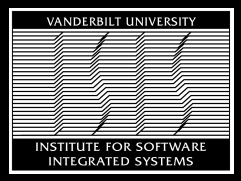
Institute for Software Integrated Systems

Vanderbilt University



The *Science of Security* Virtual Organization

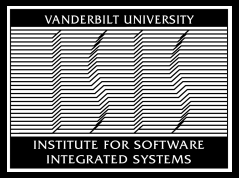
http://cps-vo.org/group/sos/

24th Nov 2012

Chris.vanBuskirk@vanderbilt.edu

Frankie King, Katie Dey & Anne Dyson

Outline



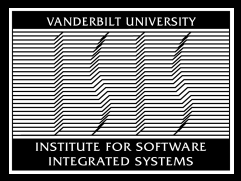
- What is the CPS-VO?
  - Objectives
  - Portal Services
  - Current Status & Timelines
- The SoS Presence on the VO
  - The *Science of Security* Group
  - The NSA SoS Lablets
- Planned Future Capabilities
- Discussion

Objectives

- **Community Building**
  - promoting collaboration and close interaction between academia, industry & government
  - facilitating interactions across technical disciplines & across applications areas
  - cross-fertilization of research in CPS Core Sciences and applied research in domain- and mission-oriented problems in a multi-agency setting
- **Collaboration Support via the website**
  - information flow and awareness of CPS activities
  - collaboration and professional networking
  - knowledge repository to facilitate the open exchange of challenge problems, research results, tools, and educational materials

* Supporting CPS/NITRD community activities

The VO - Building a Collaboration Framework



Differentiators

- *Community*-oriented framework
- Meta-Data
- Taxonomic Search Engine
- Cohesive collection of loosely coupled web-sites (*a.k.a. Groups*)

The CPS-VO Portal is not just a "web site"

Available *Group Services*

- Branding
- A Virtual Filesystem
- Revision Control
- Calendar (*incl.* Meeting Mgmt)
- Discussion Forums
- Email Announcements
- Domain-Specific Search Engine
- Subscriptions Service
- Configurable Security Policies

Common Use Cases

- Research Projects
- Special Interest Groups
- Conference/ Workshop Planning
- Proceedings Archival

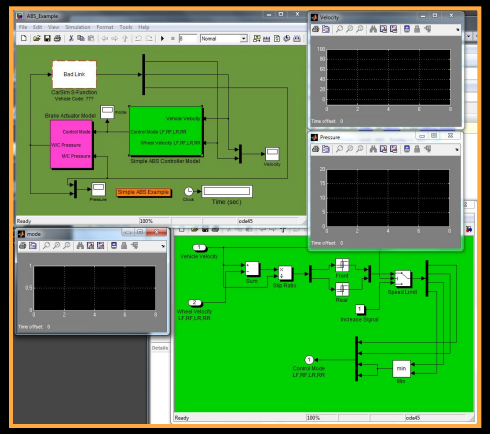
Group Name	Description	Group Type
CPS Certification (CERT)	To discuss and identify research needs in the...	Special Interests Group
VO Admins		
VO Moderators	*This is group #267	
Medical CPS	The group brings together researchers and...	Special Interests Group
Science of Integration	Our mission is to provide reports,...	Research Project
CPS PI Meeting 2010	Start: Aug 10 2010 End: Aug 12 2010	Conference Proceedings
CPS PIs Group	The CPS PI Group supports information...	Special Interests Group
Science of Security	Virtually every computing system today is at...	Special Interests Group
DARPA AVM Meta-X	The ultimate goal of the META program is to...	Research Project
Automotive	This call for position papers invites you to...	Special Interests Group
Aviation	Identify key challenges related to the Next...	Special Interests Group
Education	Working with the CPS community, VU-ISIS will...	Special Interests Group
CPS PI Meeting 2011	The CPS Principal Investigator...	Event Planning
2011 HCSS Conference Program Committee	A world class community of researchers will...	Event Planning
Transportation		Special Interests Group
National CPS PI Meetings	**RELATED EVENTS:** • ...	Conference Proceedings
Automotive CPS Workshops	The goal of this workshop series is to...	Workshop Proceedings
2011 Automotive CPS Workshop	Workshop for Developing Dependable Automotive...	Workshop Proceedings
HCSS Conferences		Proceedings Archival
CPS Architectures	The mission of this online community of CPS...	Special Interests Group
NITRD	**High Confidence Software and Systems...**	Special Interests Group
Software Certification Consortium	The SCC is organized to pursue the following...	Special Interests Group
Run Time Assurance of Safety Critical Cyber Physical Systems	*Our mission is to enable certification...*	Special Interests Group
2012 CPS Time-Critical Systems Workshop		Event Planning
2012 CPS Medical Devices Workshop		Event Planning
Meta-X Private		Research Project
mass mailing		
2012 HCSS Conference Program Committee		Event Planning
Academic Executive Board		Special Interests Group
NCSU Science of Security Lablet Research Initiative		Research Project
NSA SoS Lablets		Research Project
CMU Science of Security Lablet Research Initiative		Research Project
UIUC Science of Security Lablet Research Initiative		Research Project

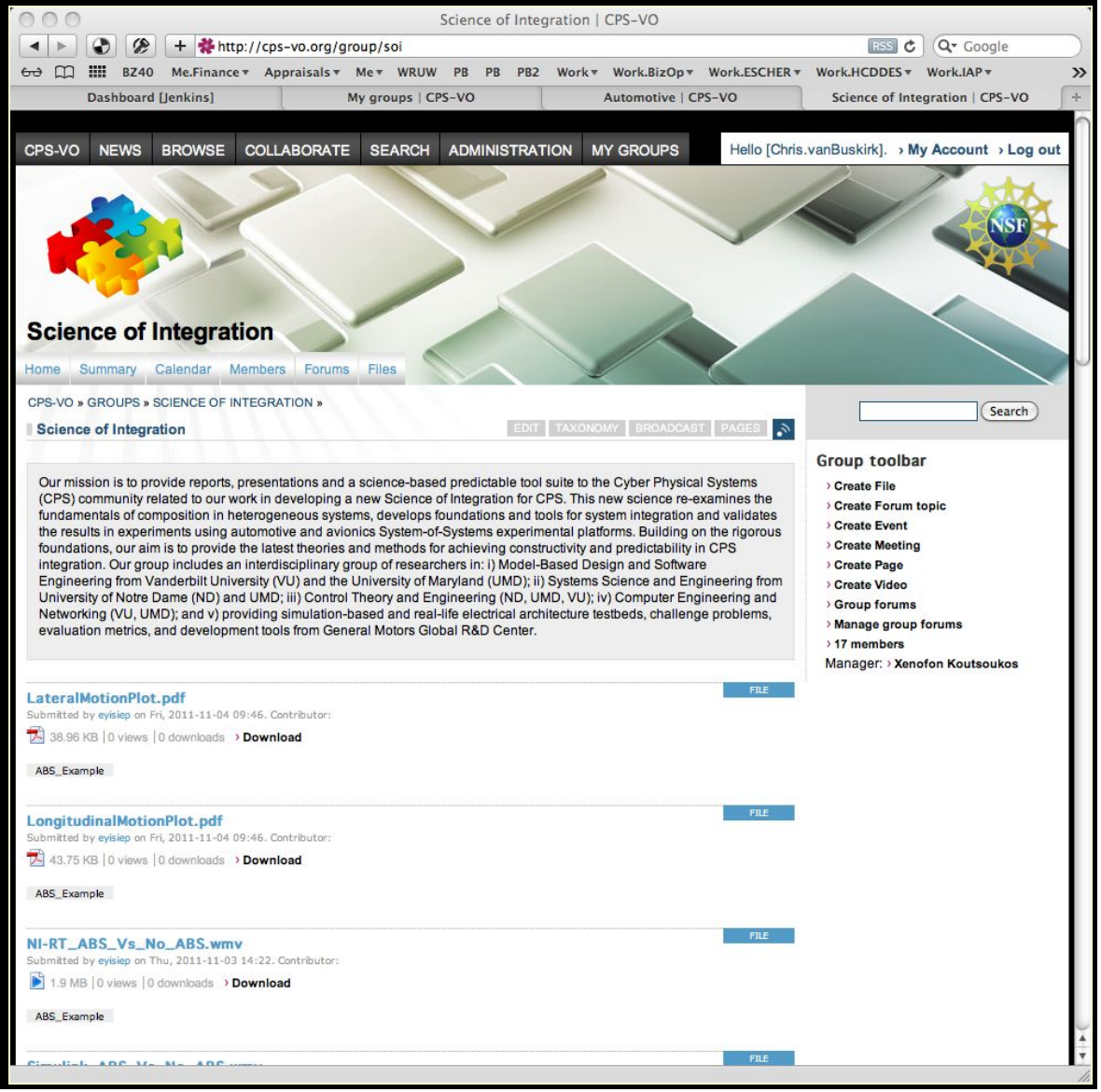
Example Research Project

Science of Integration

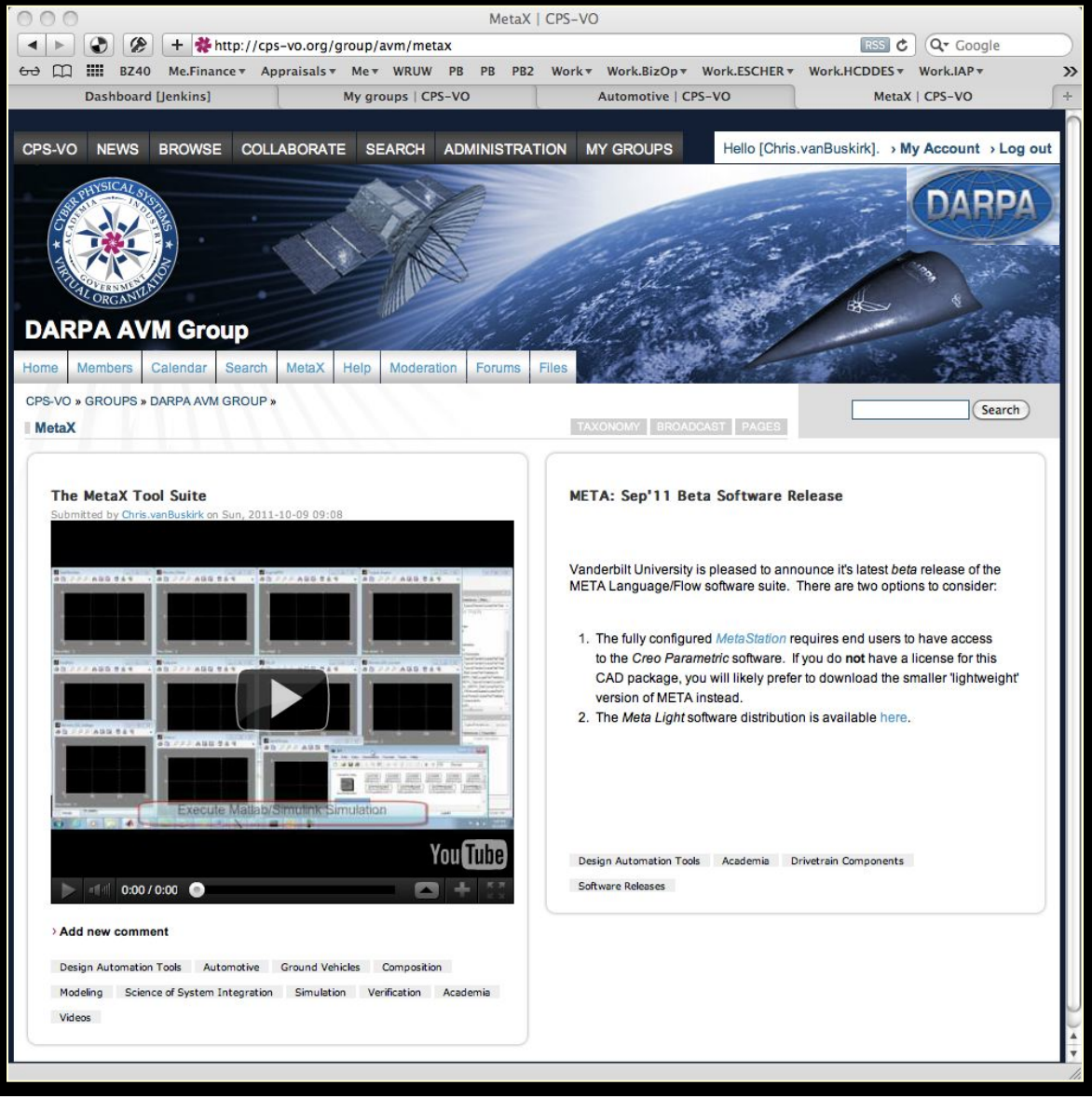
- Research Findings
- Meeting Coordination
- Automotive Experimental Platform (AEP)

