

Panel Summary #1

PROPOSAL NO.: 0338068

PANEL SUMMARY:

Panel Summary

What is the intellectual merit of the proposed activity?

The PIs are experienced and extremely well-respected scientists and are leaders in the network and computer security field.

Operational issues are central to the security of computer networks; the majority of problems that occur in practice are operational. Thus automation of management is likely to have extremely high impact on the problems that much research is focused upon. The focus of the proposal on this problem is one of its great strengths.

There were some concerns that no clear trajectory was provided to achieve some of the automation goals. Thus, to strengthen a full proposal the PIs should highlight their ideas for achieving this goal.

What are the broader impacts of the proposed activity?

Operational security failures in networking have major impacts on the larger society. The educational impact of the training component of the proposal is very important.

Integration of Research and Education

This STC is likely to be a success in improving undergraduate education in security.

This STC is likely to have a strong positive impact with its certificate program. The innovation in the education component relative to the normal UC Davis curriculum should be highlighted.

Integrating Diversity into NSF Programs, Projects, and Activities

No minority institutions and not clear what activities are focused on increasing minority participation. To increase this proposal's chance this issue should be addressed concretely.

What is the value-added of funding the activity as a Center?

The Center is well thought out and will have a strong impact on security research and education.

Proposed Leadership and Management Plan

Experienced leadership that has led both academic and non-profit research laboratories would lead the STC. The management Plan is appropriate for a Center.

Integrative Nature of the Proposed Center

Additional Comments

Review #1

PROPOSAL NO.: 0338068

INSTITUTION: U of Cal Davis

NSF PROGRAM: SCI & TECH CTRS (INTEG PTRS)

PRINCIPAL INVESTIGATOR: Levitt, Karl N

TITLE: Center for Computer Security Research (CCSR)

RATING: Good

REVIEW:

What is the intellectual merit of the proposed activity?

This proposal is for a Center for Computer Security Research (CCSR) that will address "the fundamental science and technology needed to create and maintain the Nation's systems against the attacks of the future." Research foci are: "(1) The design of resilient computers and networks; (2) Coping with the insider threat; (3) The security management of large systems; and (4) Improving the privacy of sensitive data."

The proposal outlines a set of research activities with respect to each of these areas and to varied degrees provides rationale for the proposed approaches. The proposal could be improved with a stronger sense of the underlying science and engineering philosophy that is driving the research directions. As well, the testbed applications are only suggestive. Given some vagueness about these features, it is difficult to fully evaluate the intellectual merits.

What are the broader impacts of the proposed activity?

The problems of computer and network security are clearly important ones for which this center has prospects for advancements. A strength of the proposal is strong integration of academic and industry participation. The education component is well addressed.

NSF staff will give careful consideration to the following in making funding decisions:
 Integration of Research and Education
 One of the principal strategies in support of NSF's goals is to foster integration of research and education, through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.
 Integrating Diversity into NSF Programs, Projects, and Activities
 Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.
 Additional Review Criteria
 For preliminary proposals and full proposals, excellence must be demonstrated in all aspects of each of the above criteria, as well as the following criteria specific to the STC Program: (1) the value-added of funding the activity as a Center; (2) the potential effectiveness of the proposed leadership and management plans; and (3) the integrated nature of the proposed Center's research, education, and knowledge transfer activities.
 (1) Value-added of funding the activity as a Center: Are the identified science and technology challenges of sufficient import, scale, and complexity to justify a center-mode type of investment? Will the proposed Center provide an environment to enable discovery, learning and innovation? Will the Center's research and educational programs make a special contribution to the achievement of a diverse, highly competent, and globally-engaged technical and instructional workforce, and of an educated citizenry? Will any proposed new instruments, shared experimental facilities, and/or databases be of significant value to a broad

community of users? Will the Center's partnerships achieve significant intellectual exchange and resource linkage with the school, public, industry, federal, and/or international sectors and thereby foster science and technology in service to society?

The need for a center approach is clear from this proposal. The array of partners provides a solid foundation for expanded impacts of the research and education components.

