



***Critical Infrastructure Protection and
High Confidence Adaptive Software***
University Research Initiative Program



Welcome to the “3rd Year” Option Component Review

for

The University of Pennsylvania Research Project

[Software Quality and Infrastructure Protection for Diffuse Computing](#)

Washington, D.C.

27 Oct 2003

Workings of the URI Program

- This Multi-disciplinary URI Program (MURI) started back in '96
- MURI Awards are for 3 years with a 2 year option component
- Average award is between \$800K and \$1,000K per year
- Process for Determining Whether to Exercise the Option in Yr 3
 - Outside Panel of Experts in-person review the project as a whole
 - Written recommendation of findings by the Panel chair person (in 1-2 weeks)
 - Recommendation to ONR Manager and ONR Corporate Programs Division
 - Senior Decision Makers do their thing
 - February notification of results by ONR Corporate Programs Division

Basic Questions for the Panel:

- Is the project doing excellent 6.1 basic research ?
- Is this the right direction to continue pursuing ?

The Pre-Decisional Review Criteria

- 1. Scientific and technical research accomplishments in basic science and/or engineering research**
- 2. Capability for the Research Team to work effectively**
- 3. Productivity of the Project**
- 4. Student Participation**
- 5. Relevance and usefulness of contributions of the research to CIP/SW BAA, DoD, and Industry**
- 6. Transition Potential and Anticipated Impact of the Proposed Option Research**

Rating Scale for Each Criteria: Excellent (21-25), Good (16-20), Satisfactory (11-15), Weak (6-10), Poor (1-5)

At the end of the day your hand-written completed form is to be turned in to the Panel chair

The Panel and Advisors

Panel Chair Person: Sylvan Pinsky (NSA)

Panel

- Behzad Kamgar-Parsi (ONR311)
- Ramesh Bharadwaj (NRL)
- *Carl Landwehr (NSF/CISE)*
- Steve King (OSD)
- Gary Koob (DARPA)
- Wendy Martinez (ONR311)
- Ralph Wachter (ONR311)

Government Advisors

- Cathy Meadows (NRL5543)
- Paul Syverson (NRL5543)
- Tim McChesney (NRL5540)
- Julia Abrahams (ONR/363)

Today's Agenda

7:45 - 8:30 [Breakfast](#)

8:30 - 9:00 Ralph Wachter, ONR: Welcoming & Opening Remarks

9:00 - 9:50 Andre Scedrov, UPenn: Overview of the SPYCE Project

9:50 - 10:15 Joan Feigenbaum, Yale: Incentives, Privacy and Anonymity

10:15 - 10:40 Joseph Halpern, Cornell: Protocol Design and Analysis

10:40 - 10:55 [Break](#)

10:55 - 11:20 Jonathan Smith, UPenn: Networking

11:20 - 11:45 John Mitchell, Stanford: Trust Management

11:45 - 12:00 Andre Scedrov, UPenn: Concluding Presentation

12:00 - 12:05 Sylvan Pinsky, NSA: Closing Remarks

12:05 - 01:30 [Working Lunch](#)

