

1. **Name:** Fred S. Roberts
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2. **Title:** Director, CCICADA and Distinguished Professor, Department of Mathematics, Rutgers University
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3. **Organization you are representing:** Department of Homeland Security Center of Excellence CCICADA: Command, Control and Interoperability Center for Advanced Data Analysis
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6. **Date of hearing:** June 23, 2014
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**5. Any federal grants or contracts (including subgrants or subcontracts) which you, personally, have received since October 1, 2011, from Federal Agencies under the purview of the hearing, the source and the amount of each grant or contract: (attach additional pages as necessary).**

DIMACS Special Focus on Algorithmic Foundations of the Internet  
Sponsor: National Science Foundation  
Division/Program: CNS: CYBER TRUST, ITR-CYBERTRUST, COMMUNICATIONS RESEARCH, TRUSTWORTHY COMPUTING  
\$311,867. Start date: 10/01/2007  
PI: Fred Roberts; coPI: Rebecca Wright

A DIMACS "special focus" is a multi-year program of coordinated activities addressing a topic of broad importance. This award supports the DIMACS special focus on Algorithmic Foundations of the Internet. The special focus is devoted to the study of algorithms and protocols for large-scale networks in a way that is guided by a deep understanding of the current Internet while also allowing for the possibility of radical change where this is warranted.

See attached additional document (Roberts\_PersonalGrants6-2014.docx) for full list.

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CCICADA Fellowship Program in Homeland Security at Rutgers University  
Sponsor: Department of Homeland Security  
\$500,000. Start date: 09/30/2010  
PI: Fred Roberts; coPI: Tamra Carpenter

This award provides tuition, stipends, and travel funds to support three Rutgers graduate students for 2.5-3 years of study in STEM programs relevant to CCICADA research. This is our third such award.

See attached additional document (Roberts\_RepresentingGrants6-2014.docx) for full list.

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**Signature of Witness:** 

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Your signature WILL NOT be posted to the Committee website.

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**University**  
**Department of Homeland Security Center of Excellence CCICADA: Command, Control and**  
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The Challenge of Interdisciplinary Education: Math-Bio

Sponsor: National Science Foundation

Division/Program: DRL: DISCOVERY RESEARCH K-12

\$2,205,400. Start date: 09/15/2010

PI: Fred S. Roberts; coPI: Margaret Cozzens

The project is developing high school instructional materials that integrate biology, computing, and mathematics, and it is conducting related research. The intended deliverables include up to five new instructional modules and a coherent one-semester course (and book) suitable for satisfying state requirements for a fourth year of math.

CMISS: DIMACS Project on CS/Math in Service to Society

Sponsor: National Science Foundation

Division/Program: CCF: SPECIAL PROJECTS - CCF, COMPUTER SYSTEMS

\$800,000. Start date: 09/15/2010

PI: Rebecca Wright; coPI: Fred Roberts

This award partially supports the DIMACS Center infrastructure which is vital to carrying out activities related to DIMACS special foci as well to the center's research projects and education programs.

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\$500,000. Start date: 09/30/2010

PI: Fred Roberts; coPI: Tamra Carpenter

This award provides tuition, stipends, and travel funds to support three Rutgers graduate students for 2.5-3 years of study in STEM programs relevant to CCICADA research. This is our third such award.

### Three New DIMACS Special Focus Programs

Sponsor: National Science Foundation

Division/Program: CCF: IIS SPECIAL PROJECTS, INFRASTRUCTURE PROGRAM, ALGORITHMIC FOUNDATIONS, TRUSTWORTHY COMPUTING

\$698,995. Start date: 09/01/2011

PI: Rebecca Wright; coPI: Fred Roberts

A DIMACS “special focus” is a multi-year program of coordinated activities involving hundreds of diverse participants and addressing a broad and important topic. This award supports the activities of three DIMACS special foci on the topics of: 1) Information Sharing and Dynamic Data Analysis; 2) Algorithms and Energy; and 3) Cybersecurity.

### CCICADA Natural Language Processing – Cyber Security: Early Identification of Preparation for Cyber Attacks

Sponsor: Department of Homeland Security

\$50,000. Start date: 07/01/2012

PI: Dan Roth (University of Illinois)

This project is examining and developing techniques for semantic analysis of messages sent in forums, in order to identify both network entities trying to obtain sensitive data and what kind of information such entities are interested in. This award is a “pass through” to UIUC.

