



## CRITICAL INFRASTRUCTURE RESILIENCE INSTITUTE

### INFRASTRUCTURE RESILIENCE GRANTS REQUEST FOR PROPOSALS — 2016

Issue date: September 15, 2016

Letter of intent due date (optional): September 30, 2016

Proposal due date: October 24, 2016

217-300-3162 | [ciri-grants@illinois.edu](mailto:ciri-grants@illinois.edu) | [ciri.illinois.edu](http://ciri.illinois.edu)

A webinar will be held on September 23, 2016, from 11 am to noon (Central time) to provide information and answer questions on this request for proposals. Connect through the following URL:

<https://global.gotomeeting.com/join/720692285>

Access Code: 720-692-285

Dial-in number: (872) 240-3212

# REQUEST FOR PROPOSALS 2016

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### About the Critical Infrastructure Resilience Institute

The Critical Infrastructure Resilience Institute (CIRI), led by the University of Illinois at Urbana-Champaign, is a Department of Homeland Security Science and Technology Directorate Center of Excellence that conducts research and education that enhances the resilience of the nation's critical infrastructures and the businesses and public entities that own and operate those assets and systems. CIRI achieves its mission through innovative research, technology transition, and education and workforce development. CIRI explores the organizational, policy, business, and technical dimensions of critical infrastructure with a particular emphasis on developing tools and solutions for industry and government agencies to understand and improve resiliency.

Through a multi-disciplinary team of researchers from academia, national laboratories, and the private sector, CIRI delivers transformational technology-driven solutions, data-informed policy recommendations, and decision-making tools for businesses and government agencies; training for today's homeland security workforce; and education for a more resilience-aware and resilience-motivated workforce of tomorrow.

More information on CIRI may be found at <http://ciri.illinois.edu/>.

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## Infrastructure Resilience Grant Program Overview

An objective of the Critical Infrastructure Resilience Institute (CIRI) is to bring together capabilities of colleges, universities, federal laboratories, industry, and nonprofit organizations to assess and improve resilience in the ten critical infrastructures for which the Department of Homeland Security is the designated sector-specific agency:

- Chemical
- Commercial Facilities
- Communications
- Critical Manufacturing
- Dams
- Emergency Services
- Government Facilities
- Information Technology
- Nuclear Reactors, Materials, and Waste
- Transportation Systems

CIRI activities are organized around four themes:

1. Understanding resilient critical infrastructure systems.
2. Application of critical infrastructure in the real world.
3. The business case for infrastructure resiliency.
4. The future of resiliency.

With those objectives in mind, CIRI is seeking proposals for projects that will improve the nation's ability to

- Understand vulnerabilities and risks
- Quantitatively assess risks and resilience measures
- Mitigate risks and improve resilience
- Establish the business case for resiliency
- Deploy resiliency measures

A CIRI award would fund activities such as analyses, tool development, proof-of-concept tests, modeling and simulation, mock exercises, testbed development, and training activities that together can measurably improve critical infrastructure resiliency. The 2016 awards should be viewed as seed grants to demonstrate concepts and mature CIRI partnerships with an aim toward eventual demonstration and deployment. Successful proposals will identify partnerships and realistic potential pathways and sponsors toward such ends.

## Estimated Funding

Subject to the availability of funding, CIRI will set aside \$1,200,000 to award approximately 8 infrastructure resilience grant projects conducted from approximately January 1 through June 30, 2017. Typical awards will be from \$70,000 to \$150,000; no award shall exceed \$200,000. No matching funds are required.

Applicants may propose additional work scope that would begin July 1, 2017, and extend up to June 30, 2018. Budgets for additional work scope should not exceed \$350,000. Funding decisions for such project extensions will be made in spring 2017 and will be based, in part, on

project performance up to that point and a more detailed, invited proposed work plan from the team. Proposals for project extension should drive the work toward practical outcomes to improve critical infrastructure resiliency.

## Eligible Grantees

Organizations eligible to receive CIRI grants are educational institutions, federally funded research and development centers, private industry, and private nonprofit organizations and foundations. CIRI does not award grants to individuals or to federal, state, county, or local government entities — though those groups may be partners in the work conducted by the grant recipient. Collaborations among organizations are encouraged, but not required.

