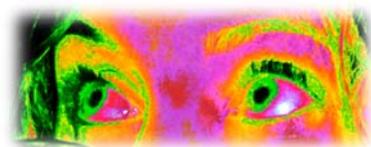




# VAC Newsletter

Integrated Visualization and Analytics Community



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Volume 1, Issue 1

October 2009

## Global Collaboration

U.S. Department of Homeland Security

The Command, Control and Interoperability (CCI) Division and the Office of University Programs of the U.S. Department of Homeland Security Science and Technology Directorate are establishing collaborative relationships with government agencies, research organizations, and academia throughout the world to expand the

base of work in the areas of visual and data analytics.

The outcome of this effort is expected to be an enduring, broadly based coalition of organizations contributing to the development and application of comprehensive information analysis tools focused on preparing for, preventing, and

responding to natural and manmade disasters and terrorist incidents.

The coalition will enable such organizations to share and jointly benefit from individual efforts. Meetings with United Kingdom, German and French counterparts held throughout 2009, revealed a great interest in and need for sharing the results of research in the areas of data and visual analytics. Detailed descriptions of and discussions on CCI programs in these areas are the next step in accomplishing a mission critical exchange of technical and operational information, which can benefit all parties.

Furthermore, such an exchange will ultimately lead to the creation of joint research and development programs. Such joint programs are not only cost-effective but also administratively efficient, as they will enable all parties to share development costs and operational lessons learned and create common standards for technology application and use.



Above displays the collaborative efforts currently on-going in the **Integrated Visualization and Analytics Community**.

### Inside this issue:

<b>US-UK Workshop</b>	<b>2</b>
<b>Law Enforcement-Guided Research</b>	<b>3</b>
<b>US-German Collaboration: VASA Concept</b>	<b>3</b>
<b>CCI CoE: Overview</b>	<b>4</b>
<b>CCI CoE: CCICADA</b>	<b>5</b>
<b>CCI CoE: VACCINE</b>	<b>5</b>
<b>VACCINE /FAZD Puget Sound Exercise</b>	<b>6</b>
<b>Active Products Pilot</b>	<b>6</b>
<b>VACCINE wins \$7 NSF Grant</b>	<b>7</b>
<b>NAM's MATH-fest XIX</b>	<b>7</b>
<b>Schedule of iVAC events</b>	<b>back</b>
<b>Award for Former NVAC Director</b>	<b>back</b>

# US-UK Workshop on Visual Analytics

U.K. Visualization and Analytics Consortium (UK-VAC)

In an effort to facilitate development of a complementary activity in the United Kingdom to visual and data analytics research in the U.S., members from the Command, Control and Interoperability Division's Basic/Futures Research program area co-hosted a workshop with the UK's Home Office, the U.S. National Visualization and

Analytics Center, AE Solutions (UK) and Middlesex University on Visual Analytics. The Visual Analytics Workshop 2009 (VAW2009) focused on Visual Analytics in Security and Defence, and was held at Middlesex University in London, on September 15 and 16, 2009.

VAW2009 had two main goals: the first of which was to encourage the UK government's interest in the field of visual and data analytics research, and the second, to develop a path forward with regard to US-UK collaborative research projects and funding. Presentations and discussions demonstrated the extensive research already underway in the overarching areas of Sense Making and Security. Attending were researchers from U.S. and U.K. academia, industry, and government agencies, with other invited guests from Canada, Germany and Australia.



**(Left to Right): Richard May**, Director, National Visualization and Analytics Center; **William Wong**, Professor, Middlesex University; **Jim Thomas**, Co-Founder and Former Director, U.S. National Visualization and Analytics Center; **Joseph Kielman**, Director of Futures Research, U.S. Department of Homeland Security; **Martin Loomes**, Professor, Middlesex University; and, **Dario Leslie**, UK Ministry of Defence and UK Home Office.

The results of VAW2009 include the official establishment of a U.K. Visualization and Analytics Consortium (UK-VAC), led by Middlesex University, as well as prescribed funding for kick-off projects to demonstrate the success of this US-UK union. UK-VAC partners currently include Middlesex University (Lead), Bangor University,

University College London, Swansea University, and Imperial College.