(2) Proposed Leadership and Management Plan:

Do the Center Director and the Center management team convincingly demonstrate the vision, experience, and capacity to manage a complex, multi-faceted, and innovative research, education, and knowledge transfer enterprise? What is the succession plan for leadership of the

Center? What is the likely effectiveness of the proposed management plan, including the mechanisms for topic selection, resource allocation, progress evaluation, and project termination? Is there documentation of institutional and other commitments to the proposed Center? Is the requested budget appropriate for the scope and complexity of the research, education and knowledge transfer projects proposed?

There is a very strong team for this proposal with an extensive background in computer security. The management plan lays out who will do what, but as currently framed is not very flexible in showing how new directions will be fostered and innovative research can be funded. It appears from the budget that all funds are committed to participating personnel.

There is limited attention in this proposal to benchmarks for evaluating progress toward the proposed goals. There is documentation of institutional commitment in the budget narrative and the budget generally seems appropriate.

(3) Integrative Nature of the Proposed Center: Are the research, educational, and knowledge transfer activities strategically integrated such that the whole is greater than the sum of the parts? Do the partners and participants have an essential role and share goals appropriately in the integrated Center? Does the Center structure promote organizational connections and linkages within and between campuses, schools or the world beyond?

The proposed center is strong with respect to research and education. The applications -- specifically testbed laboratories -- are not well specified, and as such it is unclear how they fit into the research and outreach components of the center.

Summary Statement

This proposal is for a center that addresses computer security. The strength of the proposal is a clear research agenda and strong set of research partners. The main limitation is the need for attention to the specific applications and outcomes for the proposed center.

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Recommendation: Invite

PANEL RECOMMENDATION: Invite

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Review #2

PROPOSAL NO.: 0338068

INSTITUTION: U of Cal Davis

NSF PROGRAM: SCI & TECH CTRS (INTEG PTRS)

PRINCIPAL INVESTIGATOR: Levitt, Karl N

TITLE: Center for Computer Security Research (CCSR)

RATING: No Rating

REVIEW:

What is the intellectual merit of the proposed activity?

What are the broader impacts of the proposed activity?

Weak outreach. Minimal education program. No minority-serving institution involvement.

NSF staff will give careful consideration to the following in making funding decisions:
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The research focus of the proposed center would be the fundamental science and technology needed to create and maintain the Nation's systems against the attacks of the future.

The education focus proposes to span the levels from middle school to PhD training, with the goal of making computer security and important and hands-on topic at all of these levels.

Team members propose collaboration on undergraduate education and curricula development, including coordinating laboratory exercises among their classes.

Team proposes to develop a certificate program in security.

All of the team's undergraduate minority student participation efforts seem to be based on UC Davis student participating in existing UC Davis efforts.

CCSR proposes to introduce computer security into the curriculum for grades 7-12, but mechanism for accomplishing this task is not described.

The team's proposed efforts do not include minority-serving institution faculty/student support for research/education.

(2) Proposed Leadership and Management Plan:

Do the Center Director and the Center management team convincingly demonstrate the vision, experience, and capacity to manage a complex, multi-faceted, and innovative research, education, and knowledge nsfer enterprise? What is the succession plan for leadership of the

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(3) Integrative Nature of the Proposed Center: Are the research, educational, and knowledge transfer activities strategically integrated such that the whole is greater than the sum of the parts? Do the partners and participants have an essential role and share goals appropriately in the integrated Center? Does the Center structure promote organizational connections and linkages within and between campuses, schools or the world beyond?

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Review #3

PROPOSAL NO.: 0338068

INSTITUTION: U of Cal Davis

NSF PROGRAM: SCI & TECH CTRS (INTEG PTRS)

PRINCIPAL INVESTIGATOR: Levitt, Karl N

TITLE: Center for Computer Security Research (CCSR)

RATING: Very Good

REVIEW:

What is the intellectual merit of the proposed activity?

There's a clear description here of a coherent framework for computer and network security research. The proposed research in each of several specific areas is well motivated, that is, not only is it scientifically interesting but it fits clearly into this framework for solutions to security problems. The scientists on the research team are first-rate, with a good track record of work in this area.

