

## **Performance-based Infrastructure Asset Management (PBIAM)**

This proposal solicits NSF's support and auspices, through a partnership with the US Federal Highway Administration (FHWA), for holding a 3-Day international workshop at Istanbul, Turkey during July 7-9, 2008, on the topic of "performance-based infrastructure asset management". In addition to NSF's Civil, Mechanical and Manufacturing Innovation (CMMI) and Office of International Science and Engineering (OISE) Divisions, the proposal is being co-sponsored by the FHWA. Partial support has been promised by a number of Turkish, European, Canadian and Japanese agencies.

### **Objectives of the Proposed Workshop**

We propose an international workshop in Istanbul, Turkey to dissect the paradigm of ***Performance-Based Infrastructure Asset Management (PBIAM)***. **The highway transportation infrastructure, with its linkages and interdependencies to other modes of transportation and other infrastructures will be leveraged as a case study to guide the discussion.** Turkey is at the cross-roads between Europe and Asia, and the highway infrastructure connecting Asia and Europe at Istanbul will serve as an excellent backdrop for the discussions. Specific objectives of the proposed workshops include:

- (1) To bring a multi-disciplinary group of engineers and scientists from academe, government and industry together for discussing **how innovative paradigms and concepts may be integrated and leveraged** to advance the engineering and management of infrastructures in general, and highway transportation infrastructure in particular. The workshop will explore the inter-relations and synergies between the concepts and paradigms of asset management, performance-based engineering, multi-hazards risks, multi-domain systems identification, applied systems analysis, health monitoring and intelligent systems in addition to interdependence, resilience and sustainability.
- (2) To initiate the construction of ontology of performance-based asset management of highway transportation infrastructure to help overcome the fragmentation that is obstructing effective integration and leveraging of concepts and paradigms with potential to innovate engineering and management of infrastructures. Ontology has been leveraged as a mechanism for creating a unified worldview and language in highly complex emerging fields of study that face integration challenges. Space, defense, AI, IT are examples.
- (3) To develop an International Collaborative Research Agenda on PBIAM. This Agenda will incorporate an in-depth understanding and sharing of recent experiences and advances on PBIAM in Europe, the Far East and North America. It will also permit an understanding of how different social and cultural institutions and related human systems in different regions of the world impact PBIAM applications.

### **Intellectual Merit**

While we broadly recognize that infrastructures are multi-domain and multi-disciplinary systems with human, natural and engineered elements, there is currently little awareness and no consensus regarding how innovative paradigms and concepts need to be integrated and leveraged to advance the engineering and management of infrastructures in general and transportation infrastructures in particular. Each paradigm remains an island with its own subscribers, champions, researchers and industry fragmented from other paradigms. The principal intellectual merit of the proposed workshop will be to leverage the concept of Ontology construction for bringing together experts and stakeholders that have so far remained apart, and explore effective manners of integrating disciplines effectively. The highway transportation infrastructure will serve as a realistic case-study to explore the construction and leveraging of the ontology as an integrative mechanism. We expect to widely disseminate and maintain the Ontology and track its utilization by universities, State DOT's, AASHTO and FHWA among other institutions.

### **Broader Impacts**

No one country or region has yet discovered the best and most effective framework for efficient, safe, sustainable and secure operation and preservation of their infrastructures. The path to innovation has to go through global, coordinated, multi-domain and multi-disciplinary research. The proposed workshop has been conceived in this manner. Its results and product will be broadly disseminated to promote the adoption of PBIAM principles by transportation infrastructure stewards throughout the US and abroad.

To facilitate the participation of experts from traditionally underrepresented groups in these workshops, several strategies will be employed. Leading civil engineering faculty and practitioners from traditionally underrepresented groups will be directly contacted and invited to participate in the proposed workshops.