

# Interactive Systems and Their Vulnerabilities – A Holistic Approach to Modeling and Testing

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## Abstract

Man-machine systems have several *desirable* global system properties such as user friendliness, reliability, safety, and security. System *vulnerability* is the lack, or the exposure to breaches, of any such property, potentially leading to an *undesirable* situation from the user's point of view. Such undesirable situations could arise from internal faults, unintended environmental failures or malicious attacks from the system environment. The undesirable system features, viewed here as the sum of situations, which are *complementary* to the desirable ones, must be taken into account in the system development process from the very beginning in assuring a stable system behavior and a robust operation. In this respect, this presentation proposes an event-based approach to modeling, analysis and testing of systems that exhibit various forms of vulnerabilities, in particular, those encountered in user interface design and safety critical systems. The emphasis of the work is on the *holistic* treatment of both desirable and undesirable system features in a similar manner at an identical level of abstraction. Ideas on determination of the level of "testedness"/robustness and test optimization will be presented.

The presentation introduces a basic terminology, summarizes existing relevant approaches and demonstrates the applicability as well as the limitations of the approach introduced, using realistic examples drawn from different domains, mostly from industrial applications.

## About Dr. Fevzi Belli

Fevzi Belli completed his PhD in formal methods for verifying software systems and self-correction features in formal languages at Berlin Technical University in 1978. He spent several years as a software engineer in Munich, writing programs to test other programs. After a brief stint as a senior scientist at the SHAPE Technical Center at The Hague, he became in 1983 a professor at the Hochschule Bremerhaven; in 1989 he changed to the University of Paderborn. Prior to his appointment with the University of Paderborn, Dr. Belli was also a faculty member of the University of Maryland, College Park, European Division, for many years. During 2002 and 2003, he was founding chair of the Computer Science Department at the University of Economics in Izmir, Turkey. He has an interest and experience in software reliability/fault tolerance, model-based testing, test automation and practical lightweight formal methods. He was general chair and program chair of and invited speaker at several IEEE and ACM conferences on those topics. Visit <http://adt.uni-paderborn.de/forschung.php?id=2> for publications.