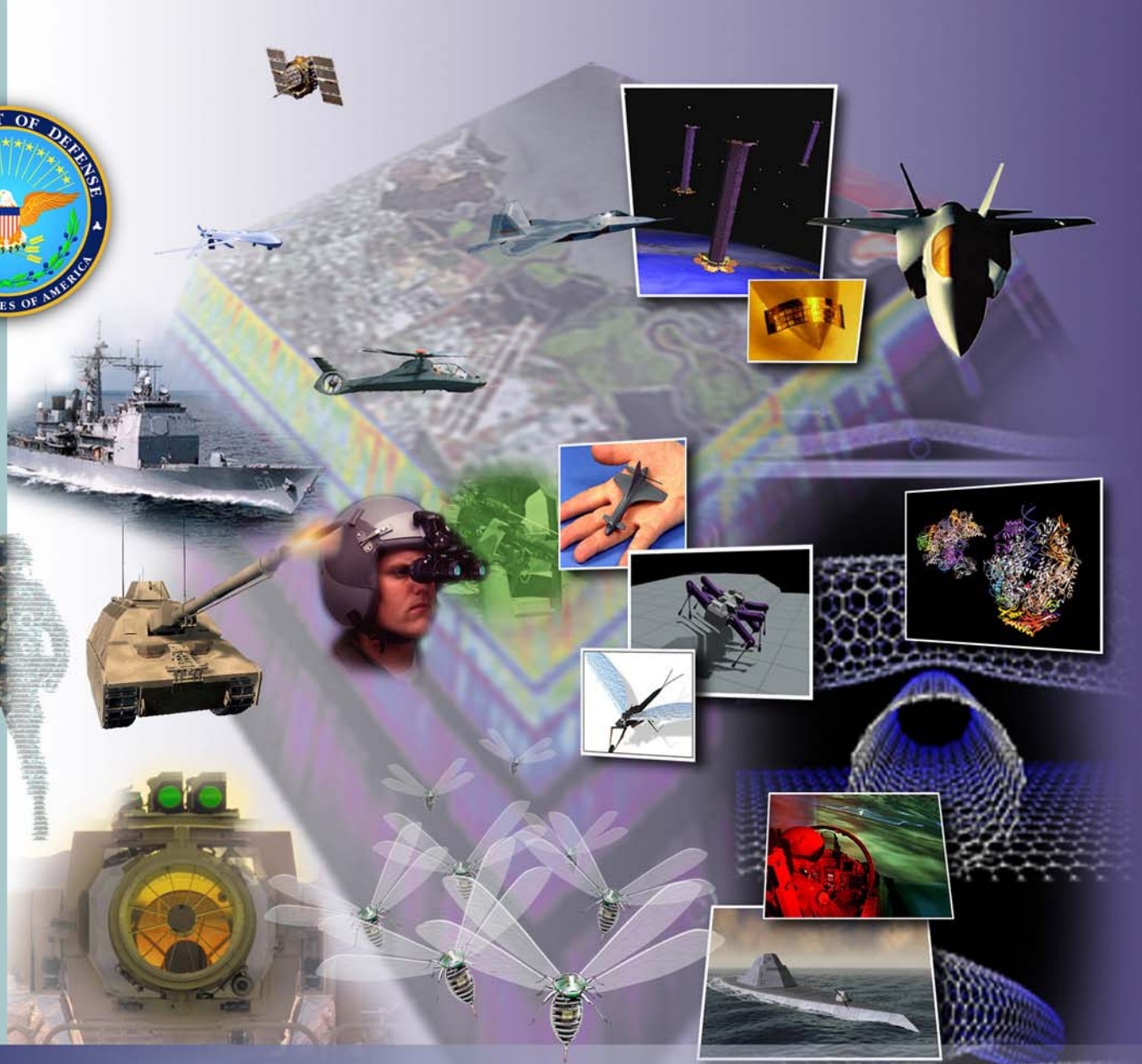
1:30 - 4:30 Closed Session of Review Panel

The CIP/SW Program Overview

Mission

... to ensure that the warfighters today and tomorrow have superior and affordable technology to support their missions, and to give them revolutionary war-winning capabilities.

Office of the Deputy Under Secretary of
Defense for Science and Technology



Defense Science and Technology

Critical National Infrastructures

Information & Communications

Banking & Finance

Water Supply

Emergency Health Services

Law Enforcement

Transportation

Government & Emergency Services

Power, Oil, and Gas production

**Infrastructures
which are so vital
that their
incapacitation or
destruction would
have a debilitating
impact on defense
or economic
security.**

