Solicitation of Proposals  
For Metro21 Initiative Program Funding

Carnegie Mellon University’s Metro21 Initiative
Carnegie Mellon University (CMU) is establishing Metro21 as a multi-disciplinary research and educational initiative. Our goal is to research, develop, deploy and evaluate technology and analytically based solutions to the problems facing the systems and infrastructure that serve the quality of life and economy of our communities, cities, counties and metropolises. Metro21 will initially partner with the communities of southwestern Pennsylvania, CMU’s “home metro”, as a “test bed”. Metro21 will be distinctive by exploring deep synergies between sensing, analytics and evaluation methodology and through its emphasis on deployment. In addition to our local partnership, Metro21 also intends to reach out to other universities and metros to build a Metro21 Network of partners to research and deploy solutions that can be applied around the nation and the globe. See Appendix A for more about the Metro21 Initiative.

Purpose of Solicitation
The purpose of this solicitation is to elicit definitive proposals from CMU faculty and researchers for seed funding to pursue research and development projects related to the near term objectives of the Metro21 Initiative as outlined in Appendix A.

Briefings
Briefings will be scheduled to provide further information regarding Metro21 to address questions regarding the Initiative and this RFP. Please register for briefings at http://www.ices.cmu.edu/metro21/briefing-rsvp.asp.

Due Date and Method of Submission
Submissions are due by October 31, 2014. Proposals should be submitted electronically to Rick Stafford, Director of the Metro21 Initiative at rstaff@andrew.cmu.edu.

Award dates
Responses to all proposals will be forthcoming by no later than December 31, 2014.

Initial seed funding award amounts
No seed award will exceed $75,000. The expectation is to make 8-12 awards.
Additional funding

The Metro21 Initiative will be seeking additional funding for those projects receiving initial seed funding. Submissions not awarded in this initial round of seed funding but judged as having potential may also be included in future funding efforts by the Metro21 Initiative.

Contents of Proposal Submissions

While the format may be customized, a proposal should have the following contents in no more than five pages (though appendices, web links and references should be utilized as desired):

1. Provide a project summary.
2. Define the problem(s) that will be addressed, innovativeness of the approach and the desired results.
3. Provide evidence of the potential for one or more partners from the Pittsburgh community and region (e.g. government units, nonprofit organizations, corporate organizations). Note: partners do not need to be funding the project, but the proposal should indicate that the partnership can grow in strength if the initial seeded research is successful.
4. Outline the major tasks and rough timetable.
5. Identify the likely CMU project team.
6. Discuss actual need for or potential for involvement of public or private partners.
7. Provide a budget. Expectation is that funds will be used primarily for support of graduate students and salary of non-tenure track faculty and staff. Equipment and other expense may be included as well. No overhead charges need be included in the budget.
8. Identify any potential sources of financial support other than Metro21 funding.
9. Speculate as to how the project could lay the groundwork for future growth in research, deployment, and commercialization.

Evaluation of Proposal Submissions

Proposal submissions will be evaluated by a team consisting of Jim Garrett, Dean of Engineering; Ramayya Krishnan, Dean of the Heinz College; Andrew Moore, Dean of the School of Computer Sciences; Dan Martin, Dean of Fine Arts; Richard Scheines, Dean of the Dietrich College of Humanities and Social Sciences and Rick Stafford, Metro21 Director. In doing so, consideration will be given to the factors below.

Project concepts must first and foremost be responsive to the vision and scope of Metro21 (see Appendix A). Second, there must be evidence of the potential for community partners per item #3 in the proposal contents listed above. In addition, project concepts responsive to one or more of the following characteristics will be viewed more favorably:

1. The project has an interdisciplinary faculty team, with PIs preferably drawn from more than one CMU school.
2. The project outcome has the potential to have an impact in the Pittsburgh metro Pittsburgh community within the next two years.
3. The project shows promise for leading to some meaningful longer term impact on the quality of life and economy of Pittsburgh community.

4. The project has the potential to leverage additional money from public or private sources in the immediate or longer term future.

5. Students will be involved in the project.

6. The project could lay the groundwork for future R&D funding.

Metro21 is doing substantial outreach to establish interest on the part of potential collaborators such as public agencies, corporate partners and additional funding sources.

**Contact for questions/issues**
Inquiries regarding the process, guidelines or other matters should be directed to Rick Stafford at rstaff@andrew.cmu.edu or call him at 8-2160.
APPENDIX A: DESCRIPTION OF CMU’s Metro21 Initiative

What is Metro21’s public vision?
Carnegie Mellon University (CMU) is establishing Metro21 as a multi-disciplinary research and educational initiative. Our goal is to research, develop, deploy and evaluate technology and analytically based solutions to the problems facing the systems and infrastructure that serve the quality of life and economy of metro areas. Initially, Metro21 will partner with our “home metro” of southwestern Pennsylvania as a “test bed” partner. We plan to reach out to other universities and metros to build a Metro21 Network of partners to research and deploy solutions that can be applied around the nation and the globe. Metro21 will be distinctive by exploring deep synergies between sensing, analytics and evaluation methodology and through its emphasis on understanding factors relevant to sustainable deployment.

