiring visual communication of integrated information and operational support missions.



Visualization and Analytics Centers



A Partnership with Academia, Industry, Government Laboratories

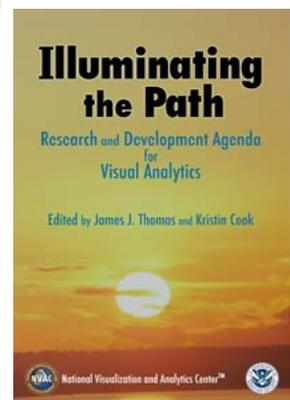
*Detecting the Expected --
Discovering the Unexpected™*

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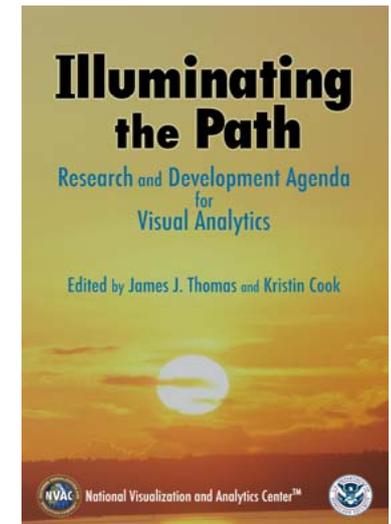


Visual Analytics Definition



Visual analytics provides the last 12 inches between the masses of information and the human mind to make decisions

“Visual analytics is the science of analytical reasoning facilitated by interactive visual interfaces”





Available now



Panel Members

Tony Bartoletti
Lawrence Livermore National Laboratory

Mark Billinghurst
Human Interface Technology Laboratory, New Zealand

Stuart Card
Palo Alto Research Center

Daniel Carr
George Mason University

Nancy Chinchor
Advanced Technologies and Programs, U.S. Government

John Dill
Simon Fraser University

Rae Earnshaw
University of Bradford

David Ebert
Purdue University

Stephen Eick
University of Illinois at Chicago and SSS Research, Inc.

Robert Grossman
University of Illinois at Chicago and Government

Charles Hansen
University of Utah

Kenneth Joy
University of California - Davis

David Kasik
Boeing Corporation

David Laidlaw
Brown University

Sharon Laskowski
National Institute of Standards and Technology

Alan MacEachren
Penn State University

Catherine Plaisant
University of Maryland

William Ribarsky
University of North Carolina, Charlotte

John Stasko
Georgia Institute of Technology

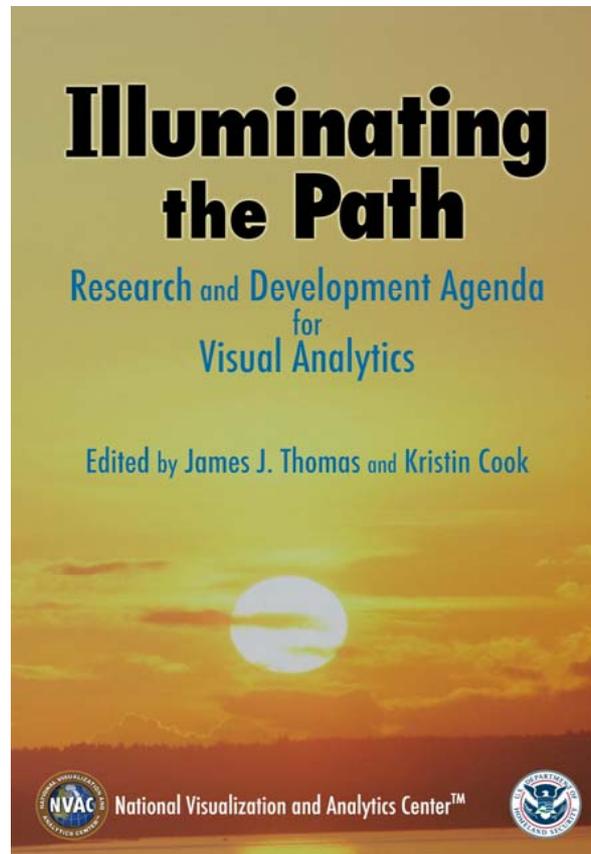
Maureen Stone
StoneSoup Consulting

Matthew Ward
Worcester Polytechnic Institute

David White
Sandia National Laboratory

David Woods
Ohio State University

William Wright
Oculus Info Inc.