A special thanks goes out to Martin Loomes, William Wong, Emma Byrne, Serengul Smith and Neesha Kodagoda of Middlesex University; Rick Adderley of AE Solutions; Dario Leslie of the UK Home Office; and Richard May of the NVAC for all of their work coordinating and organizing for VAW2009 in order to make it such a success!

**“We value the encouragement to think big in how we conceive the consortium and its activities, such that it would create a visual analytics hive of activity in the UK that would create opportunities for UK and US universities to collaborate in visual analytics, and with industry.”**

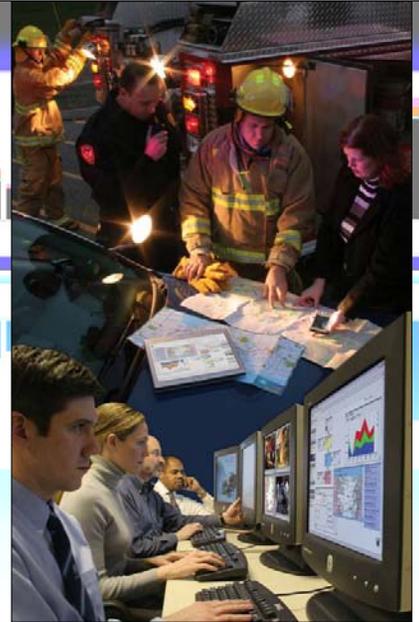
**- William Wong**

# Law Enforcement-Guided Research

U.S. Department of Homeland Security (DHS) and the National Visualization and Analytics Center (NVAC)

The final Information Sharing Advisory Group Workshop on the future needs of Law Enforcement was held in September, 2009. These workshops were funded through the CCI Regional Information Sharing and Collaboration (RISC) portfolio and organized by the International Association of Chiefs of Police and the Pacific Northwest National Laboratory.

The advisory committee is composed of 13 members representing U.S. state, regional, and tribal law enforcement agencies and Canada. In the workshops, 14 needs areas were identified, along with high priority projects and research recommendations for each area. The organizers and participants are preparing a report, highlighting recommendations for future CCI research needed to support regional law enforcement. The report is expected to be completed by the end of this calendar year.



## What is VASA?

U.S.-German Collaboration

On March 16, 2009, a formal agreement enabling collaboration in science and technology was signed by the U.S. and German governments. One of the areas specifically included under this agreement was research in visual analytics.

Recently, members of CCI, Purdue University, the NVAC, the Fraunhofer Institute and the University of Konstanz met to outline the first research concept to come out of this agreement. The Visual Analytics in Security Applications (VASA) project will focus on the cascading effects of terrorist incidents or natural and manmade

disasters on critical infrastructures within the U.S. and Germany. The data infrastructures being addressed will encompass power grids, cyber infrastructure, food supply, and transportation.

This project will leverage the resources of the U.S. and Germany, with university leads being Purdue and Konstanz, and will include industrial partici-

pation. VASA work is set to begin in Spring 2010, with a kick-off meeting anticipated in Summer 2010.



Aerial view of the **University of Konstanz** in Konstanz, Germany.

# The CCI CoE Takes Shape

Command, Control and Interoperability (CCI) Center of Excellence (CoE), U.S. Department of Homeland Security

In March, 2009, the S&T Office of University Programs and CCI officially created the 12<sup>th</sup> member of the CoE Network, the Command, Control and Interoperability Center of Excellence (CCI CoE).

The CCI CoE is designed to build the mathematical and computational foundations for deriving knowledge and understanding from massive amounts of unstructured data, from multiple sources, to more reliably detect threats to the security of the nation and its infrastructures, and to the health and welfare of its populace. These new technologies also improve the dissemination of both information and related technologies.

The Center will help the U.S.'s 2.3 million homeland security personnel perform their jobs more effectively by turning floods of data into actionable information. The center consists of the free-standing teams, consisting of multiple universities, with one lead university: the visualization sciences team, led by Purdue University (**VACCINE**), and the data sciences team, led by Rutgers University (**CCICADA**).