- Publishing Models

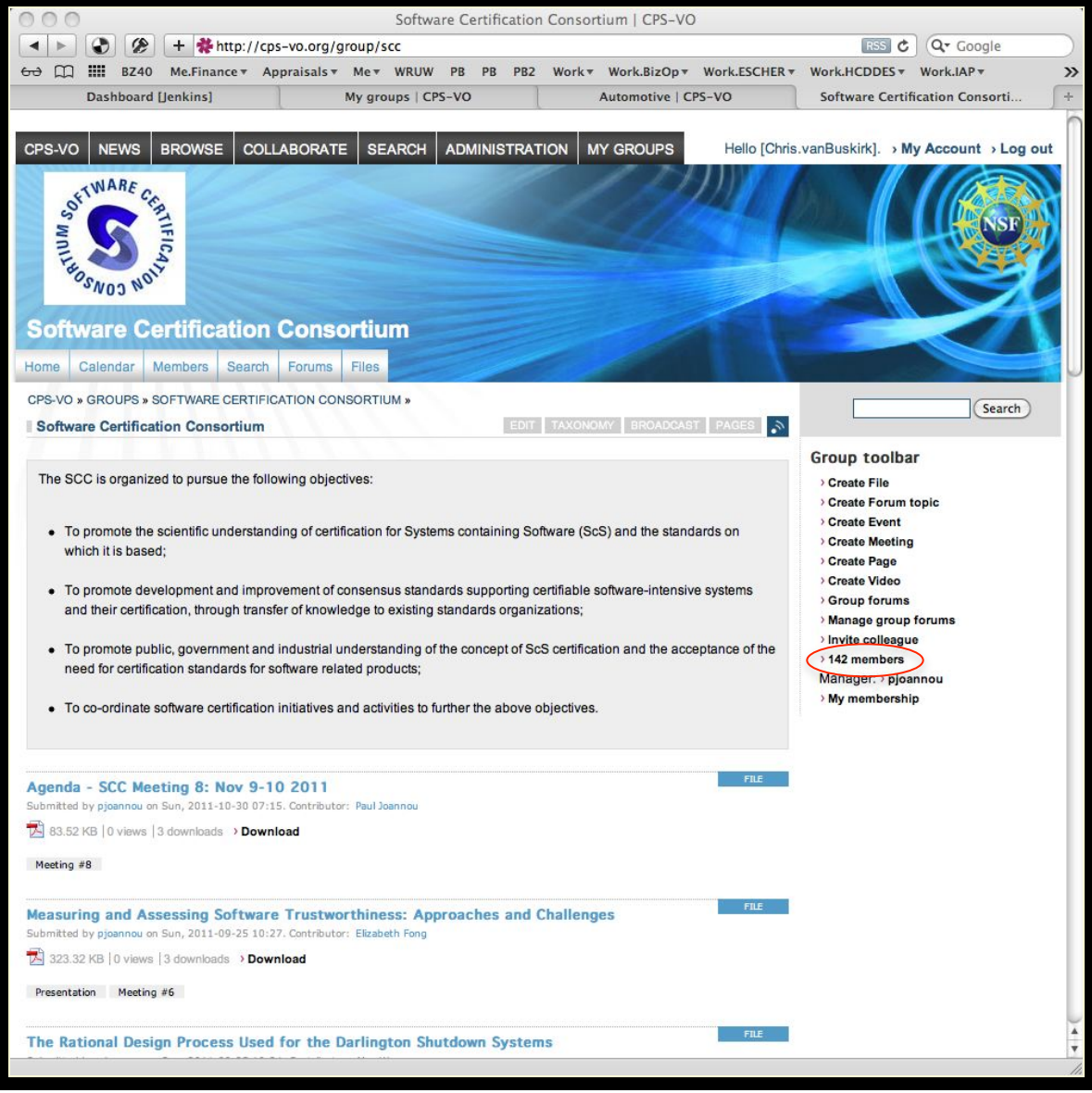




AVM's *META-X* Software Distribution Website



Special Interest Groups: Software Certification Consortium



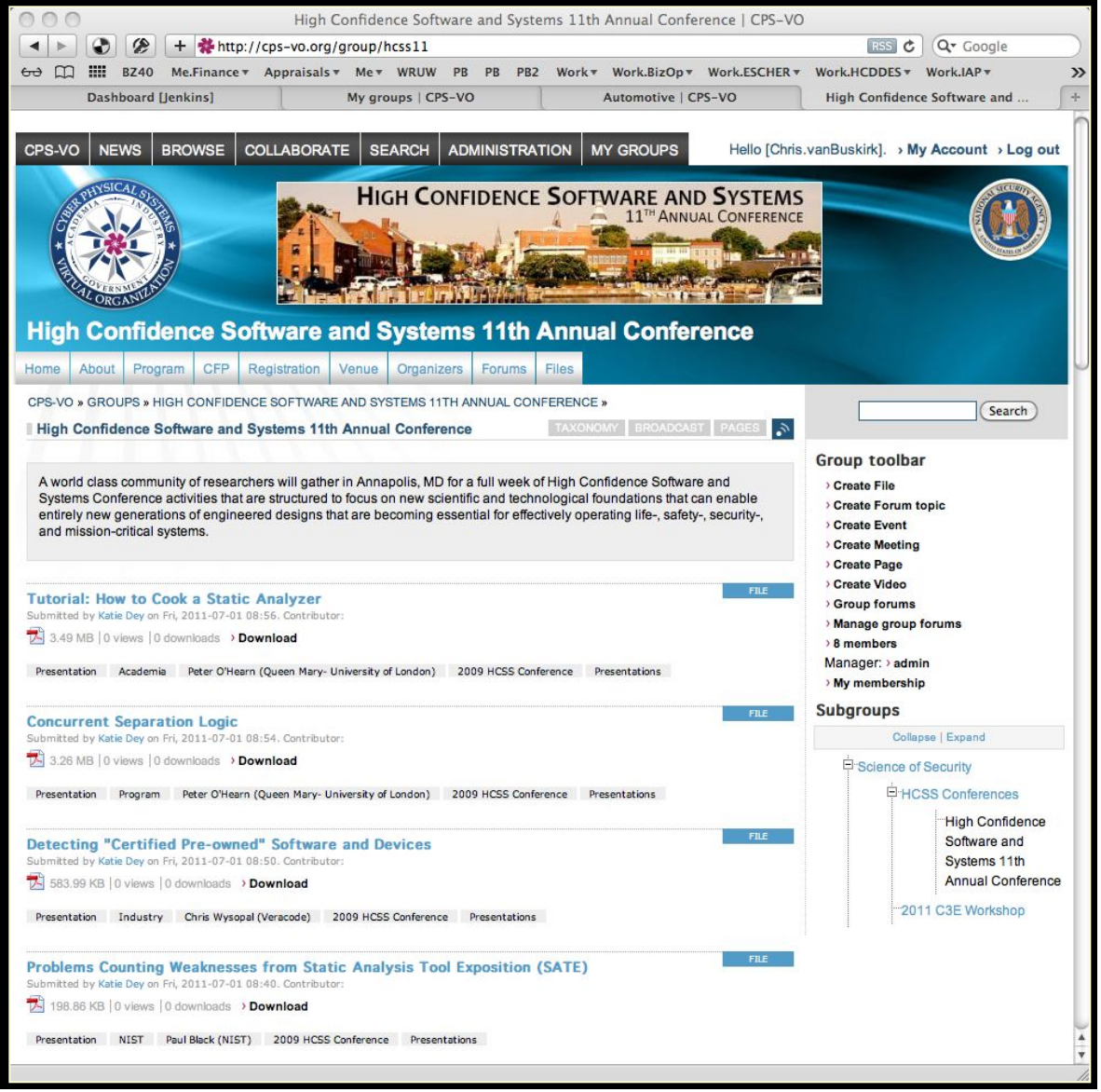
VO-Hosted Conference Proceedings

HCSS

Annapolis, MD

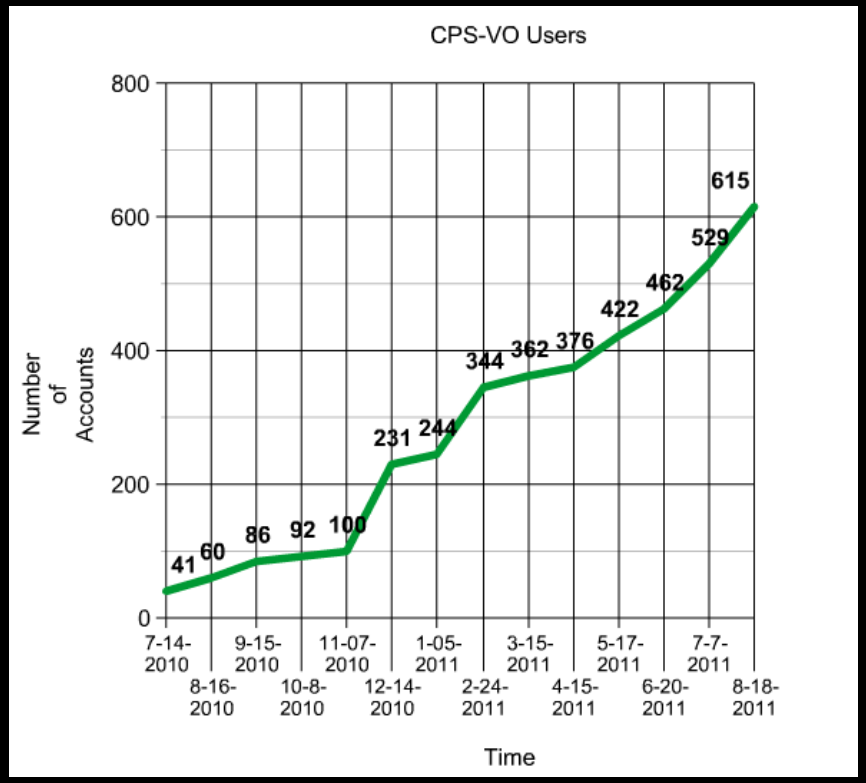
May, 2011

1. Conference Proceedings
2. Program Planning
   Upcoming: May, 2012

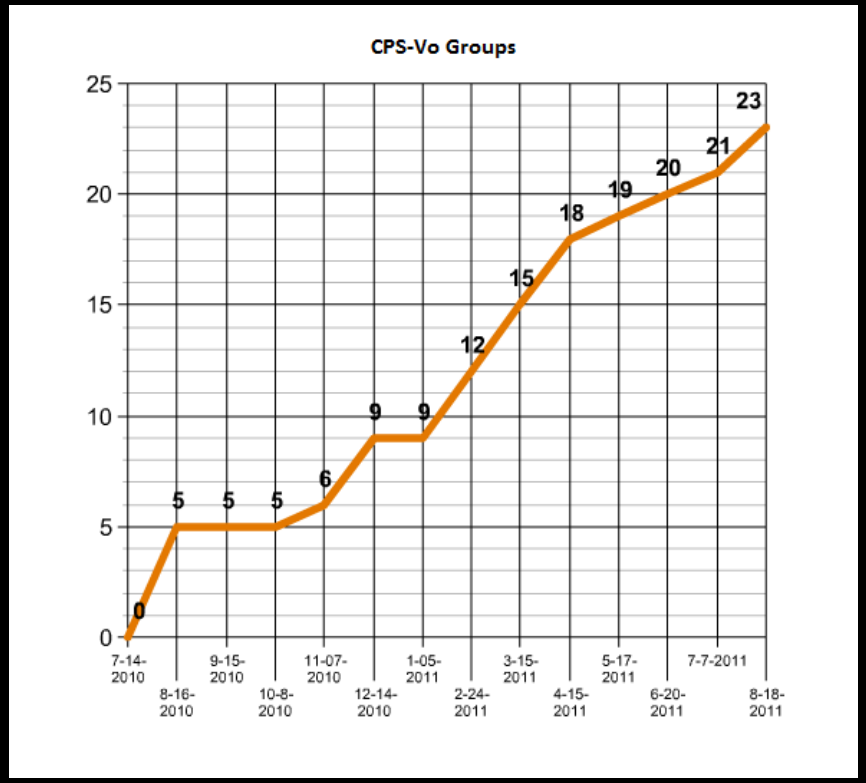


CPS-VO Growth, Year #1

Registered Users



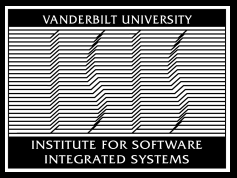
Community Groups



Jan 23rd, 2012: ~850 Users

33 Groups

Outline



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- Planned Future Capabilities
- Discussion

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cps-vo.org/group/SoS

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Current Research

NSA SoS Lablets

NSF TRUST Center

AFOSR MURI

ASD(R&E) JASON Study

Upcoming Events

Lablet Quarterly Meeting
Date: 01/24/12
First Science of Security Quarterly Meeting...

SoS Group Meeting
Date: 01/26/12
Meeting to discuss the SoS VO.

Conference on High Confidence Networked Systems (HiCoNS)
Date: 04/17/12 - 04/18/12
This conference aims to foster collaborations...

Lablet Quarterly Meeting
Date: 04/17/12
Quaterly Meeting at University of Illinois,...

Twelfth Annual HCSS Conference
Date: 05/06/12 - 05/11/12

Highlights

Nicol leads new Science of Security "Lablet" at Illinois

The University of Illinois at Urbana-Champaign, Carnegie Mellon University, and North Carolina State University are each receiving an initial $1 million in grant funds from the U.S. National Security Agency (NSA) to stimulate the creation of a more scientific basis for the design and analysis of trusted systems.

Read more ›

Recent Posts

NEWS
IEEE Security & Privacy
Submitted by Katie Dey on Mon, 2012-01-23 20:55

NEWS
The Next Wave: The Science of Cybersecurity
Submitted by Katie Dey on Mon, 2012-01-23 20:14

FILE
Is it Possible to Do Scientific Experiments in Security?
Submitted by Katie Dey on Sun, 2012-01-22 19:40. Contributor: Roy Maxion

102.61 KB | 0 views | 0 downloads › **Download**

Science of Security | Carnegie Mellon University | 2008 NSF-IARPA SoS Workshop | Presentation

Academia | Science of Security | 2008 NSF-IARPA SoS Workshop

FILE
Towards a Science of Security
Submitted by Katie Dey on Sun, 2012-01-22 18:40. Contributor: Fred Schneider

284 KB | 0 views | 0 downloads › **Download**

Science of Security | Cornell University | Presentation | Academia | JASON 2010 Summer Study

Related Groups

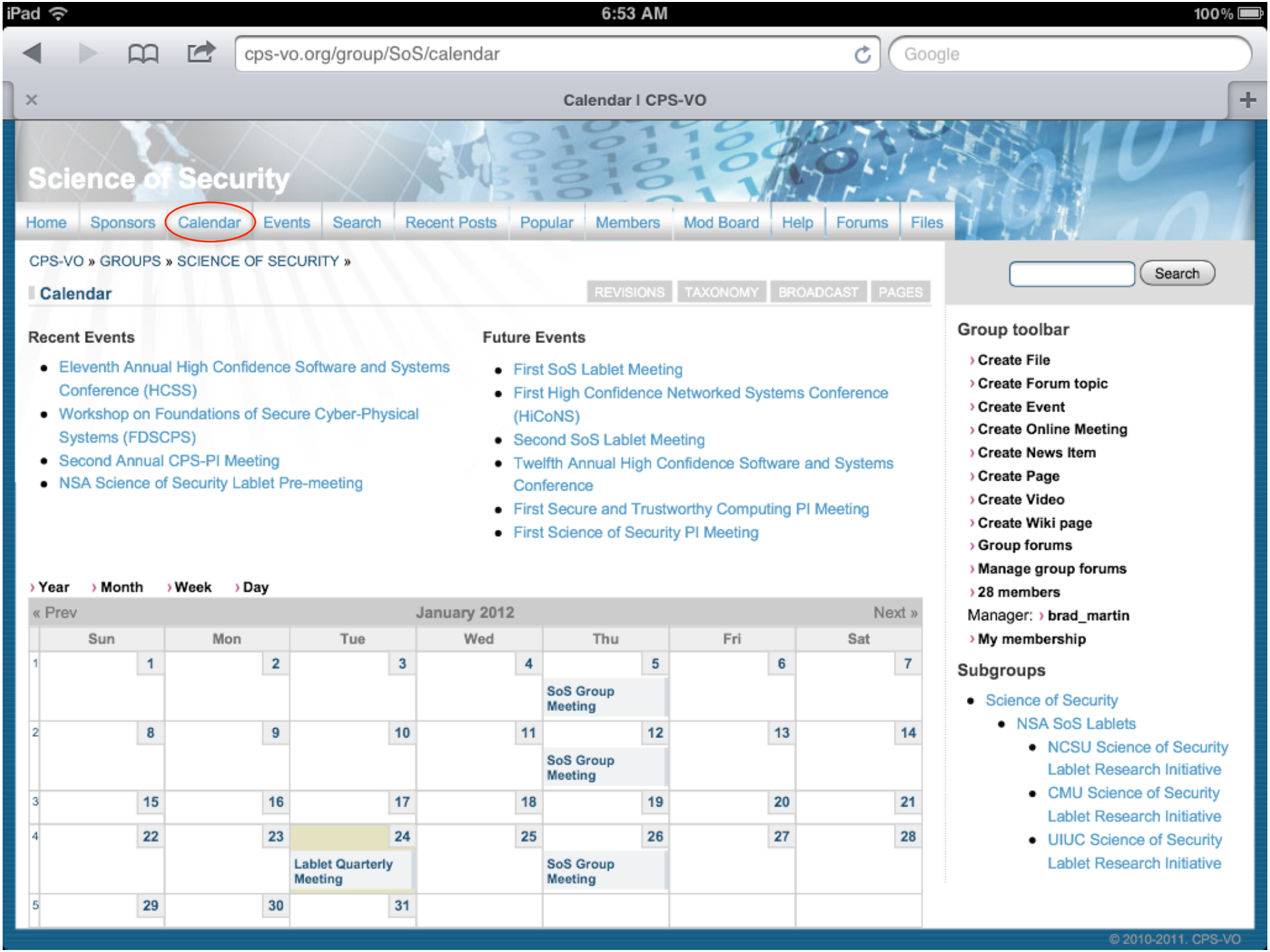
NSA SoS Lablets

HCSS Conferences

Vision and Goals

While certain subfields of security have a strong scientific lasis (e.g., cryptography, formal methods), there is no comprehensive scientific basis for constructing systems that are trustworthy by design. This lack of a disciplined and rigorous scientific basis profoundly limits our ability to design, deploy, and trust most large-scale and cyber-physical systems (CPS). A foundational science of security is needed now. To this end, the CPS-VO Science of Security Group will provide a portal for community awareness, collaboration, and information all directed toward the maturing of the scientific basis for security.