The proposal's designated principal investigator must be an employee of the organization applying for a CIRI grant.

## Eligible Projects

Funding decisions will be based on how well a proposal meets the evaluation criteria listed later in this request for proposals. Quantitative scoring of the evaluation criteria will be provided by external expert reviewers.

This request for proposals is focused on three thrust areas. A proposal must identify which thrust area it is targeting.

Within any of the thrust areas, there are needs for

- Identifying needs and requirements
- Mapping system components and dependencies
- Developing data architectures
- Identifying and filling data gaps
- Dealing with uncertainties
- Modeling and simulation, and integrating such models
- Visualizing data, model results, and uncertainties
- Developing tools and technology solutions
- Testing solutions
- Conducting exercises
- Working with sector partners to deploy solutions
- Training and educating the workforce

CIRI will consider proposals within the three thrust areas that clearly identify the needs being addressed. In all cases, projects funded by CIRI under this solicitation must be completed by June 30, 2017.

### Thrust 1: Resilience Insurance

A properly functioning insurance market plays a critical role in providing metrics needed to make risk management decisions and serves as the vehicle for sector-wide risk sharing. Cyber and cyber-physical resilience insurance, however, has gained little traction in critical infrastructure sectors. Barriers include a lack of knowledge of critical infrastructures and their vulnerabilities; difficulties in quantifying risks and uncertainties; and issues surrounding legal, legislative, and policy frameworks.

Example projects could include:

- The development of methodologies or technologies to assess the risk of failures and compromise of cyber systems.
- The development of methodologies for identifying and assessing the risk to physical components of failure or compromise of the cyber component of a cyber-physical system.
- The development of measureable performance indicators for insurers to confirm compliance with system-protection standards.
- The development of a self-supporting data exchange vehicle for information sharing to improve risk models and assessment methodologies.
- Analysis revealing barriers to and incentives for insurers offering insurance of critical infrastructures, and barriers to and incentives for private entities purchasing that insurance.
- Analysis of regulatory policies affecting issues related to insurance, e.g., with respect to information harvesting, information exchange, and liability.

### Thrust 2: Macro and Micro Industrial Supply Chain

At the macro level, industry is subject to risk through a complex supply chain that links material, services, and information that flow from one business to another. Disruption of one business has consequences both upstream and downstream in the supply chain. Similarly, material and information are exchanged through a “micro supply chain” that links one system or component to others within a single manufacturing facility or industrial operation. Infrastructure technology and software are further integrating manufacturing at these macro and micro levels. This is leading to improved efficiencies, but is also creating new entryways for disruptions, such as through cyber attacks.

Example projects could include:

- The development of methodologies or technologies supporting the identification, assessment, or reduction of risk to
  - Business continuity of macro-level inter-business supply chain relationships (e.g., dependencies on parts, services, and information).
  - Industrial operations due to micro-level supply chain issues such as counterfeit parts, altered or interrupted information flow, or failure of software due to design or compromise.
- The development of predictive analytics to identify patterns, deviations, and anomalies in cyber-physical sensor networks in the industrial sector.
- Analysis of regulatory policies affecting industrial operations and resiliency.
- The identification and quantification of incentives for industry to invest in resilience.

### Thrust 3: Infrastructure Dependencies and Interdependencies

The growing dependencies and interdependencies of critical infrastructures create a complex risk profile that can lead to significant and unanticipated economic and physical damage. Here, *infrastructure dependency* is defined as a connection between two infrastructures through which a perturbation in one infrastructure affects the state of the other. *Infrastructure interdependency* is a similar, but bidirectional, relationship between two infrastructures.

Proposed projects within this thrust area should support the development of practical tools that can be used by policy and decision makers at a local or regional level, such as a military compound, a city, or a state. Example projects could include:

- The identification, organization, and visualization of physical points of contact and interdependencies between critical infrastructures at a local scale.
- Analysis of how local stakeholders (e.g., government, community, and industry groups) can better communicate about interdependencies to integrate resilience measures.
- The development of models of critical infrastructures, their interdependencies, and risk to the coupled system at a scale and level of complexity that can be used by stakeholders in decision-making about investment in resilience.
- The identification of barriers and incentives and the development of supporting economic assessments for local stakeholders to invest in resiliency.
- Analysis of how disruptions across infrastructures affect regional costs, business continuity, and economic recovery.

