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**Science Masters Program: Networking for Smart Infrastructure (Systems)**<suggest other names>

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To win the NSF SMP, CU needs to submit a “shovel ready” M.S. program that will train people in STEM careers that have demand in the next two to three years. We believe the following proposal will meet that need:

1. It is modeled on the Interdisciplinary Telecommunications Program (ITP) a professional masters program that has incorporated business, management, professional, and career training into its engineering masters degree for 38 years. ***We have a successful and sustainable model.***
2. ITP has a high success rate in placing M.S. grads and has very close ties with industry. In Fall 2008 and Spring 2009 ITP had 51 graduates. Of these, 84% graduated with degree appropriate jobs in hand and most of the remaining students found jobs within six months of graduating; ***Despite the severe job market downturn our students are in demand*.**
3. The units who support the NSI program including the Departments of Electrical, Computer, and Energy Engineering (ECEE), Computer Science (CS), and Civil, Environmental and Architectural Engineering (CEAE); the Engineering Management Program (EMP), and the Law School (Law) already work together on cross-disciplinary education. ***We have a strong team that knows how to work together across disciplines.***
4. Many potential partners inside and outside Colorado can support the proposal. These partners through board memberships, joint projects, alumni, and direct program support already work with CU. CU can work through this NSI partnership to build programs that meet their needs and further strengthen these partnerships. ***Industry support is large and diverse***.

**Program Synopsis:**

As noted more than a decade ago in Presidential Decision Directive 63, the strength of our economy depends on our critical infrastructure including telecommunications, energy, transportation, water systems and emergency services. The information technology revolution owes its success to the pervasive wired and wireless networks that have connected people and computers. This success is being applied to our infrastructure systems to take them from “physically and logically separate systems [to systems that] have become increasingly automated and interlinked.[[1]](#footnote-2)” This transition is coming to a head as energy grids become “smart grids[[2]](#footnote-3)” and roads and bridges become “smart roads[[3]](#footnote-4)” and “smart bridges[[4]](#footnote-5).” All levels of government are funding billions in infrastructure projects including $150B in this year’s American Recovery and Reinvestment Act[[5]](#footnote-6). As this rapid pace of investment unfolds, what is needed are engineers who understand the networking technologies that can make our energy grids, roads, bridges, and water systems “smart”.

However, engineers who apply a simple overlay of monitors and networks will not make infrastructure smart if it does not integrate with the engineering, business, and political realities. To be successful, engineers are needed who understand wired and wireless networking technology, the role it plays in building and transforming business, the regulatory context within which it must operate, the security required to protect them from outside attack, and the management skills to implement complex engineering projects.

To meet these needs, CUs NSF Science Masters Program in Networking for Smart Infrastructure (NSI) will efficiently leverage current coursework and education initiatives in ITP, CS, CEAE, ECEE, EMP and Law to develop a world-class education program. Students will enter with undergraduate degrees in the infrastructure-specific engineering disciplines. They will either be recent graduates or experienced engineers seeking to retool. The CU NSI program is built on the NSI Platform. The platform consists of the fundamentals of wireless and wired networking and network security. It introduces students to network economics, principles of regulation, and engineering management. On this platform students will specialize with courses in technologies, business, and law specific to their infrastructure domain. They will tie their studies together with a regular interaction with industry through monthly industry seminars and a one year capstone research project mentored by industry partners.

The industry players in smart infrastructure are local such as the National Renewable Energy Lab (NREL) and Vestas with close ties to ECEE and RASEI, and Tendril Networks with close ties to CS. Major national players include IBM who “predicted nearly a million jobs would be created from a $30 billion investment in smart infrastructure systems.”[[6]](#footnote-7) Other players include Accenture an IT consulting firm who regularly hires ITP students, Siemens, and GE whose Ecomagination initiative[[7]](#footnote-8) goal is to employ 30,000 technologists to engineer smart grids and other green solutions.

Over the next month we will work with these and other partners to hone our NSI concept for the final proposal. We believe that this project will be a fundamental step forward for the University of Colorado and its ability to be recognized as a leader in energy and engineering.

1. PDD-63 Critical Infrastructure Protection, May 22, 1998. [↑](#footnote-ref-2)
2. Stephanie Simon, “A groundbreaking 'smart grid' test in Boulder, Colo., is delivering some surprises for both consumers and utilities,” Wall Street Journal, February 9, 2009. [↑](#footnote-ref-3)
3. Michael Totty, “Smart Roads. Smart Bridges. Smart Grids.,” Wall Street Journal, February 17, 2009. [↑](#footnote-ref-4)
4. Saswato R. Das, “`Smart’ bridges harness technology to stay safe,” Scientific American Online, June 17, 2009. [↑](#footnote-ref-5)
5. White House “American Recovery and Reinvestment Act: A $150B Investment in Our Nation’s Infrastructure – The Largest New Investment since the Construction of the Interstate Highway System,” press release, Feb. 17, 2009. [↑](#footnote-ref-6)
6. Andy Greenberg, “IBM's 'Smart' Moves: Company revamps its infrastructure offerings just as the Senate is expected to approve billions in IT spending.” Forbes Magazine, February 9, 2009. [↑](#footnote-ref-7)
7. ge.ecomagination.com [↑](#footnote-ref-8)