### CCICADA Best Practices for Stadium Security

\$500,000. Start date: 08/01/2012

PI: Fred Roberts

The DHS Office of SAFETY Act Implementation (OSAI) made this award to CCICADA to identify best practices and develop a resource guide for SAFETY Act Block Designation for sports venue security/counter-terrorism. The proposed uses of the guide are: a) as guidance for applicants seeking SAFETY Act block designation and b) as a basis for application evaluation. There are four primary project tasks: identifying best practices in anti-terrorism security for sports venues; identifying the key best practices and developing metrics; developing a best practices resource guide and testing the best practices guide which was delivered in July 2013.

Sponsor: National Science Foundation

Division/Program: DMS: INFRASTRUCTURE PROGRAM

\$467,549. Start date: 09/01/2012

PI: Fred Roberts

This award provides support to sustain activities of the North American Mathematical Institutes’ Mathematics of Planet Earth 2013 program beyond 2013, focusing on topics such as management of natural resources, sustainable human environments, data-aware energy use, natural disasters, and global change.

### CCICADA Fellowship Program in Homeland Security at Rutgers University

Sponsor: Department of Homeland Security

\$400,000. Start date: 09/20/2012

PI: Tamra Carpenter; coPIs: Fred Roberts, Rebecca Wright

This award provides tuition, stipends, and travel funds to support three Rutgers graduate students for 2.5-3 years of study in STEM programs relevant to CCICADA research. This is our fourth such award.

### Mathematical and Computational Methods for Planning a Sustainable Future

Sponsor: National Science Foundation

Division/Program: DRL: DISCOVERY RESEARCH K-12

\$425,773. Start date: 10/01/2012

PI: Margaret Cozzens; coPIs: Tamra Carpenter, Fred Roberts, and Hal Salzman

This is an exploratory project developing and testing two instructional modules for grades 9-12 that emphasize mathematics and computational methods in planning for a sustainable future.

Comparing Algorithms for Nuclear Detection

Sponsor: University of Southern California (subcontract, prime agency is DHS)

\$250,000. Start date: 5/24/2013

PI: Fred Roberts

One of the primary functions of the Domestic Nuclear Defense Office (DNDO) is the application of sophisticated and highly accurate nuclear detection systems in support of the US DHS objective to safeguard the country against nuclear attack. DNDO is responsible for reviewing emerging technologies and other advancements in nuclear detection including the evaluation of the component algorithms that seek to differentiate true isotope identification from false positives and false negatives. This project will seek to enhance DNDO's algorithm evaluation strategies. CCICADA will collaborate with COE CREATE on the project.

CCICADA Year 5 Base Grant

Sponsor: Department of Homeland Security

\$1,574,000. Start date: 7/1/2013

PI: Fred Roberts

The Year 5 US Department of Homeland Security Center of Excellence Award to the Command, Control and Interoperability Center for Advanced Data Analysis provides funding across its research partner institutions in four primary Homeland Security research themes plus one education theme: Theme 1: Work with DHS agencies; Theme 2: Work with the homeland security enterprise; Theme 3: Work with the private sector; Theme 4: Work with agencies concerned with cybersecurity; and Theme 5: Education.

CCICADA Fellowship Program in Homeland Security

Sponsor: Department of Homeland Security

\$225,000. Start date: 7/1/2013

PI: Fred Roberts and Tamra Carpenter

This award was included as a separate component of the CCICADA base award. (This is in contrast to previous awards which were funded based on separate competitions.) The award will provide half tuition, stipends, and travel funds to support one graduate student at Rutgers and one graduate student at RPI for roughly 2.5 years of study in STEM programs relevant to CCICADA research. This is our fifth award for fellowships, but through a different funding mechanism this time.

CCICADA Year 5 Supplemental: EDGE Virtual Training and Transition

Sponsor: Department of Homeland Security

\$212,798. Start date: 7/1/2013

PIs: Fred Roberts and Dennis Egan

US DHS S&T has partnered with the US Army to develop the Enhanced Dynamic Geo-social Environment (EDGE) virtual training tools to address a high priority training requirement identified by first responders. CCICADA will elicit additional training requirements from first responders, evaluate the likely effectiveness of EDGE and look at transitioning options for the EDGE virtual training tools.