### Allowable Expenses

Allowable opportunity grant costs are typical of those associated with exploratory work, including personnel, materials and supplies, justified travel, and research services.

Unallowable expenses are outlined in 2 CFR Part 200

([http://www.ecfr.gov/cgi-bin/retrieveECFR?gp=1&SID=394cce1f1add661dfe486ab68f07b1d1&ty=HTML&h=L&mc=true&n=pt2.1.200&r=PART#\\_top](http://www.ecfr.gov/cgi-bin/retrieveECFR?gp=1&SID=394cce1f1add661dfe486ab68f07b1d1&ty=HTML&h=L&mc=true&n=pt2.1.200&r=PART#_top)).

CIRI infrastructure resilience grants may not be used to procure computers or other equipment. Indirect costs are allowed under this grant program.

### Deadlines

Letters of intent, which are optional, are due by 7 pm (Central time) on September 30, 2016.

Proposals are due by 7 pm (Central time) on October 24, 2016.

### Letter of Intent

CIRI requests that applicants submit a letter of intent that outlines

the concept that will be proposed. This will allow CIRI to recruit targeted subject-matter experts as external proposal reviewers. Although letters of intent are not required, they will help ensure that applicant proposals receive the most effective expert reviews.

Letters of intent should be limited to one page and should be sent as a PDF file to [ciri-grants@illinois.edu](mailto:ciri-grants@illinois.edu) by 7 pm (Central time) on September 30, 2016.

## Proposal Requirements

*All proposals must be submitted through the CIRI grant application portal at [ciri.illinois.edu](http://ciri.illinois.edu).*

Proposal narratives should not exceed 9 pages (including any bibliography, but not counting the budget form, resumes, and commitment letters) and must be uploaded as a single PDF file. Proposals should use 1 inch margins, and 11-point font. Submissions that exceed the stated page limit may be rejected without review. Cover page information (see Appendix A) should be entered separately through the grant application portal. The portal includes a downloadable MS Excel budget form that should be completed and then uploaded to the system.

CIRI will treat proposals as proprietary until an award is made. Nonetheless, applicants shall not include proprietary or sensitive information in their submittals to CIRI. Please note that proposals will be reviewed by external expert reviewers and that there will be public disclosure of funded projects.

Full proposals must contain the following elements. Applicants should abide by this framework, as it has been designed to match requirements so that awarded proposals can be uploaded into the Department of Homeland Security work plan database.

1. A completed cover page, generated online, that contains the information shown in Appendix A.
2. A project narrative with the following sections:
  - a. **Abstract**  
A summary describing the needs addressed by the proposal.
  - b. **Background**
    - i. A description of the tangible outcomes the team envisions that will make the nation's critical infrastructure more resilient against natural or manmade disruptions.
    - ii. The barrier to that vision that the proposal seeks to overcome.
    - iii. The goal and objectives of the project.
  - c. **Scope of Work**  
A detailed discussion of the proposed work, including:
    - i. A description of the project concept.
    - ii. A justification, including key literature references, that this concept will help transform the resiliency of

the nation's critical infrastructure.