http://cps-vo.org/group/sos/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Recent Events
Eleventh Annual High Confidence Software and Systems Conference (HCSS)
Workshop on Foundations of Secure Cyber-Physical Systems (FDSCPS)
Second Annual CPS-PI Meeting
NSA Science of Security Lablet Pre-meeting
Future Events
First SoS Lablet Meeting
First High Confidence Networked Systems Conference (HiCoNS)
Second SoS Lablet Meeting
Twelfth Annual High Confidence Software and Systems Conference
First Secure and Trustworthy Computing PI Meeting
First Science of Security PI Meeting
Group toolbar
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Create News Item
Create Page
Create Video
Create Wiki page
Group forums
Manage group forums
28 members
Manager: brad_martin
My membership
Subgroups
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SoS Group Meeting
SoS Group Meeting
Lablet Quarterly Meeting
SoS Group Meeting
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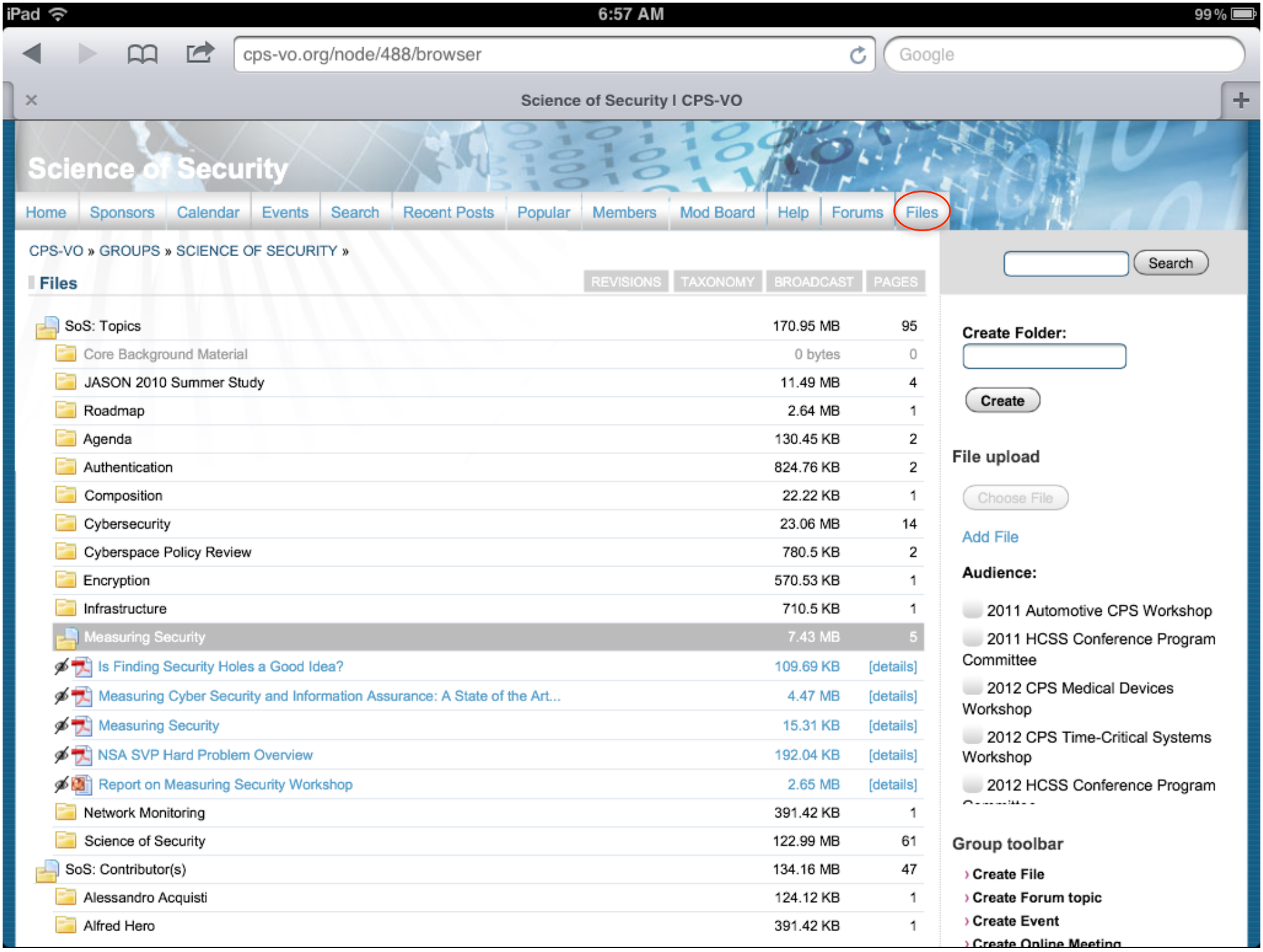
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Core Background Material 0 bytes 0
JASON 2010 Summer Study 11.49 MB 4
Roadmap 2.64 MB 1
Agenda 130.45 KB 2
Authentication 824.76 KB 2
Composition 22.22 KB 1
Cybersecurity 23.06 MB 14
Cyberspace Policy Review 780.5 KB 2
Encryption 570.53 KB 1
Infrastructure 710.5 KB 1
Measuring Security 7.43 MB 5
Is Finding Security Holes a Good Idea? 109.69 KB [details]
Measuring Cyber Security and Information Assurance: A State of the Art... 4.47 MB [details]
Measuring Security 15.31 KB [details]
NSA SVP Hard Problem Overview 192.04 KB [details]
Report on Measuring Security Workshop 2.65 MB [details]
Network Monitoring 391.42 KB 1
Science of Security 122.99 MB 61
SoS: Contributor(s) 134.16 MB 47
Alessandro Acquisti 124.12 KB 1
Alfred Hero 391.42 KB 1
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2012 CPS Medical Devices Workshop
2012 CPS Time-Critical Systems Workshop
2012 HCSS Conference Program
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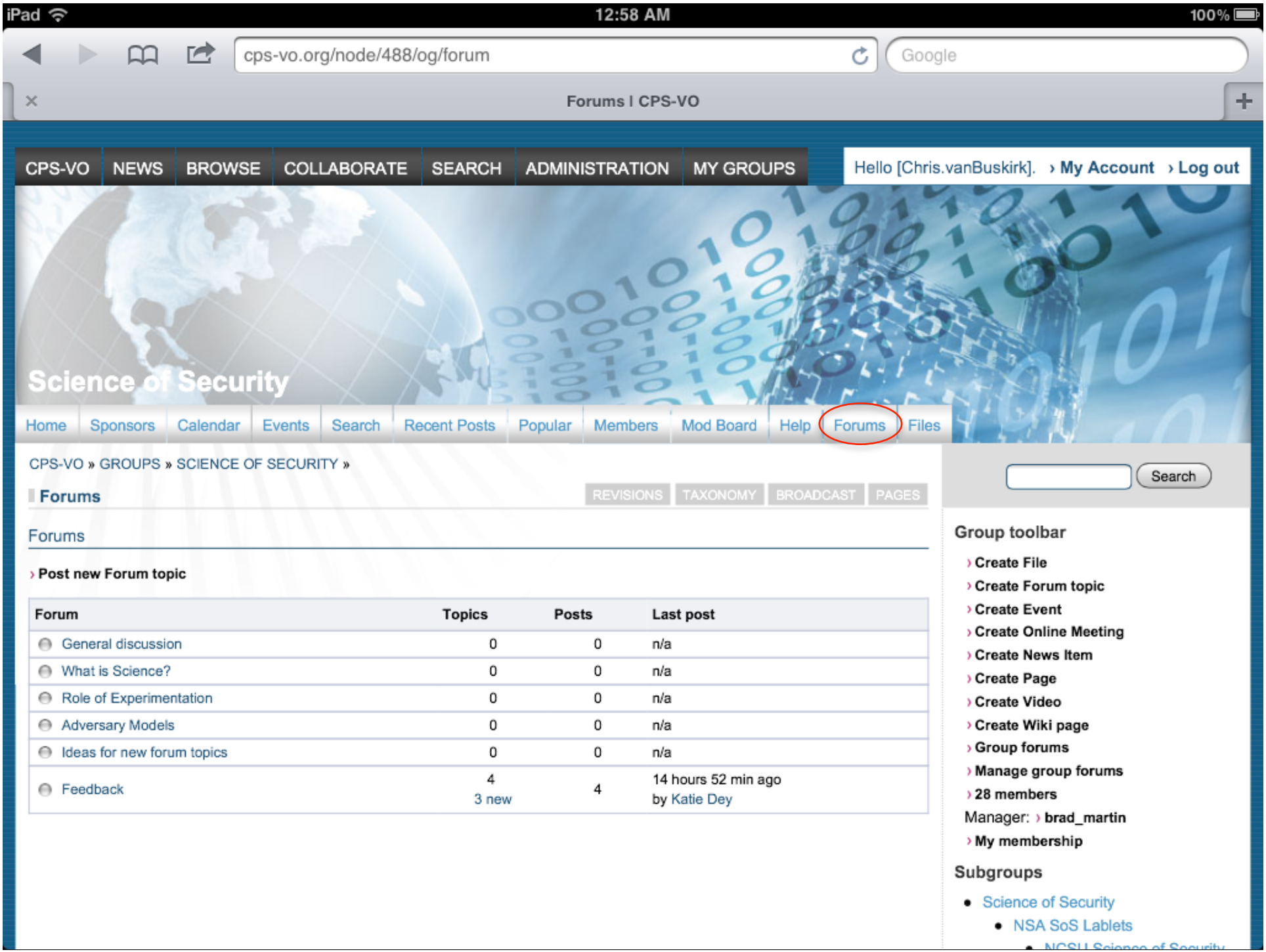
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Adversary Models
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Ideas for new forum topics
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› Group forums
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› 28 members
Manager: › brad_martin
› My membership
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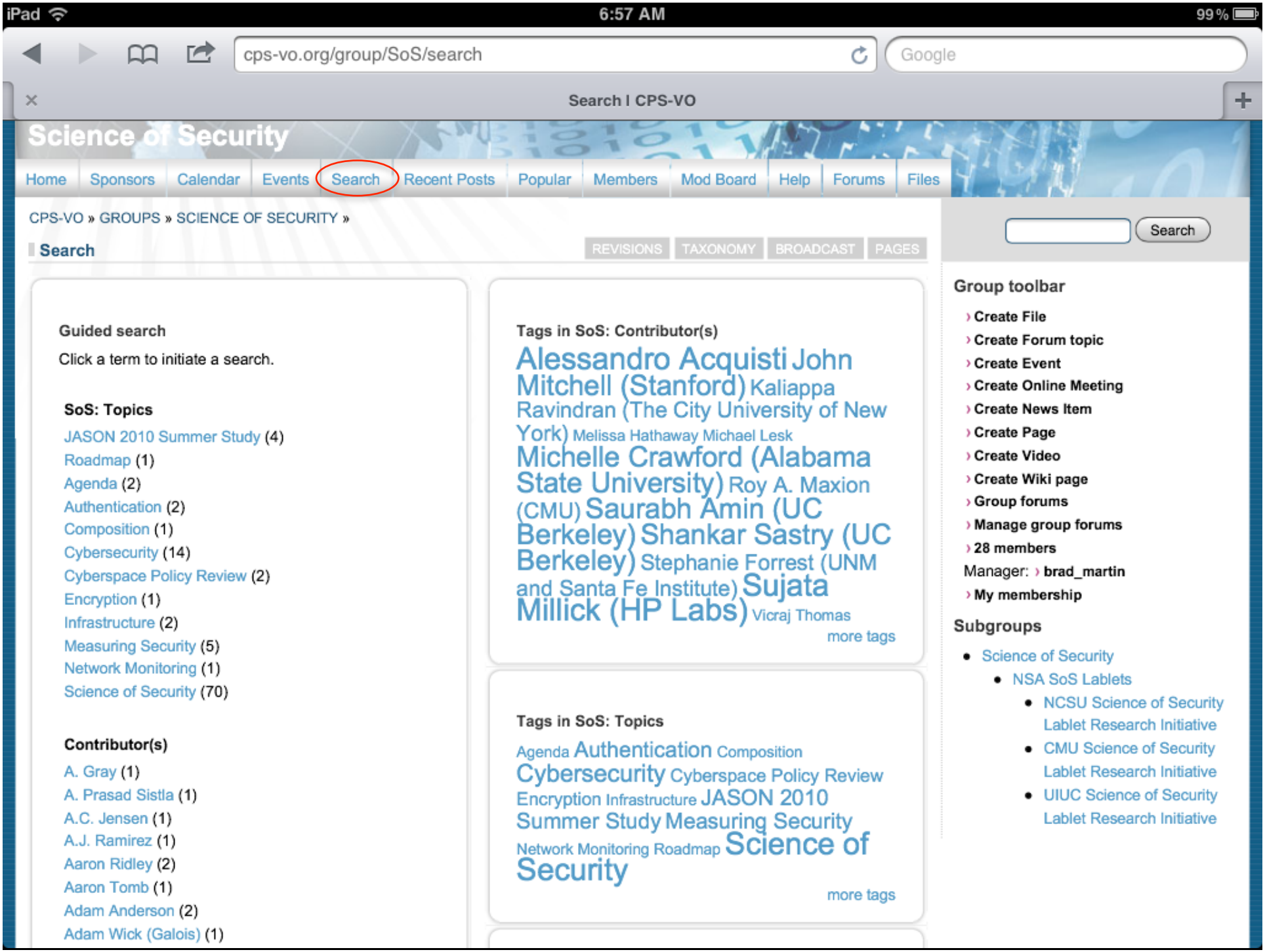