The CCI CoE's research and education efforts directly support the activities of CCI and focus on issues related to information analysis, knowledge management, threat assessment, situational awareness, decision support, information sharing, interoperable communications, surveillance and investigative operations, and cyber-infrastructure protection.

The need for this CoE came from the requirement for addressing issues related to:

- dynamic, on-demand data processing & visualization,
- hypothesis-driven data analysis,
- visualization of structured, unstructured, & streaming data,
- mathematics of discrete & visual analytics,
- scalable information filtering & dissemination,
- visualization & simulation of information, and
- mobile & light-weight information analytics & sharing.

VACCINE Partner Institutions	
Virginia Tech University	Purdue University (Lead)
Jackson State University	Georgia Institute of Technology
University of Stuttgart, Germany	Pennsylvania State University
University of Houston, Downtown	University of North Carolina - Charlotte
Florida International University	University of Washington
Indiana University	Stanford University
North Carolina A&T State University	Simon Fraser University, Canada
University of Texas at Austin	University of British Columbia, Canada

CCICADA Partner Institutions	
University of Massachusetts - Lowell	Rutgers University (Lead)
Alcatel-Lucent Bell Labs	Howard University
Princeton University	Carnegie Mellon University
Texas Southern University	Morgan State University
University of Illinois at Urbana/Champaign	Rensselaer Polytechnic Institute
University of Southern California	Tuskegee University
AT&T Labs - Research	Geosemble Technologies

# Data Sciences Team: CCICADA

Command, Control and Interoperability Center for Advanced Data Analytics (CCI CoE: CCICADA)

The data sciences component of the CCI CoE, CCICADA, focuses its work on algorithmic methods for challenging problems in data analysis. CCICADA is developing the types of capabilities homeland security relies on to ferret out patterns and draw inferences from massive amounts of unstructured data contained in books, newspapers, reports, blogs, images, geospatial data, sensor readings, and audio and video streams.

CCICADA researchers are building the mathematical foundations for a new generation of computational methods being developed. Center research touches a wide variety of applications that include: container inspection in ports; sensor management for nuclear detection; syndromic surveillance for early warning of disease outbreaks; risk analysis; data management for law enforcement and emergency



response; defense against attacks on cyber infrastructure; and resource planning for infrastructure protection. Through these and other applications, CCICADA partners with a wide variety of agencies in local, state, and Federal government, as well as in the private sector.

In addition to research, CCICADA is committed to building pioneering educational programs that are fully integrated with ongoing research, and designed to meet a broad spectrum of educational needs. CCICADA involves graduate students in all of its research projects and hosts a variety of summer programs tailored to the needs of graduate and undergraduate students, college faculty, homeland security professionals, and K-12 teachers. Programs for educators feature new courses, certificate programs, guidance for faculty who want to bring homeland security topics into their classrooms.

# Visualization Sciences Team: VACCINE

Visual Analytics for Command, Control, and Interoperability Environments (CCI CoE: VACCINE)

The amount of information gathered during a crisis can be crushing if not managed correctly. DHS views this new Center's research and education in visualization as critical to the protection and security of America and her allies. In the event of a catastrophe, such as a chemical spill, natural disaster, disease outbreak or a terrorist attack, information will be coming from many sources, such as camera images, data from sensors and simulations, and text documents from



police and health-care agencies. VACCINE will focus on education, research, development, and deployment of interactive

visual analytic environments for communicating and disseminating information and deriving insight from the massive homeland security data deluge.