- iii. The objective of the work to be performed with CIRI funding.
  - iv. Details of the work to be performed with CIRI funding, including specific tasks and milestones and how they support the objective.
  - v. A roadmap of how the work would eventually lead to a measurable, practical outcome, such as adoption by industry or government.
  - vi. An identification of key risks and mitigation strategies to address them.
  - vii. A justification as to why CIRI funds are needed to achieve the objective.
  - viii. A list of the deliverables to be provided to CIRI, including mid-project and final reports.
- d. **Qualifications**  
A summary of the expertise and capabilities being brought to bear, including:
- i. The applicant's credentials in this topic area, including past accomplishments.
  - ii. The names of public- and private-sector partners.
  - iii. Commitments from partners in terms of collaboration and resources.
- e. **Budget and Schedule**  
The MS Excel budget form available at the CIRI grant application portal should be completed and uploaded separately to the system. Appendix B indicates the budget categories available and provides guidance for completing the form. The proposal narrative should include:
- i. A brief narrative justifying the items in each budget category. Budgets should include travel for meetings and related events with CIRI and sponsors.
  - ii. A schedule for the activities funded by CIRI. Note that the activities funded under this solicitation must be completed by June 30, 2017.
- f. **Compliance Assurances**
- i. Data Needs – Outline the data to be acquired in this project and how it will be obtained.
  - ii. Information Protection Plan, if applicable.  
Note that upon award, CIRI may require additional documentation, such as a human-subject research plan or a research safety plan, if applicable.
- g. **Project Extension**  
For proposed work beyond June 30, 2017, the applicant should provide a one-page description of the additional work scope that includes:
- i. The objective of the additional work.
  - ii. A summary of the work, including planned milestones and deliverables.
  - iii. A list of potential new partners.

iv. A preliminary budget and schedule. Proposed project extensions need to be completed by June 30, 2018.

Keep in mind that funding decisions for project extensions will be made in spring 2017 and will be based, in part, on project performance up to that point and a more detailed, invited proposed work plan.

h. **Resumes**

A set of resumes for key personnel (not to exceed 2 pages per person). The set of resumes does not count toward the 9-page limit.

i. **Letters of Commitment**

A set of commitment letters from the main collaborating partners. The commitment letters do not count toward the 9-page limit.

j. **F&A Rate Documentation**

A copy of the latest facilities and administrative (F&A) rate agreement negotiated with a cognizant federal agency. This documentation does not count toward the 9-page limit.

Applicants may append any additional documentation they feel will help the decision process of CIRI. Although such appendices are not subject to the 9-page limit, applicants should exercise discretion in providing additional material.

## Project Reporting

In addition to other promised deliverables, the grantee shall provide CIRI with a progress report halfway through the project period. Final deliverables must be submitted within 30 days following the grant end date.

CIRI will periodically check on the progress of the project through its duration.

CIRI will track metrics on funded projects for two years after their completion. The metrics will include information on publications, patents, commercialization, student education, external sponsorship, and further collaborations among the partners that were facilitated by CIRI funding.

## Proposal Evaluation

Invited full proposals will be evaluated according to the criteria found in Appendix C. CIRI will be looking for strength in

- Technical merit
- Impact
- Capability
- Collaboration
- Cost

## Applicant Notification

CIRI will strive to notify applicants within 5 weeks after proposal

submission whether the grant will be awarded. The award process may take an additional 4 to 6 weeks, so applicants should accommodate that in their project planning.

CIRI may enter into pre-award discussions with an applicant to address issues such as:

- Budget
- Work scope
- Additional information needed to make an award decision
- Any special terms and conditions that are required

## Invoicing

All awards made under this grant program will be cost- reimbursable.

Payment will be made upon receipt of proper invoices until payment has reached 90% of the award amount. The remaining 10% invoiced will be paid after CIRI has received and approved all contracted deliverables.

## Questions about this Request for Proposals

Specific questions about this request for proposals should be addressed in writing to Mark C. Petri, Director of the Critical Infrastructure Resilience Institute, at [ciri-grants@illinois.edu](mailto:ciri-grants@illinois.edu).

*The Critical Infrastructure Resilience Institute reserves the right to fund, in whole or in part, any, all, or none of the applications submitted in response to this request for proposals. Submission requirements for this grant program may be waived at the discretion of CIRI.*

*In accordance with University of Illinois policy, CIRI does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. veteran. Inquiries can be directed to the Office of Diversity, Equity, and Access; 1004 South Fourth Street, Champaign, Illinois 61820; [diversity@illinois.edu](mailto:diversity@illinois.edu); (217) 333-0885.*

## Appendix A

### Cover Page Information to be Entered Online

#### Project thrust area:

- Resilience insurance
- Macro or micro industrial supply chain
- Infrastructure dependencies and interdependencies