NSA SoS Lablets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Composition (1)
Cybersecurity (14)
Cyberspace Policy Review (2)
Encryption (1)
Infrastructure (2)
Measuring Security (5)
Network Monitoring (1)
Science of Security (70)
Contributor(s)
A. Gray (1)
A. Prasad Sistla (1)
A.C. Jensen (1)
A.J. Ramirez (1)
Aaron Ridley (2)
Aaron Tomb (1)
Adam Anderson (2)
Adam Wick (Galois) (1)
Tags in SoS: Contributor(s)
Alessandro Acquisti John Mitchell (Stanford) Kaliappa Ravindran (The City University of New York) Melissa Hathaway Michael Lesk Michelle Crawford (Alabama State University) Roy A. Maxion (CMU) Saurabh Amin (UC Berkeley) Shankar Sastry (UC Berkeley) Stephanie Forrest (UNM and Santa Fe Institute) Sujata Millick (HP Labs) Vicraj Thomas
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› Create Video
› Create Wiki page
› Group forums
› Manage group forums
› 28 members
Manager: › brad_martin
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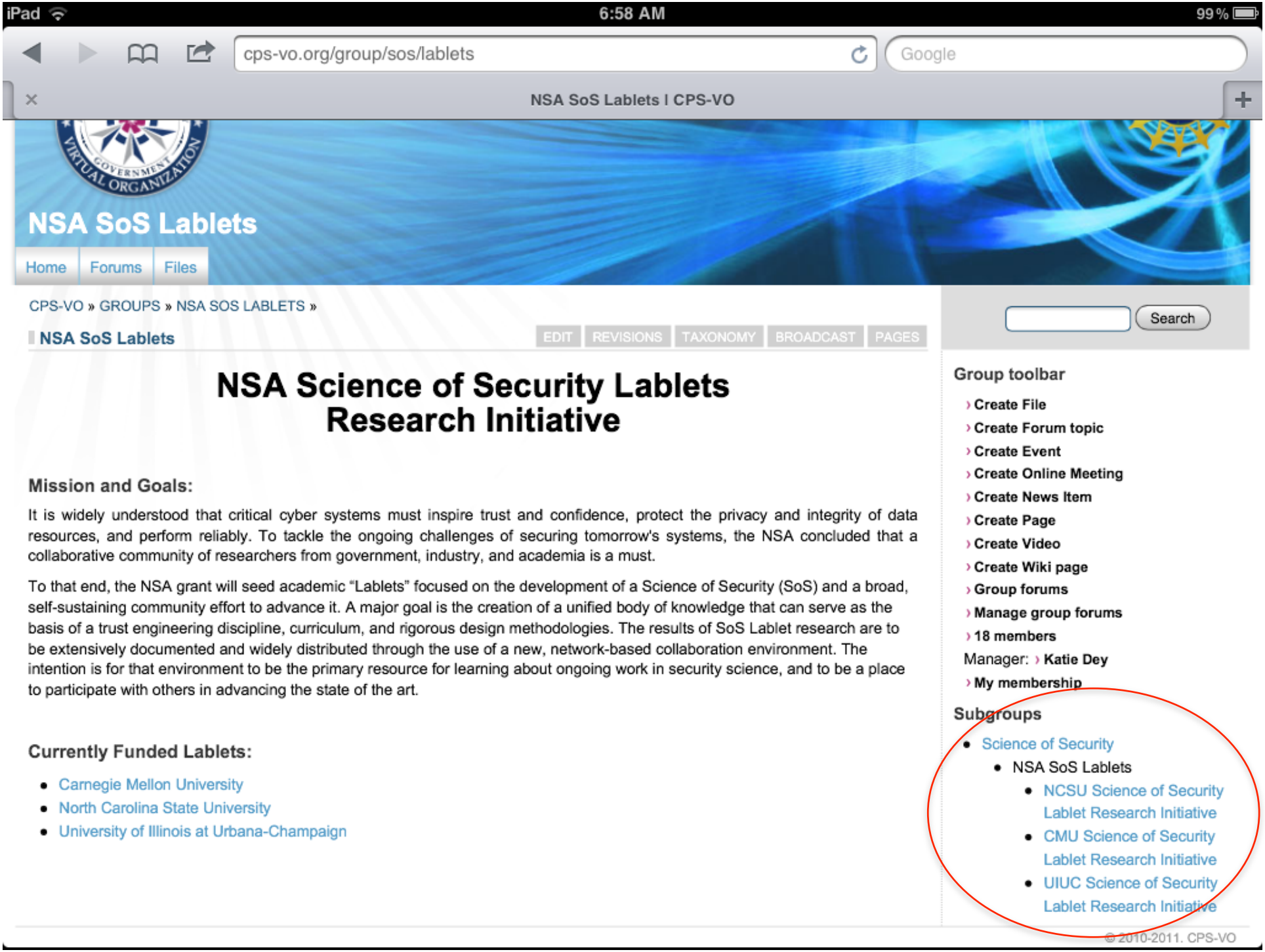
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NSA Science of Security Lablets Research Initiative
Mission and Goals:
It is widely understood that critical cyber systems must inspire trust and confidence, protect the privacy and integrity of data resources, and perform reliably. To tackle the ongoing challenges of securing tomorrow's systems, the NSA concluded that a collaborative community of researchers from government, industry, and academia is a must.
To that end, the NSA grant will seed academic "Lablets" focused on the development of a Science of Security (SoS) and a broad, self-sustaining community effort to advance it. A major goal is the creation of a unified body of knowledge that can serve as the basis of a trust engineering discipline, curriculum, and rigorous design methodologies. The results of SoS Lablet research are to be extensively documented and widely distributed through the use of a new, network-based collaboration environment. The intention is for that environment to be the primary resource for learning about ongoing work in security science, and to be a place to participate with others in advancing the state of the art.
Currently Funded Lablets:
Carnegie Mellon University
North Carolina State University
University of Illinois at Urbana-Champaign
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Create File
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Create Online Meeting
Create News Item
Create Page
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North Carolina State University