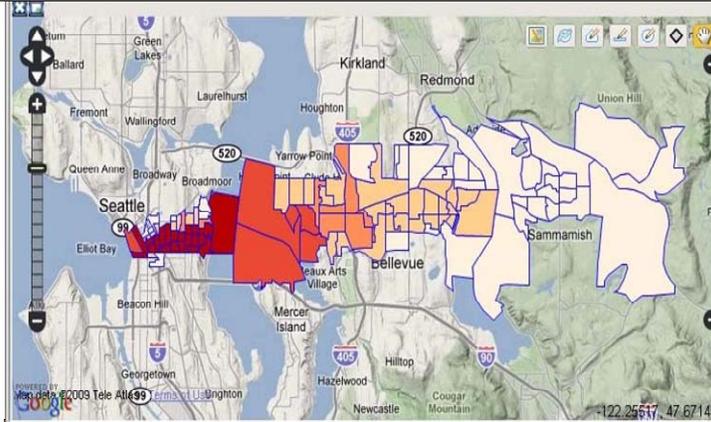
VACCINE has three core mission focuses: Innovation and Science Leadership, Transition and Engagement, and Educational Innovation, Leadership, and Outreach.

# VACCINE/FAZD Partner on DNDO Exercise

Visual Analytics for Command, Control, and Interoperability Environments (CCI CoE: VACCINE)

Over the summer, VACCINE partners Purdue University and the University of Washington, in collaboration with the National Center for Foreign Animal and Zoonotic Disease Defense (FAZD) Center, worked closely with U.S. Coast Guard and other agencies to provide a current operational picture and decision support system at field, command center and Unified Command levels.

On September 23<sup>rd</sup>, 2009, an initial version of this common operating picture was made available during a Domestic Nuclear Detection Office (DNDO) exercise in Seattle, Washington. The Puget Sound Small Vessel Maritime PRND Pilot Exercise involved more than 300 personnel from 23 tribal, local, county, state, Federal and private agencies, utilizing state of the art research and technology to further



**Screen shot from the Puget Sound Inter-agency Current Operational Picture (PSICOP).**

improve and validate the preparedness of the multi-jurisdictional agencies within the Puget Sound region.

The CCI CoE Team developed a fused operational picture that integrated real-time sensor information from the field, a dynamic plume model graphically showing the potential

impact of alternative “places of refuge,” a field reporting capability, live video and numerous other data sources. Currently named the Puget Sound Inter-agency Current Operational Picture (PSICOP), this flexible, user-centered electronic environment successfully demonstrated the capacity to leverage DHS S&T investments to support C4I requirements across the DHS community of stakeholders. The exercise was a deemed a success and generated a great deal of interest from the first responder community.

## Active Products System to be Piloted

National Visualization and Analytics Center (NVAC)

NVAC’s Active Products technology is a system that supports the next generation of interactive, dynamic intelligence reports. Now, a group of analysts at PNNL will be piloting the system in its first deployment in a collaborative setting. The technology helps groups of analysts collect and share content from the analysis tools they already use, and quickly organize this content into reports that can be readily formatted for different users. Active Products recipients can drill down into those reports to uncover the data and reasoning that went into individual statements, helping decision makers “see what the analyst saw.” One analyst involved in the pilot said, “I just spent two hours doing what took me all day to do prior to using this tool!”

# VACCINE Partners Receive \$7M Grant

Visual Analytics for Command, Control, and Interoperability Environments (CCI CoE: VACCINE)

VACCINE's Purdue University and University of Texas at Austin were recently awarded a \$7 million National Science Foundation Extreme Scale Data Visualization grant.