CCICADA Year 5 Supplemental: Human Trafficking

Sponsor: Department of Homeland Security

\$125,000. Start date: 7/1/2013

PIs: Fred Roberts and Eduard Hovy (CMU)

CCICADA will focus on extending the existing technologies that have been developed to combat human trafficking by developing software that leverages data collected from previous work to perform generic analytics necessary for detection of trafficking, data gathering, and subsequent arrest and prosecution of traffickers and restitution of victims. This software will be applicable to several different kinds of trafficking, including illegal immigrant slavery, illicit money laundering, illegal weapons and drug trafficking, etc.

CCICADA Year 5 Supplemental: Cybersecurity Education

Sponsor: Department of Homeland Security

\$100,000. Start date: 7/1/2013

PI: Fred Roberts

US DHS and homeland security enterprise personnel need to receive basic education/training in cyber threats and cyber security methods/tools/principles. This project aims to: identify important cybersecurity educational efforts; categorize or classify them; lay out recommendations for a cybersecurity education initiative for US DHS; and define an educational research program that would strengthen the nation's cybersecurity initiative.

CCICADA Year 5 Supplemental: Unaccompanied Alien Children Project - Resource Management

Optimization for UAC Transfer and Placement and Shelter Utilization

Sponsor: Department of Homeland Security

\$100,000. Start date: 7/1/2013

PI: Fred Roberts

CCICADA will work in partnership with the NCBSI and CREATE Centers of Excellence and all system stakeholders to improve the operational efficiencies and enhance the mission outcomes of the Unaccompanied Alien Children program (minors who enter the USA illegally) by: a) building on expertise in data analytics, decision science, algorithm development, systems simulation, projections, optimization/resource allocation and stochastic modeling; b) applying broad experience with assisting homeland security clients with real world issues and c) leveraging experience in approaching bed management efficiency questions gained in related projects and staff expertise in correctional/inmate movement systems.

CCICADA Year 5 Supplemental: Unaccompanied Alien Children: Tool Development Project

Sponsor: Department of Homeland Security

\$100,000. Start date: 7/1/2013

PI: Fred Roberts

CCICADA will work with NCBSI and CREATE to develop a usable tool (e.g., model, software, methodology, etc.) that can be delivered to the agencies involved with the Unaccompanied Alien Children program as described above. The tool will be based on the research and models coming from the previously planned project and will be developed in conjunction with the users agencies so it meets their needs.

CCICADA Year 5 Supplemental: REALTech: E2E Technology Transition Project

Sponsor: Department of Homeland Security

\$50,000. Start date: 7/1/2013

PI: Fred Roberts

This project will enhance a resource allocation technology, REALTech (REsource ALlocation Technology), developed through a long-term collaboration between the US Coast Guard (USCG) and CCICADA, by adding a third partner, FICO (NYSE: FICO), that develops decision management tools. The project will enhance tool transition to the USCG and look to expand to other client bases.

CCICADA Best Practices in Anti-Terrorism Security Tier II: Metrics and Effectiveness + Next Generation Communications Interoperability

Sponsor: Department of Homeland Security

\$510,000. Start date: 4/15/2014 anticipated

PI: Fred Roberts

This project will extend CCICADA's work on Best Practices for Stadium Security by concentrating on the development of metrics, reviewing and assessing effectiveness measures, proposing training testing protocols, and developing methods for comparing venues.

CCICADA Best Practices in Anti-Terrorism Security Tier II: Economics and Randomization

Sponsor: Department of Homeland Security

\$500,000. Start date: 5/1/2014 anticipated

PI: Fred Roberts

CCICADA's research team will analyze the economic benefits and costs of implementing best practices security strategies at stadium venues that host primarily professional, semi-professional and college sports and at times entertainment events (such as concerts, monster truck and/or appearances of major world figures like the Pope), and assess the effectiveness of randomizing some aspects of security, including patron screening processes, security camera placement, and updates of employee background checks.

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