NSA Science of Security Lablet

ABSTRACT

Building on its core strengths in Applied Mathematics, Statistics and Computer Science, North Carolina State University (NCSU) has, over the last five years, emerged as a leader in both Analytics education and research. Through university-wide collaboration, our Institute for Advanced Analytics with its pioneering graduate education program, and our Institute for Next Generation Information Technology (ITng) with its security research and translation services, NCSU is well-positioned to apply advanced analytics toward such critical areas as building the scientific underpinnings to software security.

LEAD PI

Laurie Williams is a Professor in the Computer Science Department of the College of Engineering at North Carolina State University (NCSU). Her research focuses on software security particularly in relation to healthcare IT; agile software development practices and processes; software reliability, software testing and analysis; open source software development; and broadening participation and increasing retention in computer science. Laurie has more than 170 refereed publications.

PROJECTS

- *Developing a User Profile to Predict Phishing Susceptibility and Secure Technology Acceptance* – Christopher B. Mayhorn, PhD and Emerson Murphy–Hill, PhD
- *An Adoption Theory of Secure Software Development Tools* – Emerson Murphy–Hill, PhD

PUBLICATIONS

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An Adoption Theory of Secure Software Development Tools

North Carolina State University | Seedling Proposal

LEAD PI: Emerson Murphy-Hill

ABSTRACT

The purpose of this research is to investigate why developers use (and do not use) a variety of security tools, as well as investigate the barriers that current security tools present. Previous research has typically focused on improving individual security of tools in a number of dimensions, such as reducing the number of false-positive security warnings.

The goal of this research is to develop a theory that predicts how well a given tool will help a given developer improve the security of her software. This is useful in three ways. First, it will help individual developers and organizations predict return on investment when introducing a new security tool, given current practices and infrastructure. Second, it will help educators to decide what to teach students to ensure that future developers are best equipped to use security tools.

Third, it will help researchers determine how to align security tools with the needs and practices of software developers.

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FLAVUS RATIONIS

Flauto Vulgariter Ratihabere Nisus

The University of North Champaign-Mellon

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OVERVIEW

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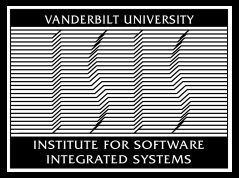
SUPPORTED PLATFORMS

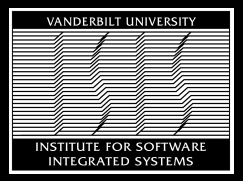
FLAVUS RATIONIS runs on Windows XP/Vista, Mac OS 10.5/10.6, and Ubuntu Linux 8.10/9.04/9.10.

