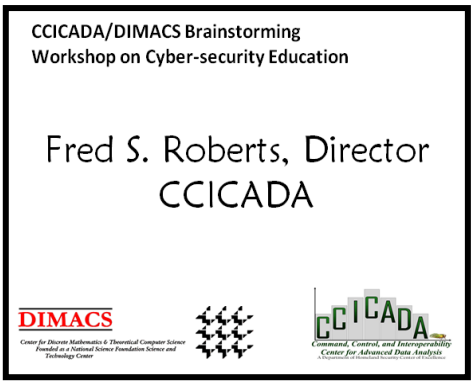
Command, Control and Interoperability Center for Advanced Data Analysis
A Department of Homeland Security Center of Excellence

CCICADA Newsletter: September-October 2013

Notes from the Director

The Command, Control and Interoperability Center for Advanced Data Analysis (CCICADA) is one of twelve (12) current US Department of Homeland Security University Centers of Excellence (COE) administered through the Office of University Programs, Science and Technology Directorate. The ". . . COE network is an extended consortium of hundreds of universities generating ground-breaking ideas for new technologies and critical knowledge . . ." that ". . . work closely with academia, industry, Department components and first-responders to develop customer-driven research solutions to 'on the ground' challenges as well as provide essential training to the next generation of homeland security experts." (*source*: https://www.dhs.gov/st-centers-excellence)



In addition to engaging in a wide variety of applied and theoretical research activities to meet the critical Centers of Excellence mission charge, CCICADA sponsors and holds gatherings of leading experts, researchers and other interested individuals to focus on a specific topic area. The purpose of these *Workshops* is to present cutting edge information, share ideas and 'brainstorm' in the advancement of a certain research interest or priority.

During September and October 2013, CCICADA, with co-sponsorship from the DIMACS Center (Center for Discrete Mathematics and Theoretical Computer Science) and other agency, industry and university partners held two such Workshops:

- **Workshop on Urban Planning for Climate Events**
- **Brainstorming Workshop on Cyber Security Education**

Both of these events, which are highlighted in this issue of the Newsletter, were highly successful and productive in framing research issues and questions, sharing knowledge, experience and relevant research and setting the course for ongoing research initiatives. They were additionally successful in enhancing existing and establishing new collaborative partnerships across a wide spectrum of expertise.

Fred S. Roberts, Director

Workshop on Urban Planning for Climate Events

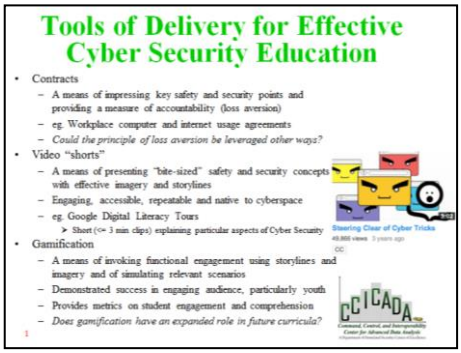
Source: http://news.nationalgeographic.com/news/2011/

Complex problems call for sophisticated strategies. Global problems call for global collaboration. These themes describe the underlying philosophy of the September 23-24, 2013 joint Workshop on Urban Planning for Climate Events held at Rutgers, the State University of New Jersey. Through a full two-day program, the workshop investigated sustainable human environments through an emphasis on urban planning for climate events such as storms, heat events, and floods. Much of the discussion reviewed and suggested algorithmic tools to make better decisions about adaptation and mitigation for such extreme climate events.

In addition, data analysis can aid event understanding and urban planning policy. The workshop looked at ways to take advantage of a great deal of data that is most certainly relevant to adaptation planning for sea level rise: flight delays, beach erosion, ferry service interruptions, salt water intrusion, water treatment plant operations, power plant location, subway and train track location, and emergency services preparedness. Data analysis can inform planning for modifications in the energy, transportation, water supply, waste, and communications sectors in advance of climate events to reduce damage, harm and disruption. In full circle, the strategic modifications can potentially impact other system sectors and therefore call for mathematical modeling and algorithmic analysis tools.

Presenters and participants came from a wide range of organizations: universities, government and industry. And, the workshop indeed had international partnership. One of the organizers and presenters was Professor Alexis Tsoukiàs, CNRS (Centre National de la Recherche Scientifique - National Center for Scientific Research) – LAMSADE (Laboratoire d'Analayse et Modélisation pour l'Aide À La Décision - Laboratory Analysis and Modeling for Decision Support), Université Paris Dauphine, Paris France.

The workshop met its goal in stimulating thought and conversation of how the mathematical sciences can help the planning processes and strategies as we continue to face the impact of more and greater climate challenges. For more information and to review the program and presentation abstracts please see (http://dimacs.rutgers.edu/Workshops/Urban/program.html).



Brainstorming Workshop on Cyber Security Education

In today's world, almost anyone who uses information technology at work, at home, or at school can benefit from at least basic education in cyber threats and cyber security methods, tools, and principles. Additionally, much of the workforce needs more sophisticated education to help prepare them to deal with cyber threats and defensive tools and strategies, both of which are changing rapidly and constantly. Government agencies, private companies, and educational institutions are all addressing these educational and training needs, or beginning to given the great potential impact and harm of a successful attack.