Why is Metro21 being established?
The Metro21 Initiative is being established to:

- Address through research and education the challenges facing our home metropolitan area as well as metros nationally and internationally.
- Position Carnegie Mellon University as an international leader in research and development of technology and analytically based solutions to the problems facing the systems and infrastructure that serve the quality of life and economy of our communities, cities, counties and metropolises.
- Establish a platform to attract, sustain and grow funding to support University research and development in this arena.
- Develop educational programs to prepare our students to address the problems and challenges facing future metropolises.

What will distinguish Metro21 from other urban, city, and/or metro efforts at universities and think tanks?
Metro21 will have these distinguishing characteristics:

- Emphasis on solutions that get deployed and “do demonstrable good”.
- Establishment of community partnerships to create “test beds” for deployment.
- Emphasis on a system of systems approach embracing principles of sustainability and equity.
- Establishment of partnerships with national and international associations that represent communities to help both in problem identification and solution dissemination.
- The unique characteristics of Carnegie Mellon, including:
  - A successful track record with a model similar to Metro21, namely the Traffic21 Initiative.
  - An international and well deserved reputation in engineering, computer science, social science, data sciences, architecture and design and public policy.
  - A culture that promotes multi-disciplinary thinking and approaches to solving multi-faceted and multi-system problems.
What is the scope of Metro21?

A metro may be thought of as a system of interacting systems that includes public and private infrastructure (water, sewer, communications, transportation, buildings and assets, etc.), and public and private services (safety, energy, health, education, human services, recreation and parks, cultural and arts organizations, economic development, etc.), with democratic governance (planning, citizen participation, and deliberation) and public management (with data-based decision making capturing positive impacts and avoiding negative spillovers from interacting systems).

Metro21 will take advantage of CMU’s strengths in engineering, robotics, public policy and information systems, green design, and the social sciences to explore deep synergies between sensing, analytics, and evaluation methodology, and through its emphasis on understanding factors relevant to sustainable deployment. Metro21 aims to bring those strengths together to address complicated system interactions. For example, we aim to explore questions such as:

- How can metros with aging infrastructure create more resilient systems in the face of natural and manmade disasters?
- How can metros manage their physical systems of streets, bridges, sewers, water, electric, natural gas, and communications more efficiently in the face of “silod” ownership and management?
- How can metros manage their human service systems of education, social services and health care more efficiently and effectively in the face of increasingly scarce resources?
- How can a metro be made safer through public engagement and through coordination and communication among various agencies serving the public?
- How can the introduction of autonomous and connected vehicle technology be managed to positively impact not just the transportation system but land use, built infrastructure and public safety?

In addressing these ‘system of systems’ questions, Metro21 will mobilize information and communications technologies; cyber security; innovative sensor and actuator technologies; the use of open government, social media, crowd sourcing, and sensor data; computing and networking systems; artificial intelligence and machine learning; analytical, visualization, and predictive methods; and experimental research, econometric models, cost/benefit analysis, and other evaluative and validation approaches.

How will Metro21 arrive at its research agenda?

Metro21 is about research, development and ultimately deployment (RD&D) of solutions to problems. To define the problems that will drive our research agenda, we will ask those who manage and set policies that govern the infrastructure and systems of metros. By driving our research agenda with problems “real world” organizations help define, the probability of adoption of the solutions that emerge is heightened. Ultimately however, faculty will determine the problems in which they have interest and expertise to tackle. We will do this by holding a number of faculty and stakeholder retreats where the problems and the potential research can be prioritized.
What are Metro21’s Functions

Metro21 is not a research institute or center itself. Rather it will bring together centers of excellence across CMU’s seven colleges and with other institutions to address problems. It will be a mechanism:

- For metro communities to discover how CMU might help address problems and challenges through its research and educational resources;
- For University faculty, students and staff to discover what metro problems and challenges might be addressed through their educational and research expertise;
- For CMU to work with other universities to pursue research and educational projects and programs;
- For students to be educated and pursue public and private sector careers in metro related fields.

How will Metro21’s success be measured?

Metro21’s goal is to research, develop, deploy and evaluate technology and analytically based solutions to the problems facing the systems and infrastructure that serve the quality of life and economy of metropolitan areas. Metro21’s success will therefore be measured by 1) whether the research and development carried out eventually lead to solutions that are deployed in the “real world” of the metro system of systems; 2) whether deployment leads to commercialization; 3) whether through curriculum development and student engagement our graduates are motivated, prepared, and choose to lead and manage these systems; 4) whether resources can be leveraged many times over to bring about more ambitious results; and 5) whether the reputation of CMU and its home metro are enhanced.

How is Metro21 being organized?

An Executive Committee at the University guides the Metro21 Initiative. The Committee’s members include: Dr. James Garrett, Dean, College of Engineering; Dr. Ramayya Krishnan, Dean, Heinz College of Public Policy and Information Systems; Dan Martin, Dean, College of Fine Arts; Dr. Andrew Moore, Dean, School of Computer Sciences; Dr. Richard Scheines, Dean, Dietrich College of Humanities and Social Sciences. The launch of Metro21 is being directed by Rick Stafford, Distinguished Service Professor of Public Policy and formerly Director of the Traffic21 Initiative.