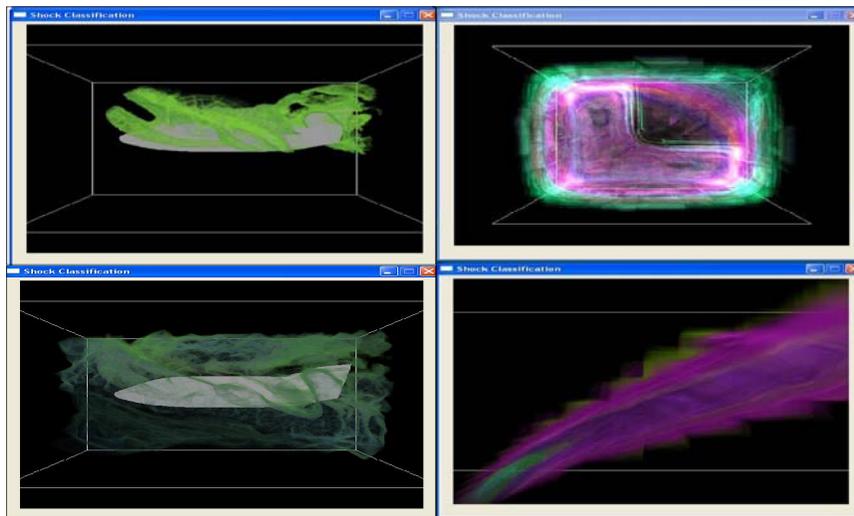
Kelly Gaither at Texas is the Principal Investigator and David Ebert at Purdue is a Co-Principal Investigator on the grant entitled, "Enabling Transformational Science and Engineering Through Integrated Collaborative Visualization and Data Analysis for the National User Community".

Purdue will design and develop visualization and analysis tools for integration into the Texas Advanced Computing Center tools deployed for the U.S. user community.

These tools will focus on advanced volume visualization

tools, correlative analysis tools, visual analytic tools, and atmospheric and flow visualization tools. They will have a wide range of applicability, including drought and flood analysis, climate models, medicine, public health, and engineering.

Purdue will expand their research suite of integrated visualization and analytics tools created in the DHS CCI CoE to massive (exascale) data and to applications for the national science, engineering, and health research communities.



## NAM's MATHFest XIX

Command, Control, and Interoperability Center for Advanced Data Analytics (CCI CoE: CCICADA)

The National Association of Mathematicians' Undergraduate MATHFest XIX will be in Washington, DC at the University of the District of Columbia on November 12 - 14, 2009. The conference is sponsored by the National Security Agency (NSA), the Educational Advancement Foundation (EAF), the U.S. Department of Homeland Security CCICADA Center and the National Association of Mathematicians (NAM).

The National Association of Mathematicians (NAM), a non-profit professional organization, has always had as its main objectives, the promotion of

excellence in the mathematical sciences and the promotion of the mathematical development of underrepresented American minorities. It also aims to address the issue of the serious under-representation of minorities in the workforce of mathematical scientists. The organization achieves its goals by focusing on five areas: Mathematics Education, Professional/Career Development, Scholarly Productivity, Student Development, and Databases.

For more information visit: <http://www.nam-math.org>



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## Schedule of Events

- **Purdue CCI CoE Kick-Off**  
Purdue University  
November 9, 2009
- **NAM Mathfest XIX**  
Washington, D.C.  
November 12-14, 2009
- **FODAVA Review**  
GA Tech  
December 3-4, 2009
- **Rutgers CCI CoE Kick-Off**  
Rutgers University  
December 9-10, 2009
- **PIE Workshop**  
University of Washington  
December 14-15, 2009

### NOVEMBER 2009

Sun	Mo	Tue	We	Th	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

### DECEMBER 2009

Sun	Mo	Tue	We	Thu	Fri	Sat
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6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

## Award for Former Director of NVAC

U.S. Department of Homeland Security

Once a year the Christopher Columbus Fellowship Foundation recognizes individuals and programs which echo the visionary spirit and pioneering heritage of Christopher Columbus by giving its \$25,000 *Homeland Security Award* to an American citizen deserving of such tribute.

On October 13, 2009, Jim Thomas, co-founder and former Director of the CCI's National Visualization and Analytics Center (NVAC), received the *2009 Homeland Security Award* at the U.S. Capitol in Washington, D.C. Mr. Thomas received this award for his leadership in the establishment of visual analytics as a new field of science. This award reflects CCI's leadership role in this field, as well as it has supported and funded the NVAC's activities for the last 5 years. Joseph Kielman, who leads the NVAC activities at DHS, was in attendance on October 13, as were members of Congress, Congressional staffers and other prominent figures within the homeland security community to recognize Mr. Thomas, and thank him for his service. For more information on the Christopher Columbus Fellowship Foundation and its awards, you may visit

<http://www.columbusfdn.org/homelandsecurity/>.

