

Future Internet Architecture Next Phase (FIA-NP)

February 11, 2013



Agenda

- **Welcome and CISE Context**
- **FIA-NP Overview**
- **FIA-NP scope and requirements**
- **Questions**

Farnam Jahanian
Assistant Director, CISE

Keith Marzullo
Division Director, CNS/CISE

Darleen Fisher
Program Director, NeTS

FIA-NP Team



The Future Internet Architecture Challenge

Over the last six years CISE has challenged the research community to:

design, explore, and show proof of concept at scale of computer networking architectures, not constrained by the current Internet, that could meet the needs of the 21st century as well as educate a cadre of large-scale network architects.

NSF solicitation 13-538



CISE Commitment to Future Internet Architectures

- Phase 1: 2006 Future Internet Design (FIND)
 - pursued innovative network architectural components not constrained by the current Internet
 - 49 projects reviewed by external group:
 - refreshing and liberating impact on network architecture research and put architectural research “back on the map”
 - led to new theories of network architecture
 - New ground is being broken in core networking areas such as:
 - Naming, addressing, network management, access and transport technologies, sensing, content and media delivery, and network applications
 - Outcomes include contributions on point problems and Future Internet components and requirements



CISE Commitment to Future Internet Architectures

- Phase 2: 2010 Future Internet Architecture (FIA)
 - designed and developed integrated trustworthy architectures that had similar scope to the current Internet, but were not constrained by the Internet's existing design or deployment
 - Four FIA projects awarded
 - MobilityFirst
 - Named Data Network (NDN)
 - NEBULA
 - XIA (eXpressive Internet Architecture) (originally named A Content and Service Friendly Architecture with Intrinsic Security and Implicit Trust)



CISE and Future Internets:

- Phase 3: 2013 Future Internet Architecture—Next Phase (FIA-NP)
 - Leverage and enhance the four funded Future Internet Architecture (FIA) designs
 - Move from design with integrated working code to proof of concept at reasonable scale
 - Create and demonstrate prototype systems that will be tested and evaluated in one or more relevant environments.



CISE and Future Internets:

- Phase 3: 2013 Future Internet Architecture—Next Phase (FIA-NP)

FIA-NP: NSF 13-538

- Up to 4 projects
- Up to \$5,000,000 per project
- Over 2 years
- Funds from FY2014; start date as appropriate



FIA-NP Solicitation and Review

- Solicitation Requirements
 - Personnel
 - Proposal Sections
- Suggestions
 - Personnel
- Solicitation-Specific Review Criteria
- Solicitation numbers and deadline
- FIA-NP Challenges and Broader Context



FIA-NP Personnel Requirements

- Project manager must be PI, co-PI or Senior Personnel on a current FIA project and cannot serve on any other FIA-NP project
- No individual who is not the project manager can serve on more than 2 FIA-NP projects
- Each project must include at least one network security expert
- Project should include subject area expert in the FIA-NP environment where it will be tested



FIA-NP Section Requirements

- **Vision:** describe a well-articulated "vision" of the proposed comprehensive architecture, its high-level objectives, and its motivating ideas.
- **Architecture:** describe the underlying architecture design, design requirements (such as trustworthiness), invariants and components are synthesized into a coherent comprehensive architecture , plus current status of existing prototypes



FIA-NP Section Requirements

- **Research Agenda:** define a coherent research agenda focused on principled design. Describe how the proposed work will extend and evaluate the proposed architecture and will result in a stable prototype of a complete system applied at least 1 realistic network environment; Describe the future security/trustworthiness research as well as research in considering the relevant larger social, economic and/or legal challenges facing the architecture.