The proposal slightly shortchanges fundamental basic research, and reads almost like a DARPA proposal. Several of the individual scientists have a strong track record in the fundamental science, however, and presumably would keep it up.

What are the broader impacts of the proposed activity?

Progress in improving computer and network security will have enormous and obvious benefit.

NSF staff will give careful consideration to the following in making funding decisions:
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 Additional Review Criteria
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The research problem is clearly broad and deep enough to merit a center. The collection of researchers is diverse enough to

cover this broad set of problems, and coherent enough to interact well in a productive way.

(2) Proposed Leadership and Management Plan:

Do the Center Director and the Center management team convincingly demonstrate the vision, experience, and capacity to manage a complex, multi-faceted, and innovative research, education, and knowledge nsfer enterprise? What is the succession plan for leadership of the Center? What is the likely effectiveness of the proposed management plan, including the mechanisms for topic selection, resource allocation, progress evaluation, and project termina Is there documentation of institutional and other commitments to the proposed Center? Is the requested budget appropriate for the scope and complexity of the research, education and knowledge transfer projects proposed?

Management plan looks entirely adequate; the proposed center director and co-director have experience running research efforts of this scope.

(3) Integrative Nature of the Proposed Center: Are the research, educational, and knowledge transfer activities strategically integrated such that the whole is greater than the sum of the parts? Do the partners and participants have an essential role and share goals appropriately in the integrated Center? Does the Center structure promote organizational connections and linkages within and between campuses, schools or the world beyond?

The plan for undergraduate curriculum development in computer security is quite good: it involves scientists who (1) are expert in their own subdomains, (2) are collaborating in such a way that they will see the bigger picture, and (3) are actually doing the teaching themselves at leading universities.

Summary Statement

A very strong proposal overall, with a particularly coherent research framework for research in computer security. Would be stronger if it also emphasized more fundamental science with longer term payoff.

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Review #4

PROPOSAL NO.: 0338068

INSTITUTION: U of Cal Davis

NSF PROGRAM: SCI & TECH CTRS (INTEG PTRS)

PRINCIPAL INVESTIGATOR: Levitt, Karl N

TITLE: Center for Computer Security Research (CCSR)

RATING: Good

REVIEW:

What is the intellectual merit of the proposed activity?

The proposed research thrusts mainly relate to network security and to the detection of malicious behavior (in networks or within organizations). Although substantial research has been done in these areas, many challenges remain and further research merits support. In terms of novelty, the research thrusts are mainly incremental in respect to the state-of-the-art.

In terms of security architectures, this proposal is focused on network architectures that improve security rather than on methods for the design of individual components.

What are the broader impacts of the proposed activity?

Improvements in network security have a strong impact on many activities using ICT. Through its industry partners (funded and unfunded) the proposal is well placed to translate research results into fielded systems, and to receive input from the field on the evolving nature of security challenges.

NSF staff will give careful consideration to the following in making funding decisions:

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Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

Additional Review Criteria

For preliminary proposals and full proposals, excellence must be demonstrated in all aspects of each of the above criteria, as well as the following criteria specific to the STC Program: (1) the value-added of funding the activity as a Center; (2) the potential effectiveness of the proposed leadership and management plans; and (3) the integrated nature of the proposed Center's research, education, and knowledge transfer activities.

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A collaboration of research universities, teaching universities, SRI, and companies can achieve results individual partners are unlikely to achieve on their own.

(2) Proposed Leadership and Management Plan:

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One partner (UC Davis) has a clear lead role and the proposal has a reasonable focus within IT security, which is a wide and diverse field. The project partners have relevant experienced for participating in a STC.

(3) Integrative Nature of the Proposed Center: Are the research, educational, and knowledge transfer activities strategically integrated such that the whole is greater than the sum of the parts? Do the partners and participants have an essential role and share goals appropriately in the integrated Center? Does the Center structure promote organizational connections and linkages within and between campuses, schools or the world beyond?