- Available at <http://nvac.pnl.gov/> in PDF form
- At IEEE Press in book form
- Special thanks to IEEE Technical Committee on Visualization and Graphics

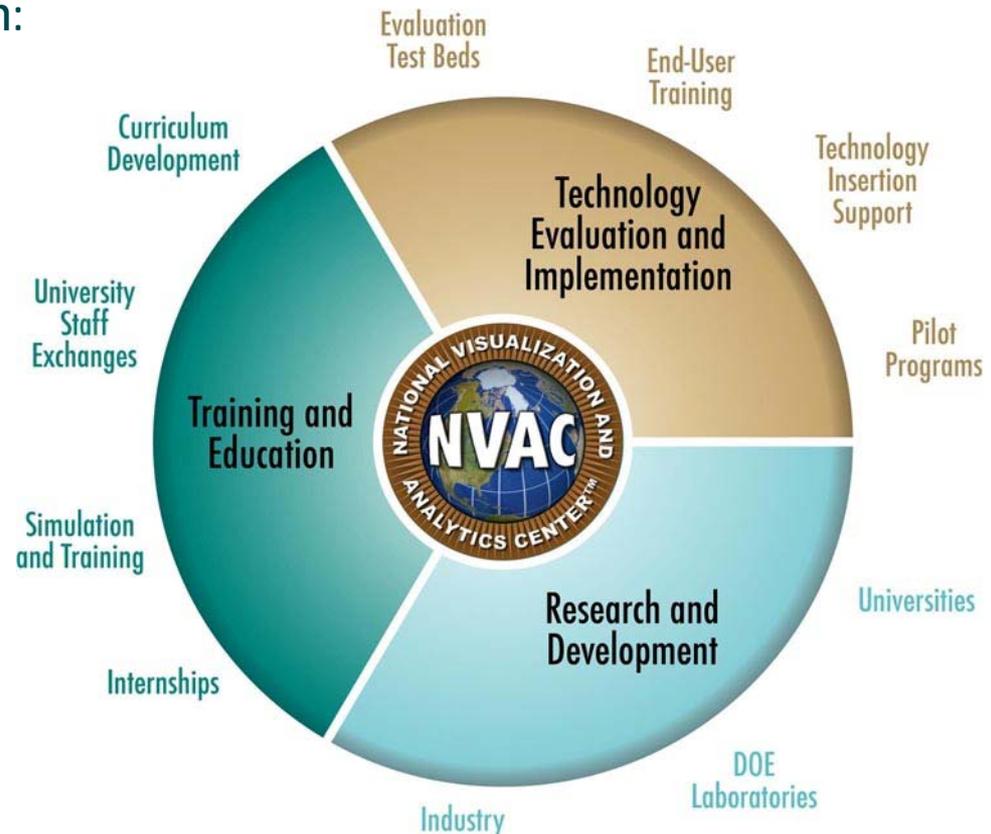


NVAC Capability



The NVAC is engaged in 4 critical areas:

1. **R&D Leadership:** providing proactive information analysis and visualization tools for threat vulnerability, assessment, and response
2. **Technology Evaluation and Implementation:** evaluating new methods and supporting the adoption of new tools for analysts and first responders
3. **Education:** training, recruiting our next generation of scientists and engineers through internships, faculty visits, joint research and curriculum development
4. **Coordination and Integration:** bringing the best and brightest together from government, academia, industry and national laboratories to create visual analytics tools to prevent terrorism.





Visual Analytics Definition



Visual analytics is the science of analytical reasoning facilitated by interactive visual interfaces.

People use visual analytics tools and techniques to

- Synthesize information and derive insight from massive, dynamic, ambiguous, and often conflicting data
- Detect the expected and discover the unexpected
- Provide timely, defensible, and understandable assessments
- Communicate assessment effectively for action.

“The beginning of knowledge is the discovery of something we do not understand.”

~Frank Herbert (1920 - 1986)

Overview of the R&D Agenda

- **Challenges**
- **Science of Analytical Reasoning**
- **Science of Visual Representations and Interactions**
- **Data Representations and Transformations**
- **Production, Presentation, and Dissemination**
- **Moving Research Into Practice**
- **Positioning for an Enduring Success**





Visual Analytics Partnership Disciplines



- Statistics, data representation and statistical graphics
- Geospatial and Temporal Sciences
- Applied Mathematics
- Knowledge representation, management and discovery
 - Ontology, semantics, NLP, extraction, synthesis, ...
- Cognitive and Perceptual Sciences
- Communications: Capture, Illustrate and present a message
- Decision sciences
- Information and Scientific Visualization

And far more than homeland security

Welcome! You're in good company.