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FIA-NP Section Requirements

- **Network Environments:** include and describe at least one and preferably two relevant and realistic environments that will be used to inform, test and demonstrate the overall architecture's feasibility and value of the architecture in realistic settings.
 - Example Environments: special-needs enterprise a critical infrastructure; a content delivery network with embedded clouds; a civil crisis or public safety network; a complex network of things; interconnected cyber-physical systems; public internet equivalent



FIA-NP Section Requirements

- **Evaluation Plan:** include an evaluation plan that specifies criteria or metrics relevant to the scientific and engineering goals of the project, and that gives a description of how the evaluation will be conducted. Include a security assessment



FIA-NP Section Requirements

- **Education and Outreach:** describe plans to integrate graduate and undergraduate education and research focused on exploring architectural design and understanding of large-scale systems
 - Note: REU support for undergraduates should be submitted with the proposal and the funds do not count against the \$5,000,000 maximum budget limit.



FIA-NP Personnel Suggestions

- Projects should include personnel with needed expertise, but no more than appropriate to complete the project
- Projects are encouraged to include experts in relevant social, economic and legal issues
- Support for software engineers or programmers is allowable
- Projects may support PostDocs as appropriate



FIA-NP Review Process

- Panel with ad hoc reviews as appropriate
 - Intellectual Merit
 - Broader Impacts
 - See NSF 13-1; Proposal and Award Policies and Procedures Guide (PAPPG) for more information
 - Additional Review Criteria—see next slides
- Reverse site visits as needed



Solicitation-specific Review Criteria

In addition to Intellectual Merit and Broader Impact, the proposal will be evaluated on the extent to which:

- **Current future internet architecture that forms the basis of the proposed work already includes basic components (implemented in code or hardware) that work together to demonstrate a prototype of a comprehensive internet architecture**
 - Shows architecture at submission is well advanced



Solicitation-specific Review Criteria

- Proposed Future Internet Architecture has a solid security design supported by prototype implementation.
- Shows security/trustworthiness is already integrated into the overall design and implementation



Solicitation-specific Review Criteria

- Research agenda and an associated collaboration and management plan provide confidence that the project will advance the architecture and implementation to a system prototype demonstration in one or more relevant environments.
- Shows research agenda and team is well organized to successfully demonstrate the FIA at scale in a reasonable environment



Solicitation-specific Review Criteria

- Targeted environments are realistic and are sufficiently important or critical so that the architecture tested and evaluated on them will show promise for a future viable deployment at a large scale.
- ➔ Indicates that the selected environments are realistic and sufficient to stretch and test the architecture. Potential early adopters have been identified



Solicitation-specific Review Criteria

- Evaluation plans and the metrics described in the proposal are well developed and appropriate to determine systematically the value and significance of the Future Internet Architecture at least within the chosen environment(s).
- Evaluation plans need to be appropriate, but do not need to be unique, but may be developed jointly by the FIA community.



Solicitation-specific Review Criteria

- Architecture takes into consideration the relevant larger societal, economic and/or legal issues that arise from the interplay between the Future Internet Architecture and society.
- Shows that teams understand and plan for the fact that FIAs do not exist in a vacuum, but to be successful must be designed within social, economic and political contexts



Additional Supplementary Documents

- Data Management Plan
- Postdoctoral Mentoring Plan, for proposals seeking postdoctoral funds
- Letters to document collaborative commitments as needed, but do not submit general letters of support
- No appendices, preprints, etc...

http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/nsf13_1.pdf



Proposal Specifics

- **Proposal Page Limits:**
 - Project descriptions: 25 pages
 - Collaboration and management plan: 3 pages
- **Cumulative project budget:**
 - Up to \$5,000,000 for 2 years (support for REUs do not count against this limit)
- **Number of expected awards:**
 - Up to 4 awards

Full Proposals

- **DUE June 7, 2013**

- The intent is to give about 4 months in which to prepare proposals.



FIA-NP Challenges

- Further develop the architecture functionality
- Identify potential early adopters
- Evaluate the FIA-NP architectures against meaningful measures
- Position the FIA-NP architectures for potential adoption by producing prototypes tested at reasonable scale and meeting new challenges



FIA-NP and National Priorities

- Supporting fundamental, interdisciplinary, and high-risk research and education;
- Transforming how we understand and design complex engineered systems;
- Creating trustworthy Internets that will meet the needs of the 21st century



Questions?

