

Integrated Reliability-Based Life-Cycle Framework for Design, Inspection, Maintenance and Monitoring of Structures: Applications to Bridges

by

DAN M. FRANGOPOLO

Fazlur Rahman Khan Endowed Chair of Structural Engineering and Architecture
Professor of Civil Engineering, Department of Civil and Environmental Engineering,
National Engineering Research Center for Advanced Technology for Large Structural
Systems (ATLSS Center)

Lehigh University, Bethlehem, PA 18015-4729, USA

www.lehigh.edu/~dmf206

Abstract: Our knowledge to model, analyze, design, maintain, monitor, manage, predict and optimize the life-cycle performance of structures and infrastructures under uncertainty is continually growing. However, in many countries, including the United States, the civil infrastructure is no longer within desired levels of performance and safety. Decisions regarding infrastructure systems should be supported by an *integrated* reliability-based life-cycle multi-objective optimization framework by considering, among other factors, the likelihood of successful performance and the total expected cost accrued over the entire life-cycle. The primary objective of this lecture is to highlight recent accomplishments in the life-cycle performance assessment, maintenance, monitoring, management and optimization of aging structural systems under uncertainty. Applications of the proposed integrated framework to life-cycle management of individual bridges and bridge networks are presented.