Of particular interest to the US Department of Homeland Security (US DHS) is training of the homeland security workforce: US DHS has more than 200,000 employees and the homeland security enterprise (HSE) broadly speaking has

millions. Whatever is developed for the HSE will also be very valuable for workers in the private sector, and ultimately for the general public. A US DHS-funded project at CCICADA under the title *Cyber Security Education* aims to: identify important cyber security educational efforts; categorize or classify them; lay out recommendations for a cyber security education initiative for US DHS; and define an educational research program that would strengthen the nation's cyber security initiative across the many affected sectors.

In beginning to address this issue, CCICADA has encountered many questions in how cyber security education is defined, implemented and evaluated. For example, how do we treat cyber security education for the general cyber user versus the cyber security specialist; at what age should cyber education begin and at what frequency should education/training be given; what principles of teaching should be applied to cyber security education; how do we measure effectiveness of education/training; what analogous education approaches can inform cyber education, e.g., medical and/or military; how do we integrate research advances into cyber security education practice; etc.

As part of the initial work in looking at these types of basic questions and to start to develop the recommendations, CCICADA hosted a "brainstorming workshop" on Cyber Security Education on October 7, 2013 at Rutgers University's Busch Campus in Piscataway, New Jersey. In addition to reviewing traditional educational formats, this workshop explored "outside the box" approaches. For example, those educational approaches based on analogies to medical student education, use of smart devices and online learning. The recommendations US DHS seeks must be based on sound educational theories/principles; a major part of the discussions focused on how to best construct an educational framework for all cyber security education and how to assess its effectiveness. This preliminary "brainstorming" workshop brought together university, industry, and government researchers and education experts to explore the important educational principles to design different kinds of programs, such as courses, short courses, webinars, refreshers, and units, as well as identify relevant existing effective efforts.

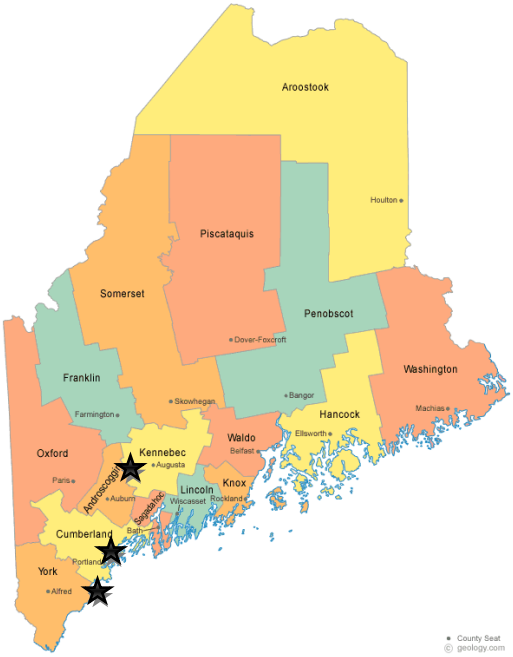
> *"Thank you for the invitation to participate in the brainstorming workshop.*
>
> *There were a lot of bases touched on at the workshop, but the most surprising to me, in the afternoon, was the emphasis on the shortage of cyber security professionals, the need to establish a pipeline to meet the anticipated deficit of 700,000 professionals and the need to find the right age for engaging the students who will become the cyber security generalists and specialists of the future*
>
> *I'd like to stay in touch on this project."* - WORKSHOP PARTICIPANT

The wide ranging ideas and contributions of the workshop participants have truly aided CCICADA in solidifying those key questions and concepts that define cyber security education and how it could be approached. The preparation of the report that will be delivered to US DHS in Spring 2014 will benefit from the discussions. This work will bring focus to areas that need more research and will guide how cyber security education is viewed and delivered going forward.

In other news . . . CCICADA Researchers Observe VIGILANT GUARD Exercise

"By failing to prepare, you are preparing to fail." - Benjamin Franklin

On November 5-8, 2013, CCICADA researchers Dr. Dennis Egan and Dr. Christie Nelson spent three days on the ground in Maine to observe the *Vigilant Guard* First Responders exercise conducted by the US Northern Command and the National Guard Bureau as a training experience for a wide variety of state, county and local first responder units across the State of Maine. The researchers attended three of the emergency scenarios:



1 – Maritime Venue, Portland, ME: "Portland Port Authority reports two recently docked container vessels notice leaks coming from multiple containers. Several stevedores from both ships have become ill."*

2 – Building Collapse, Brunswick, ME: "Brunswick/Portland Police and Fire are responding to Bowden Ice Arena in Brunswick. The structure is burning and reports estimate over 100 victims trapped in the rubble. The numbers of fatalities are unknown at this time. Additionally, fire officials are concerned that anhydrous ammonia may be leaking from holding tanks and refrigerated pipes."*

3 – Active Shooter, Augusta, ME: "Capital Police are advised of several disgruntled citizens who have entered the State House with backpacks on. A few minutes later, a Capital Police Officer reports shots have been fired on the first floor of the State House. There are initial reports of 2 people who have been injured or killed and police are requesting EMS support. Shooter states he has a bomb placed within the State House complex. This leads to contacting the MSP bomb team."*

The main purposes of CCICADA representation as observers at this impressive large-scale exercise event were to gain first-hand experience and knowledge about emergency responder operations and challenges; to understand the technology needs of first responders and how technologies developed by university research centers can best transitioned to the field and to make contacts and build relationships with the Homeland Security Enterprise (HSE). CCICADA greatly appreciates the extension of an invitation to observe the Vigilant Guard exercise from its organizers; the visit was extremely valuable in meeting CCICADA's observation objectives.

*Scenario descriptions were provided by the Vigilant Guard organizers.