October 1997

The University Research Initiative (URI) Program

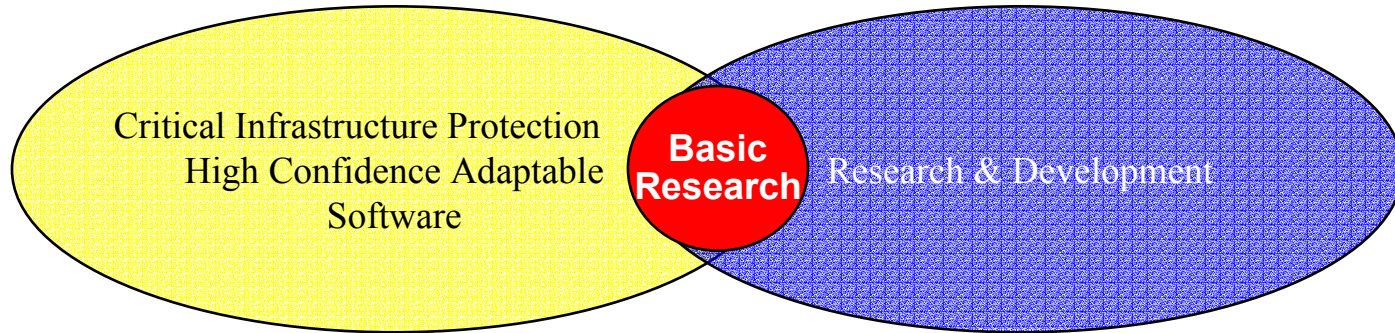
U.S. university efforts to accelerate 6.1 basic research in CIP/SW and to hasten the transition of research findings to practical application

6.1 Basic Research is:

Research directed toward increasing knowledge in science
Article 35.001 of the Federal Acquisition Regulations

Research that analyzes properties, structures, and relationships toward formulating and testing hypotheses, theories, or laws
National Science Foundation

Critical Infrastructure Protection and High Confidence, Adaptable Software URI Program



13 Basic Research topics in FY01

- Understanding Mobile Code
- Network Surveillance
- Information Assurance for Wireless Networks
- CIP Performance Assessment
- Protecting COTS
- Dynamic Network Management
- Understanding and Countering Deception
- Novel Network Architectures
- Protecting Infrastructures
- Assured Development Technology for High-Confidence Embedded Systems
- Heterogeneous Distributed Computing Systems
- Digital Libraries for Constructive
- **Assuring Software Quality**

FY2001 CIP/SW URI BAA Topic #9
ASSURING SOFTWARE QUALITY

Motivation

software for critical applications requires greater assurance at all stages of its life..... *and*, the essence of quality is the assurance that software performs usefully and efficiently as expected in all contexts

Objective

understand, express, and effectively reason about software and quality

Footnote: This topic was just about the “catch-all” topic in the BAA
We received proposals that covered the gamut of software quality
Two (2) awards were made including the UPenn Project



FY2001 CIP/SW URI BAA Topic #9: ASSURING SOFTWARE QUALITY

Research Concentration Areas

How to reason about the assurance and quality in highly distributed systems?

- Reason about uncertainty in all contexts of distributed agent-mediated information systems
- Develop co-algebraic foundations for expressing the semantics of concurrency
- Express knowledge of interactions building upon a game theoretic semantics
- Investigate configuration management in terms of distributed services, policy coordination
- Develop highly dependable self-configuring operating services for net-centric, resource-aware mobile computing
- Investigate real-time/fault tolerant middleware and component integration in hybrid control
- Develop collaborative problem solving theories that emphasize computing as mediation
- Express the meaning of software artifacts, interfaces, aspects, and operating environments
- Extract and synthesize computational knowledge about algorithms and protocols
- Investigate the economics of software technology diffusion into commercial infrastructures

Note: Submitted proposals addressed only subsets of these very tersely worded areas

Software Quality and Infrastructure Protection for Diffuse Computing

Research Team

Stanford University
UPennsylvania
Yale University
Cornell University
Experiment

Principal Investigator

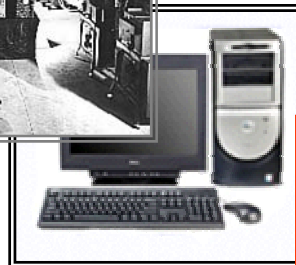
Andre Scedrov
U.Pennsylvania

Motivation

Smart devices diffuse into the environment....



Room '40s



Desktop '80s



Wearable '90s



Pervasive '00s

...with control and assurance

MURI Objective

Algorithms to model diffuse computing and achieve scalable high assurance

DoD Capabilities Enhanced

Reduced cost, improved performance, and higher reliability for networked operations across untrusted networks

Let me introduce the **SPYCE** Principal Investigator