Outline



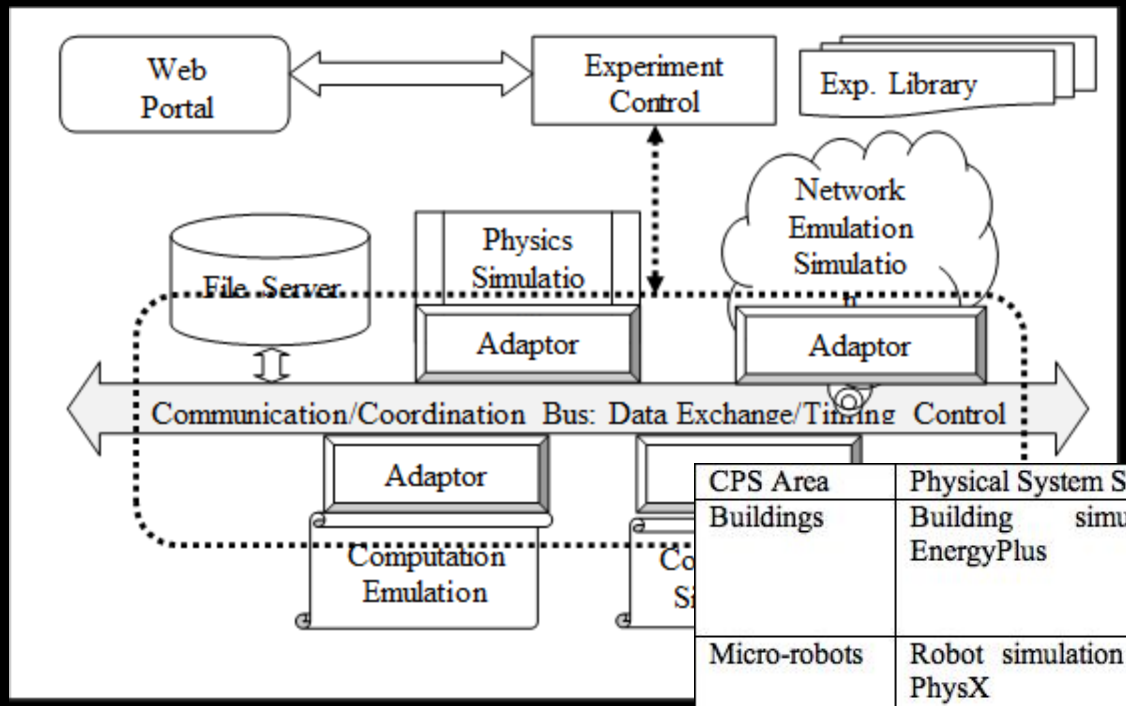
- What is the CPS-VO?
  - Objectives
  - Portal Services
  - Current Status & Timelines
- The SoS Presence on the VO
  - The *Science of Security* Group
  - The NSA SoS Lablets
- Planned Future Capabilities
- Discussion

New Capabilities



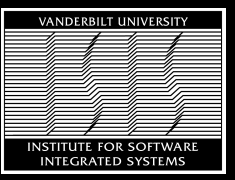
- Move from the document-centric paradigm of *File* sharing to more generalized, ubiquitous sharing of *Artifacts*. Including, for example:
  - Challenge Problems
  - Models
  - Algorithms
  - Simulators
  - Tool Suites
  - Computational Experiments
  - Specification of formal semantics

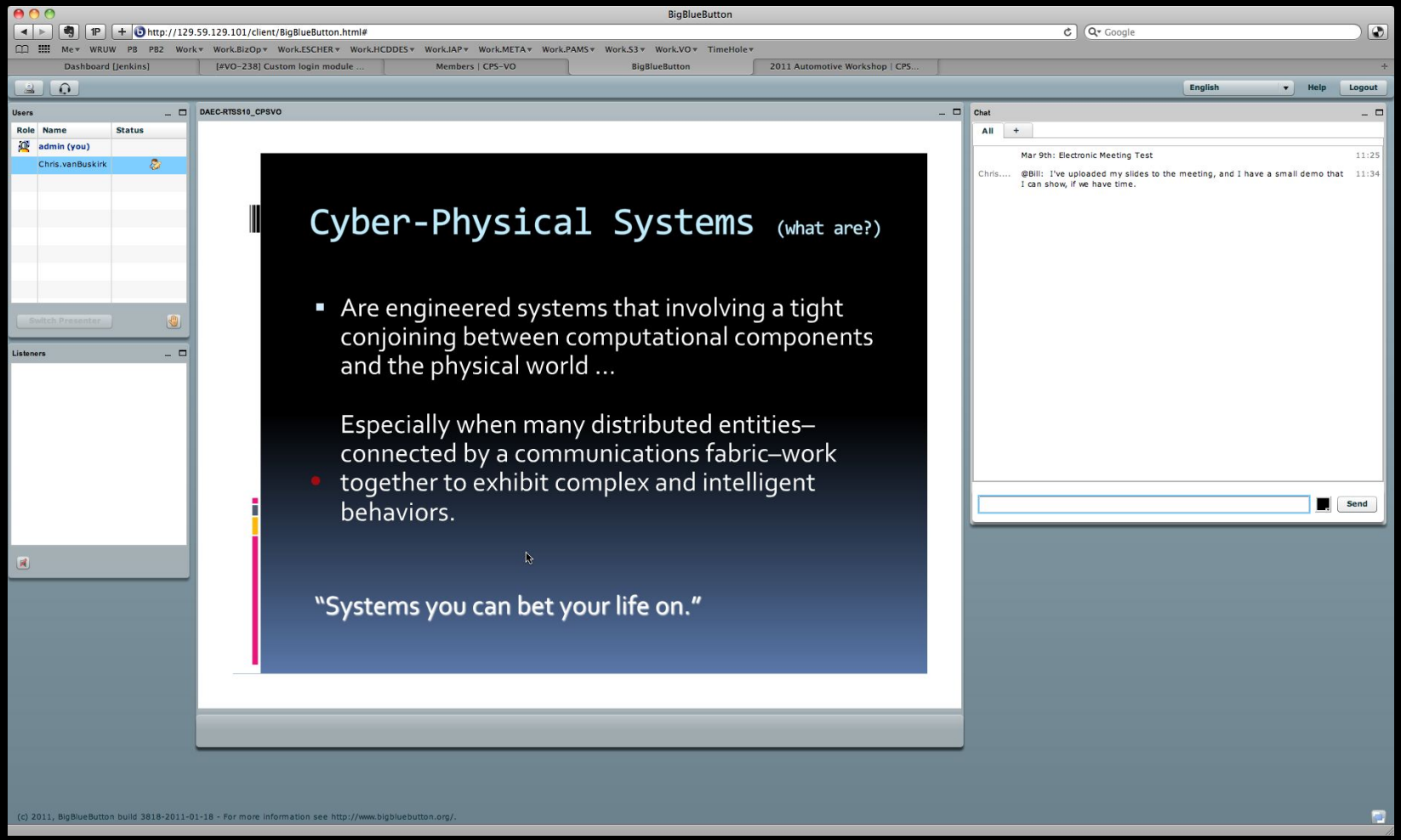
Open Experimental Platforms



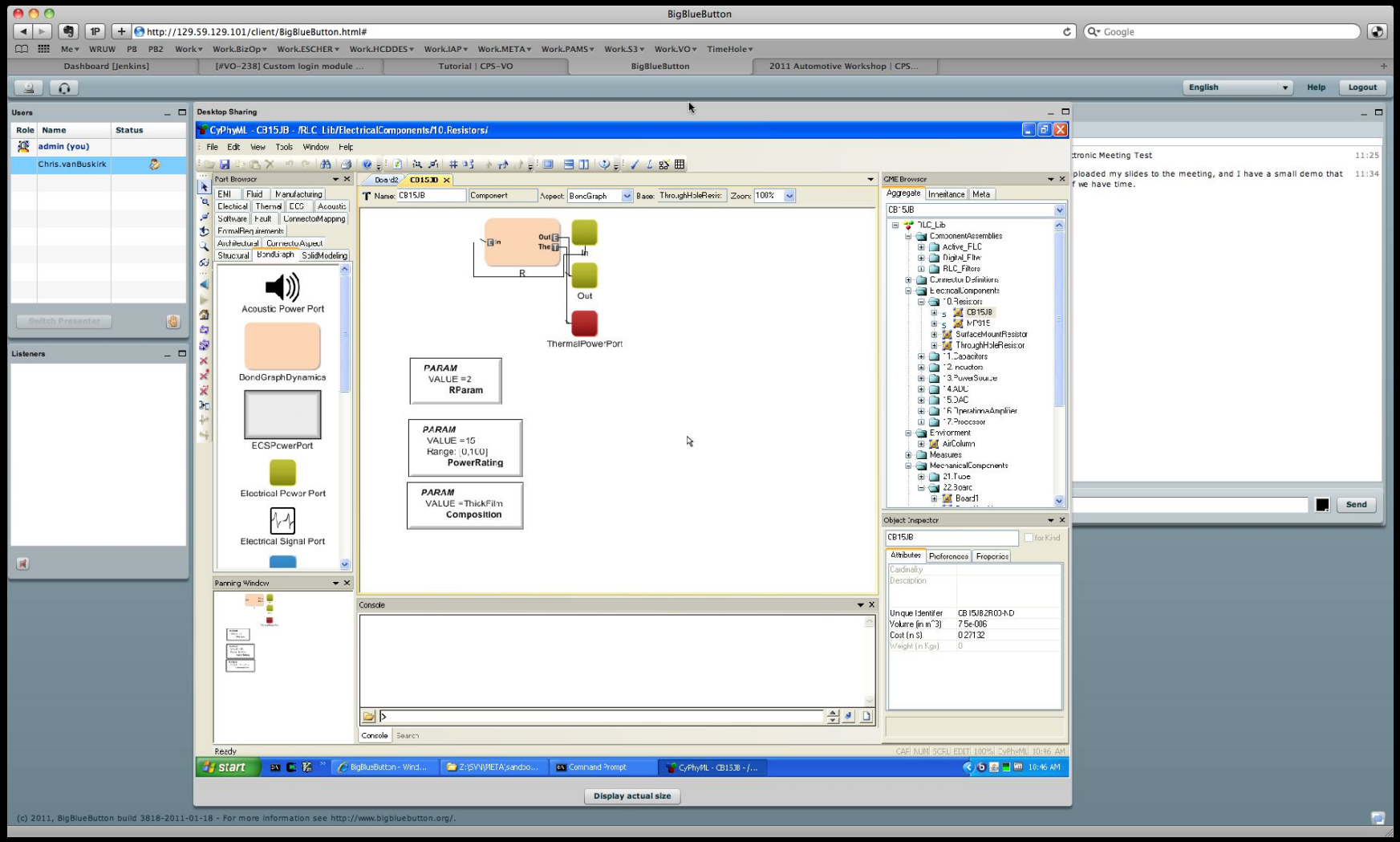
CPS Area	Physical System Simulation	Computing element	Network element
Buildings	Building simulation in EnergyPlus	Embedded control algorithm running on a virtualized server node	Emulated building network in Emulab
Micro-robots	Robot simulation in AGEIA PhysX	Embedded control algorithm running on emulated processor	Wireless network simulated
Air vehicles	Simulated air vehicle, e.g. NASA AirStar UAV Platform (simulation in Simulink) or Open Source Flight Dynamics Simulator e.g. JSBSim	Flight control software running on emulated processor/s	Time-triggered Ethernet (TDMA) network simulation for on-board network
Ground vehicles	Unmanned Ground Vehicle Simulation e.g. MissionLab	Control algorithm running in Simulink	Wireless network simulated
Medical devices	Physiological process simulator	Embedded control algorithm running on emulated processor	Wireless network simulated