#### Project information:

- Principal investigator contact information
- Co-principal investigators
- Administrative contact
- Project title
- CIRI funding requested
- Project start and end dates

#### Contracting information:

- Organization contracting official
- Organization employer identification number

## Appendix B

### Budget Categories

#### Salaries and wages

- Principal and co-principal investigators
- Technical support
- Post-doctoral associates
- Students

#### Fringe benefits

#### Travel

- Airfare
- Ground transportation
- Lodging and meals
- Incidentals

#### Materials and supplies

#### Consultants and subcontracts

#### Other direct costs

#### Tuition

#### Indirect costs

#### Other sources of funding (leveraged support)



## Guidance for completing the budget form

**Salaries & Wages:** List all personnel to be paid by the project. List their levels of effort (percent or hours and number of months). For university faculty, show summer salaries separately.

**Fringe Benefits:** Show rates and totals for each category of employee (faculty, clerical, graduate student, hourly, etc.).

**Equipment:** Under this solicitation, CIRI will not pay for computers or equipment. An item is considered to be equipment if it has a unit cost of \$5,000 or more and a useful life of one year or longer. Constructed or assembled items are also considered to be equipment if the aggregated component costs exceed \$5,000.

**Supplies & Materials:** Show the total cost and briefly describe in the budget narrative the nature of the supplies and materials to be purchased.

**Travel:** List all planned trips and provide cost estimates for each. Budgets should include travel for meetings and related events with CIRI and sponsors. For each trip include destinations, number of travelers, duration, fees, transportation, lodging, and meals. Domestic travel requires approval 30 days in advance. Proposed international travel must be fully justified. Foreign travel requires approval 90 days in advance.

**Consultants:** Provide the rates and basis for rates for each proposed consultant. All consultant costs must be included in this category, including consultant travel. In the budget narrative, justify the need for outside consultants.

**Subcontracted Partners:** Routine services should not be included in this category. Include each subcontractor's total costs as a separate line item. Include a letter of commitment from each subcontracted partner.

**Tuition:** For students with research appointments of at least 25 percent, the college or university may budget tuition remission in ways that are customary to that university. List the number of students by classification and the total tuition that will be charged to CIRI for each classification. Only tuition may be charged; other fees are not allowable.

**Other Costs:** This category includes fabrication, equipment maintenance and repair, and other routine services (e.g., printing, mailing costs, chemical analysis, photographic services, and telephone charges) that can be clearly documented as specific to and necessary for the project. In the budget narrative, briefly describe the nature of the proposed Other Costs.

**Indirect Costs:** Indirect costs should be based on the institution's negotiated facilities and administrative (F&A) rate. Applicants should provide a copy of the latest rate agreement negotiated with a cognizant federal agency.

## Appendix C

### Proposal Evaluation Criteria

Weight	Criteria	Description
30%	<b>Technical Merit</b>	<p>The technical description of the proposed project and the work plan convincingly present and justify the following:</p> <ol style="list-style-type: none"><li>1. Validity of the proposed approach and likelihood of success based on current state of the art and on the scientific principles underpinning the proposed approach.</li><li>2. Development of a comprehensive and complete work plan and schedule with milestones and interrelated tasks that clearly lead to the successful completion of the project.</li><li>3. The identification of key technical risks and mitigation strategies to address them.</li><li>4. A clear set of deliverables.</li></ol>
25%	<b>Impact</b>	<ol style="list-style-type: none"><li>1. The proposal provides a coherent roadmap for producing a measureable, practical outcome.</li><li>2. The project significantly advances CIRI's ability to have a transformative effect on improving the resiliency of U.S. critical infrastructure.</li><li>3. The project fits within a strategic suite of CIRI activities that target DHS needs.</li></ol>
20%	<b>Capability</b>	<ol style="list-style-type: none"><li>1. The team provides an appropriate level of expertise and capability.</li><li>2. Past performance of the team provides high confidence of success.</li></ol>
15%	<b>Collaboration</b>	<p>The team has sought collaboration with critical infrastructure stakeholders to make the work more applicable to real-world needs.</p>
10%	<b>Cost</b>	<p>The proposed budget is appropriate and reasonable for the planned work.</p>