The knowledge transfer into education appreciates the importance of teaching the basis of computer security at early stages in the education process. Plans for curricula development include welcome contributions like the design of testbeds for teaching and the provision of instruction material for middle and high schools.

Summary Statement

The project has a proper focus on the security issues it wants to address (which are very relevant). Among the preproposals I reviewed, this scores strongest on value-added criteria.

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Review #5

PROPOSAL NO.: 0338068

INSTITUTION: U of Cal Davis

NSF PROGRAM: SCI & TECH CTRS (INTEG PTRS)

PRINCIPAL INVESTIGATOR: Levitt, Karl N

TITLE: Center for Computer Security Research (CCSR)

RATING:Excellent

REVIEW:

What is the intellectual merit of the proposed activity?

Security is 90% operations and this proposal targets this issue head-on. This is the strongest proposal I have read and I encourage an invitation.

What are the broader impacts of the proposed activity?

The approach to educating grammar and high-school students is innovative and really addresses the issues of security and system defense where they should be addressed - at the start.

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This is likely to be an extremely effective Center. The proposal is detailed and mature, and well thought out on every point I could think of. Towards a science of security: Bravo!

(2) Proposed Leadership and Management Plan:

Do the Center Director and the Center management team convincingly demonstrate the vision, experience, and capacity to manage a complex, multi-faceted, and innovative research, education, and knowledge nsfer enterprise? What is the succession plan for leadership of the Center? What is the likely effectiveness of the proposed management plan, including the mechanisms for topic selection, resource allocation, progress evaluation, and project termina Is there documentation of institutional and other commitments to the proposed Center? Is the requested budget appropriate for the scope and complexity of the research, education and knowledge transfer projects proposed?

The proposed leadership and management plan is well thought out.

(3) Integrative Nature of the Proposed Center: Are the research, educational, and knowledge transfer activities strategically integrated such that the whole is greater than the sum of the parts? Do the partners and participants have an essential role and share goals appropriately in the integrated Center? Does the Center structure promote organizational connections and linkages within and between campuses, schools or the world beyond?

The expertise in wireless and optical networks will create extremely worthwhile integrative activities - restricting oneself to a wired Internet model is completely inadequate in the face of modern mobile and WLAN-interconnected desktops.

Summary Statement

This proposal is trenchant in its analysis of where the real problems are in networked security systems and there is a clear plan on how the Center will help address these problems.

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Review #6

PROPOSAL NO.: 0338068

INSTITUTION: U of Cal Davis

NSF PROGRAM: SCI & TECH CTRS (INTEG PTRS)

PRINCIPAL INVESTIGATOR: Levitt, Karl N

TITLE: Center for Computer Security Research (CCSR)

RATING: Very Good

REVIEW:

What is the intellectual merit of the proposed activity?

The proposers have worked out a two dimensional framework in which they identify four main areas as well as a variety of small modeling efforts that contribute to various subsets of the four main areas.

The areas are (1) resilience in nets and systems; (2) the insider threat; (3) autonomous system administration (i.e. security management); and (4) privacy enhancement.

These four main areas are in fact central parts of the cybersecurity problem. The write-up identifies several core aspects of each. Although some of the groupings seem a bit ad hoc, they do cover the most important problems, with the possible exception of an important area comprising software security, vulnerability detection and analysis, and programming language techniques.

The modeling efforts appear promising and well-tuned to the backgrounds of the proposers.

What are the broader impacts of the proposed activity?

Education and outreach are well described in the proposal.

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The research activities should create a core of strength to support outreach, education, curriculum development, etc.

(2) Proposed Leadership and Management Plan:

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Experienced and reasonably well-integrated team. Technical advisory board promising.

(3) Integrative Nature of the Proposed Center: Are the research, educational, and knowledge transfer activities strategically integrated such that the whole is greater than the sum of the parts? Do the partners and participants have an essential role and share goals appropriately in the integrated Center? Does the Center structure promote organizational connections and linkages within and between campuses, schools or the world beyond?

Summary Statement

The proposal provides a variety of modeling ideas to address four main areas of cybersecurity. Educational and collaborative goals are well represented.

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