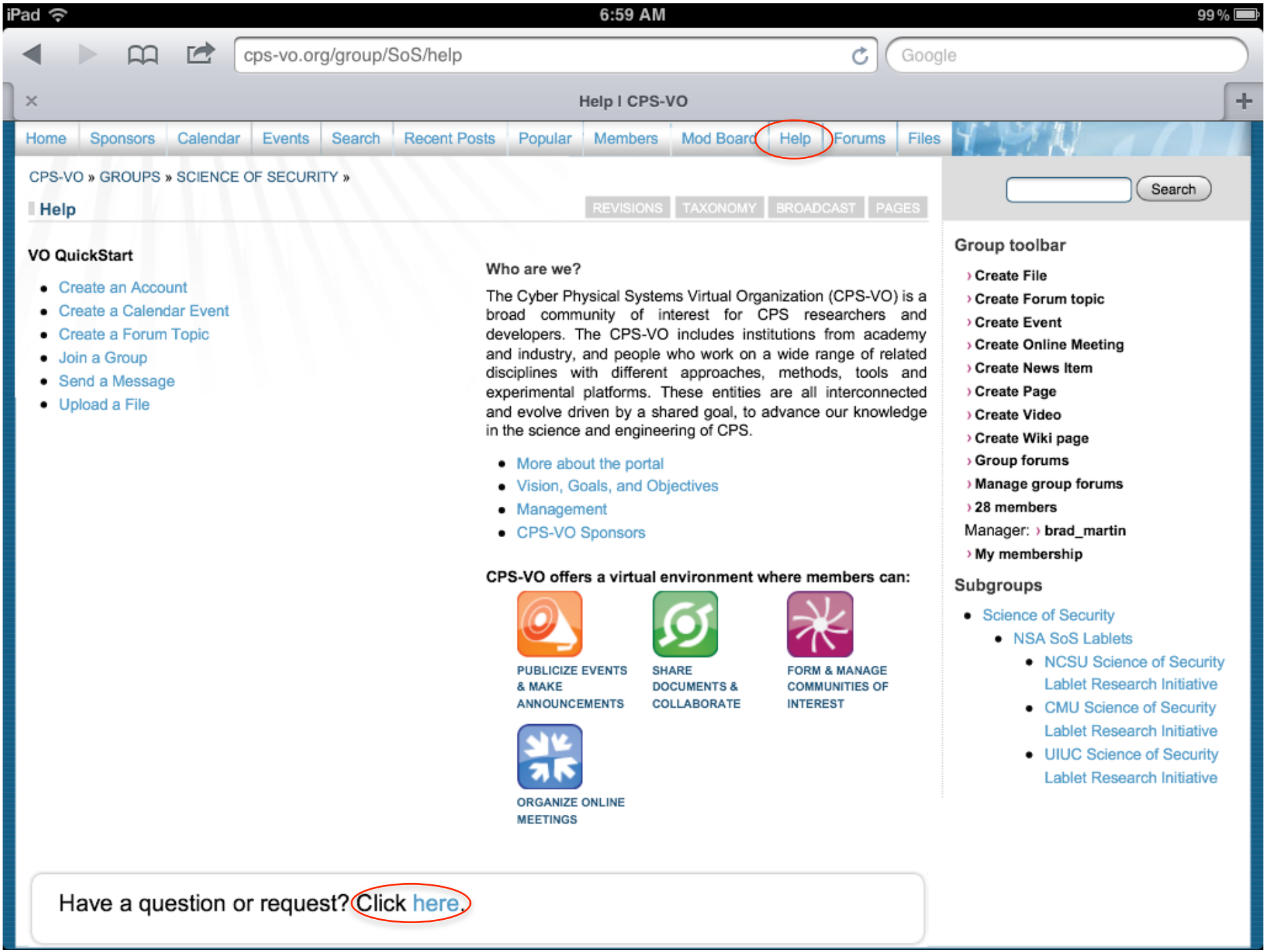
Meetings: Real-Time Document Sharing





Meetings: Desktop Sharing

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PAGES
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VO QuickStart
Create an Account
Create a Calendar Event
Create a Forum Topic
Join a Group
Send a Message
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FORM & MANAGE COMMUNITIES OF INTEREST
ORGANIZE ONLINE MEETINGS
Group toolbar
Create File
Create Forum topic
Create Event
Create Online Meeting
Create News Item
Create Page
Create Video
Create Wiki page
Group forums
Manage group forums
28 members
Manager: brad_martin
My membership
Subgroups
Science of Security
NSA SoS Lablets
NCSU Science of Security Lablet Research Initiative
CMU Science of Security Lablet Research Initiative
UIUC Science of Security Lablet Research Initiative
Have a question or request? Click here.

Discussion
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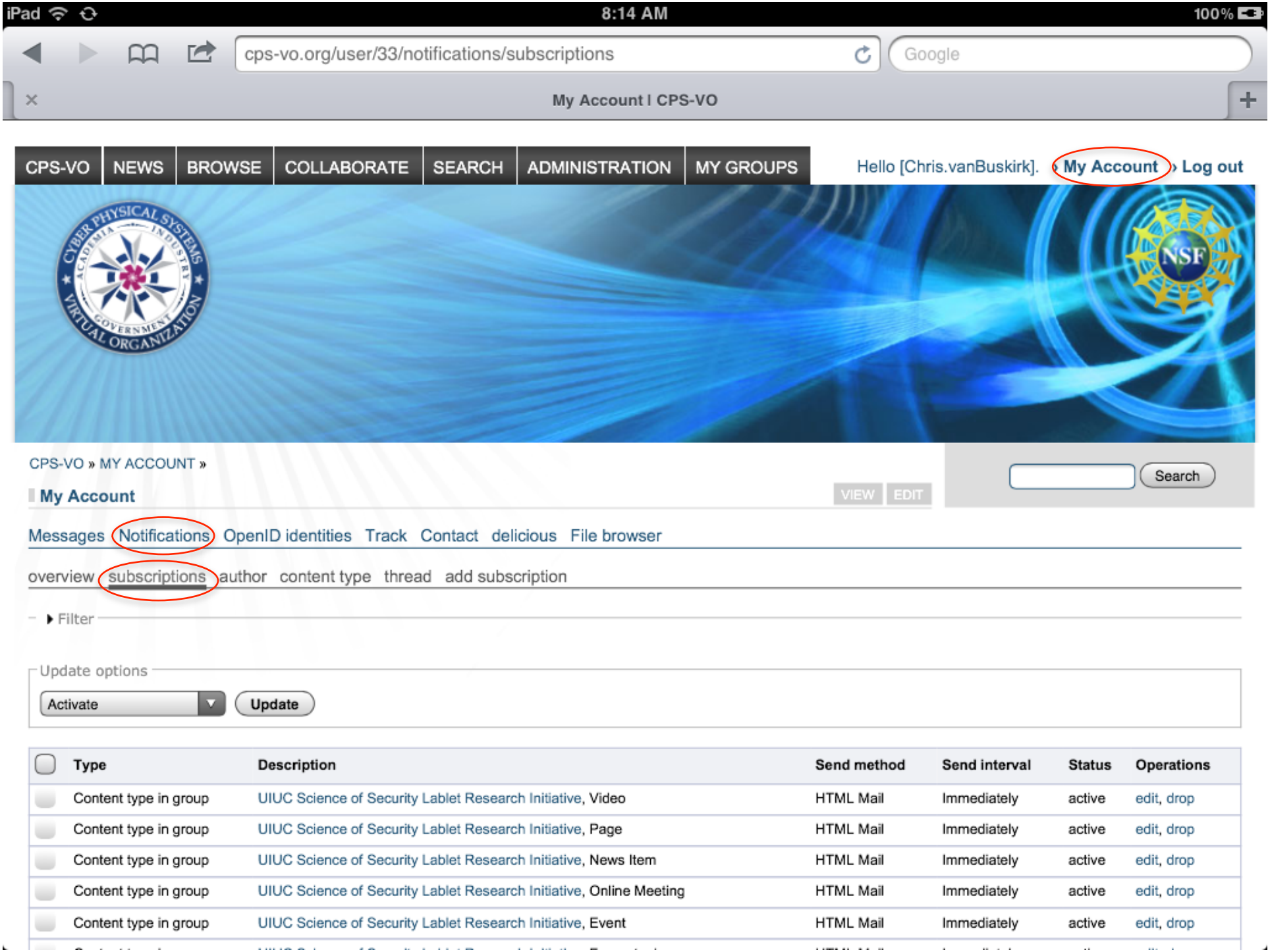
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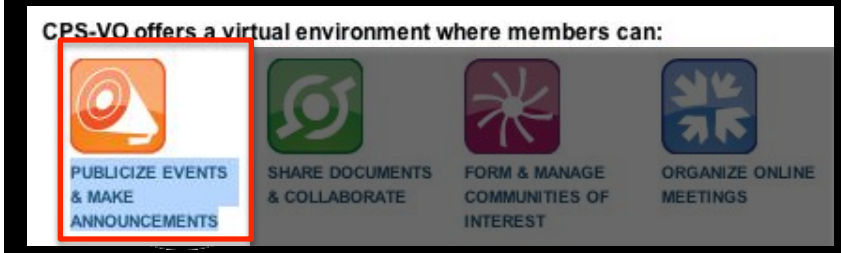

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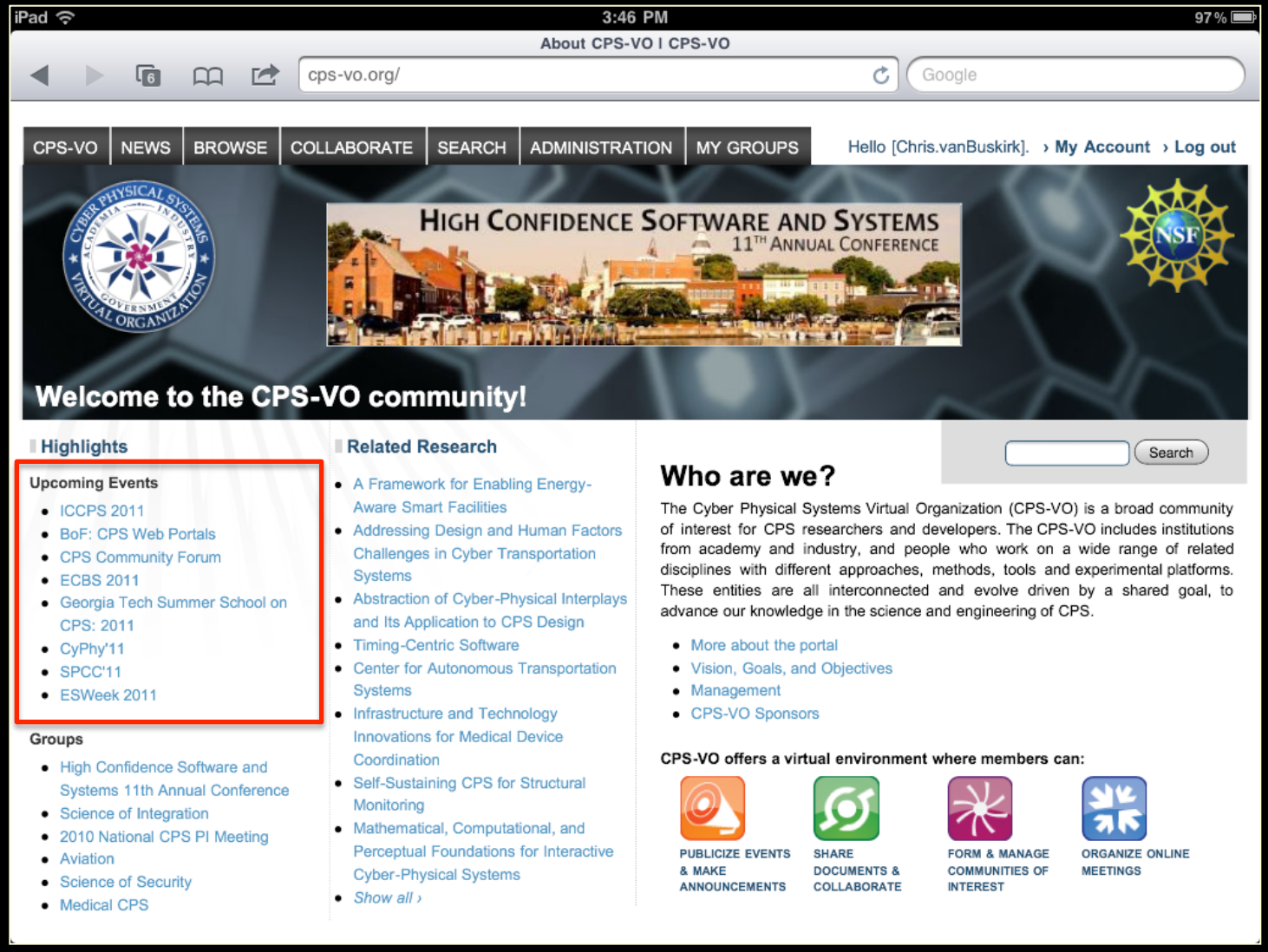