Let's learn, respect, and form partnerships to deliver.

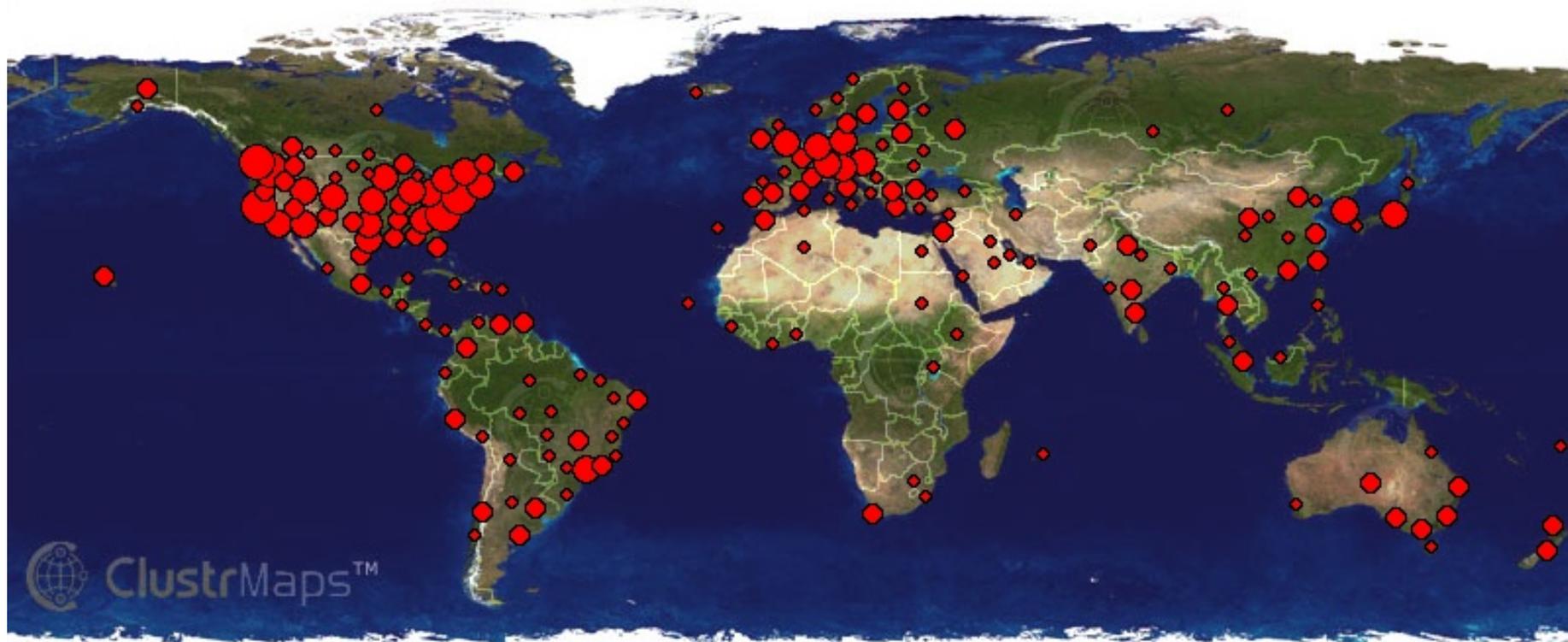




21,624 NVAC web visits since June 12th



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21624 visits since 12 Jun 2006, total visits 21609 since 12 Jun 2006, updated weekly

⊞ distance in which individuals are clustered
Total number of visits depicted above = 21461

Dot sizes:

● = 1000 + ● = 100 - 999 ● = 10 - 99 ◆ = 1 - 9

- RVAC Interns
- Interns and Scholars
- Global VA Curriculum
- Analyst Internships
- Educating Ourselves
- VAST Colloquium





Conclusions



- Visual Analytics is an opportunity worth considering
- Collaboration between academia, industry, national laboratories, and government agencies is key
- For each of you:

The best is yet to come...