

## **Vulnerability Analysis and Threat Assessment/Avoidance**

Bharat Bhargava  
Leszek Lilien  
Department of Computer Sciences  
Purdue University  
West Lafayette, IN 47907-1398

### **Project Summary**

Existing vulnerabilities are a serious threat to computer systems and organizations. Research in security is needed to identify vulnerabilities in systems, evaluate the threat, and devise mechanisms that avoid them. Formalizing vulnerability, building quantitative models of threat, and experimental studies will allow us to discover and evaluate solutions for dealing with threats to life and economy. This will result in algorithms, observations based on experiments, and infrastructure that can deal with expected and unexpected attacks in an adaptable and graceful manner. It will allow us to provide guidelines for building secure systems and databases. We plan to build upon our research on failures, fault-tolerance and reliability/safety. We reduce vulnerabilities by keeping an attacker uncertain and unaware about the latest version of databases/software and routing information that are in operation.

The scientific and experimental studies will contribute towards developing fundamental principles and policies for providing homeland security in information systems used in organizations. The research will contribute toward security in applications such as nuclear waste shipping, e-commerce, and disaster management. Foundations of security in guarding sensitive data, critical resources, and information access will result from this research. This research will contribute towards a better understanding of vulnerabilities in a variety of institutions such as schools, government agencies, air space and airports, and industrial plants. The tutorial and guidelines will be used for educating general public for increasing safety. Graduate students will learn about security issues and evaluating threats through experimental studies. Undergraduates will work in a laboratory environment and build vulnerability databases by investigating empirical incidents. They will help in developing benchmarks and identifying parameters for experiments by consulting with various institutions. We will contribute to the outreach program of CERIAS security center at Purdue through preparation of education material and organizing workshops. Two women minority graduate students are participating in this research effort and will be encouraged to publish papers and attend conferences. Undergraduate minority students are working in our laboratory and will work closely with faculty and graduate students. Poster sessions and demos will be arranged for increasing awareness about vulnerabilities and minimizing threats in local community.