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PUBLICIZE EVENTS & MAKE ANNOUNCEMENTS
SHARE DOCUMENTS & COLLABORATE
FORM & MANAGE COMMUNITIES OF INTEREST
ORGANIZE ONLINE MEETINGS
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Google
CPS-VO
NEWS
BROWSE
COLLABORATE
SEARCH
ADMINISTRATION
MY GROUPS
Hello [Chris.vanBuskirk] › My Account › Log out
HIGH CONFIDENCE SOFTWARE AND SYSTEMS
11TH ANNUAL CONFERENCE
Welcome to the CPS-VO community!
Highlights
Upcoming Events
ICCPS 2011
BoF: CPS Web Portals
CPS Community Forum
ECBS 2011
Georgia Tech Summer School on CPS: 2011
CyPhy'11
SPCC'11
ESWeek 2011
Groups
High Confidence Software and Systems 11th Annual Conference
Science of Integration
2010 National CPS PI Meeting
Aviation
Science of Security
Medical CPS
Related Research
A Framework for Enabling Energy-Aware Smart Facilities
Addressing Design and Human Factors Challenges in Cyber Transportation Systems
Abstraction of Cyber-Physical Interplays and Its Application to CPS Design
Timing-Centric Software
Center for Autonomous Transportation Systems
Infrastructure and Technology Innovations for Medical Device Coordination
Self-Sustaining CPS for Structural Monitoring
Mathematical, Computational, and Perceptual Foundations for Interactive Cyber-Physical Systems
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Catalog of Funded Projects

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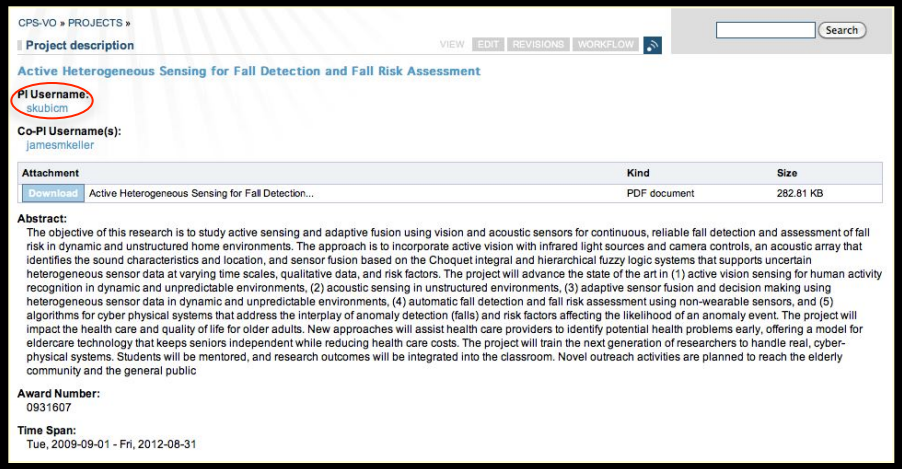
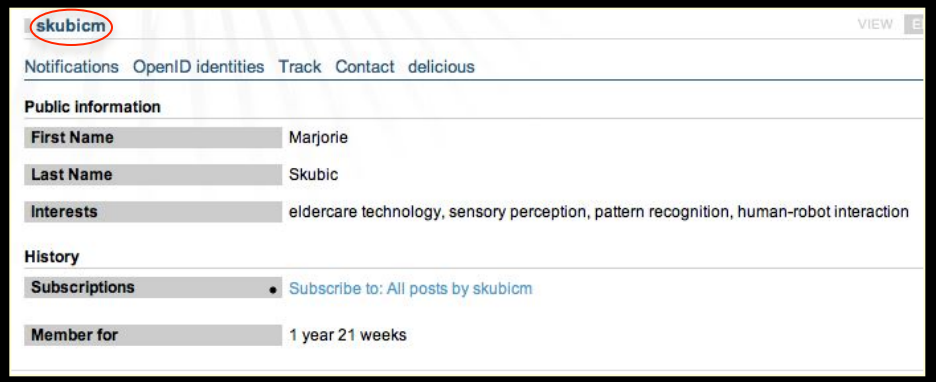
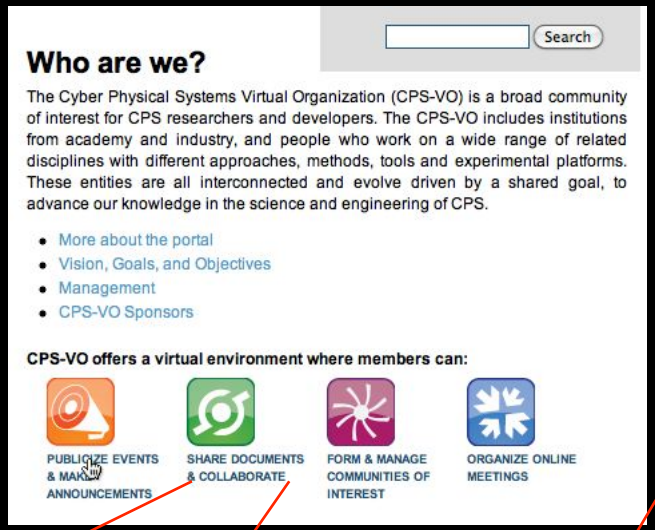
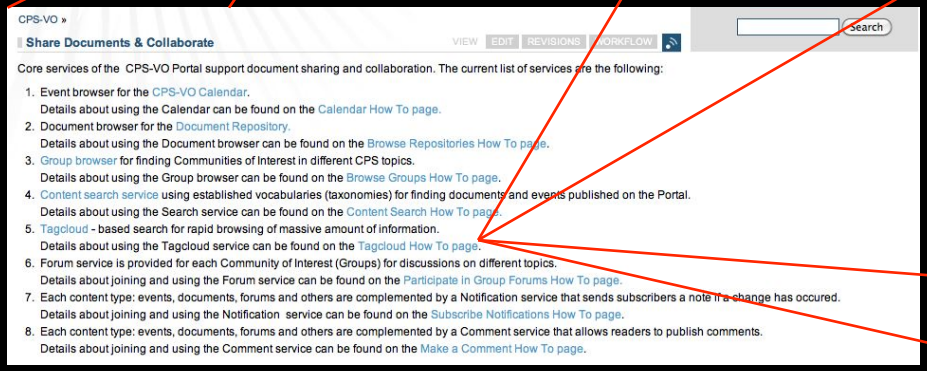
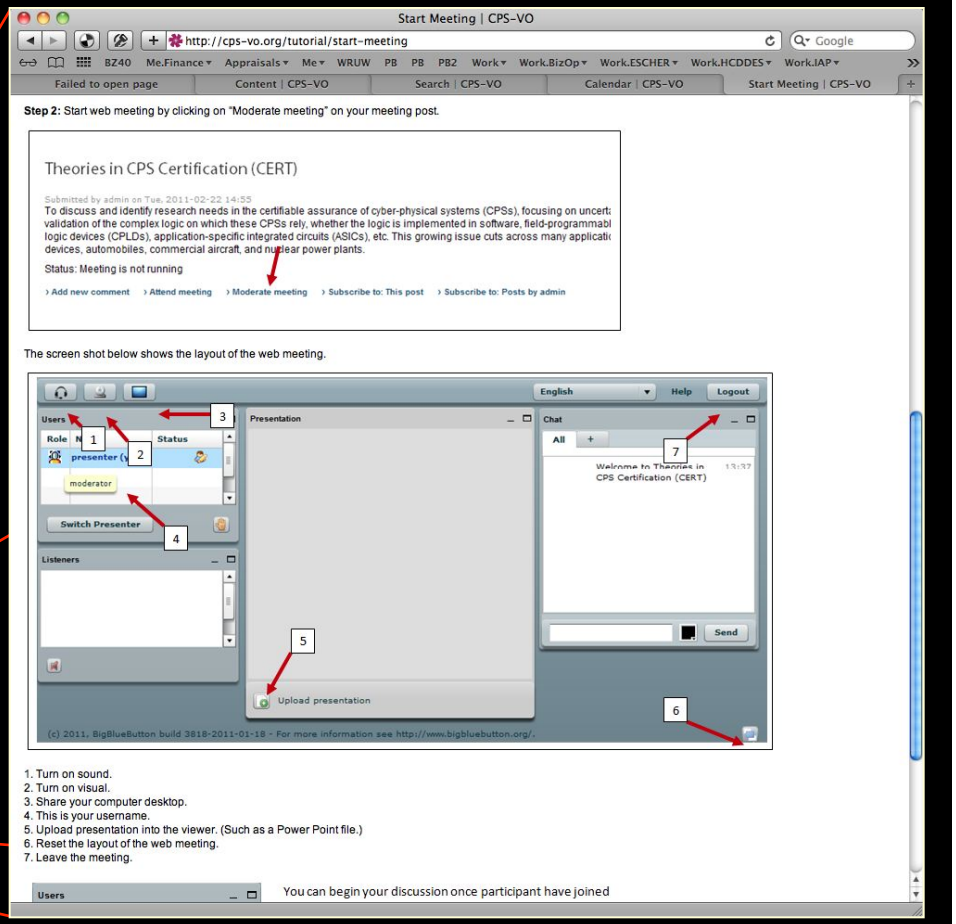
Community Research Highlights

Individual Project Overviews



Community Researchers



Documentation