Chapter 99

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

Asamoah Nkwanta
Morgan State University, USA

Janet E. Barber
Central Michigan University, USA & Prince George's Community College, USA

ABSTRACT

The purpose of this chapter is to summarize and give an overview of the educational and research programs of the Command, Control, and Interoperability Center for Advanced Data Analysis (CCICADA) in an integral way. CCICADA is based at Rutgers University and is one of the components of the Department of Homeland Security (DHS) Center of Excellence (COE) Center for Visualization and Data Analytics (CVADA). CVADA is co-led by Rutgers University and Purdue University. Purdue's Visual Analytics for Command, Control, and Interoperability Environments (VACCINE) Center and Rutgers University's CCICADA Center were established as a DHS Homeland Security Center of Excellence in 2009. Although Purdue's focus is on visualization sciences, and Rutgers' focus is on data sciences, these two CVADA components are working closely on a number of activities, projects, and programs (Command, Control, and Interoperability Center for Advanced Data Analysis, 2013).

ORGANIZATIONAL BACKGROUND

The Department of Homeland Security Centers of Excellence perform critical research and development activities to provide the necessary homeland security tools, technologies, and training to help safeguard the United States against terrorist threats and attacks, and natural disasters. Congress mandated the creation of a center or centers of excellence in the Homeland Security Act of 2002. The following quote comes from the 2013 amended Homeland Security Act of 2002:

The Secretary, acting through the Under Secretary for Science and Technology, shall designate a university-based center or several university-based centers for homeland security. The purpose of the center or these centers shall be to establish a coordinated, university-based system to enhance the Nation's homeland security (Department of Homeland Security, 2002).

The Department of Homeland Security Centers of Excellence are sponsored by the DHS Office of University Programs and supported by the Oak Ridge Institute for Science Education (ORISE). Since 2003, ORISE has provided assistance to the DHS Office of University Programs to establish a system of university-based homeland security centers of excellence in accordance with the Homeland Security Act of 2002 (Oak Ridge Institute for Science Education, 2013). In 2004, a homeland security workshop was convened, and the aim and main focus were to create a summary report that DHS could use in order to more strategically select relevant and specific university-based, homeland security centers of excellence (Shaw, 2004). In this same year, the first COE was funded and established.

The Center of Excellence network is a consortium of universities that are developing new ideas, technologies and critical knowledge for homeland security. All COEs work closely with academia, industry, DHS components and first-responders as well as provide essential training for future homeland security experts. The research portfolios of the COEs consist of basic and applied research that addresses both short and long-term needs of DHS. The COE network of university centers currently includes twelve Centers of Excellence one of which involves CCICADA of the CVADA Center.

The origins of CCICADA, formerly known as Command, Control, and Interoperability (CCI), are rooted in three previously DHS-funded Centers: the Center for Knowledge Integration and Discovery (CKID) at the University of Southern California, the Center for Multimodal Information Access and Synthesis (MIAS) based at the University of Illinois at Urbana Champaign, and the Center for Dynamic Data Analysis (DyDAn) of Rutgers University. We will give a brief overview of DyDAn whose focus was on discrete sciences.

The DyDAn Center was established in 2006 as a DHS Center of Excellence and was based in Rutgers University's Center for Discrete Mathematics and Theoretical Computer Science (DIMACS). It was one of four University Affiliate Centers of the Institute for Discrete Sciences (IDS). The IDS center was a joint project between the DHS and several national laboratories, based at Lawrence Livermore National Laboratory. DyDAn researchers were tasked with developing new techniques for drawing inferences from massive flows of data that arrives continuously over time. DyDAn's research consisted of two primary areas of theoretical research: Analysis of Large, Dynamic Multigraphs, and Continuous, Distributed Monitoring of Dynamic, Heterogeneous Data (Homeland Security Center for Dynamic Data Analysis, 2009). In addition to the theoretical research, applied research was performed. See Table 1 for some of the DyDAn research projects.

The DyDAn researchers studied novel technologies to find patterns and relationships in dynamic and sometimes large datasets. The DyDAn research programs covered topics in Knowledge Discovery, Information Management and Discrete Mathematics (Homeland Security Center for Dynamic Data Analysis, 2009). Additionally, DyDAn created educational programs for all levels and constituents of academia and incorporated these programs for future and ongoing research. For example, according to Roberts (2004), bio-terrorism sensor-location problems are researchable projects for homeland security based student activities.

The establishment of CVADA, the new 2009 Department of Homeland Security Center of Excellence, continued the research, training and

19 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/command-control-and-interoperability-center-for-advanced-data-analysis/130465

Related Content

Organizing With Self-Organization?: The Ramifications of the Strategic Use of Facebook in Informal Civic Activism
Rui Alexandre Novais (2020). *Handbook of Research on Politics in the Computer Age (pp. 315-337).*
www.irma-international.org/chapter/organizing-with-self-organization/238230

#Childathlete: Examining the Ways in Which Children are Being Presented and Perceived on Instagram
Fallon R. Mitchell, Sarah J. Woodruff, Paula M. van Wykand Sara Santarossa (2019). *International Journal of Social Media and Online Communities (pp. 1-14).*
www.irma-international.org/article/childathlete/262109

Social Networking Sites and Complex Technology Assessment
Christian Fuchs (2010). *International Journal of E-Politics (pp. 19-38).*
www.irma-international.org/article/social-networking-sites-complex-technology/45187

From Theory to Practice: Communities of Practice across the Canadian Public Service
Hope Seidman, Andrea Mamers, Bev Mitelmanand Mariève Gauthier (2010). *Educational Social Software for Context-Aware Learning: Collaborative Methods and Human Interaction (pp. 187-205).*
www.irma-international.org/chapter/theory-practice-communities-practice-across/38166

Social Media, Online Brand Communities, and Customer Engagement in the Fashion Industry
Guida Helal (2022). *Research Anthology on Social Media Advertising and Building Consumer Relationships (pp. 1823-1852).*
www.irma-international.org/chapter/social-media-online-brand-communities-and-customer-engagement-in-the-fashion-industry/305426