Title: Building dependable situation-aware software: how to self-adapt to environment changes

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Chaired by: Dr Rosenblum, David S., Professor, School of Computing
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Abstract:
Modern software-intensive systems often live in a highly dynamic context, whose behavior is both hard to anticipate and also very likely to change. Consider for example highly interactive systems, which depend on evolving usage profiles, or cloud/service environments, which rely on a dynamically evolving infrastructure, or cyber-physical systems. CPSs are characterized by continuous interaction with the physical environment. Requirements satisfaction depends heavily on assumptions on how the physical environment behaves, which may be hard to fully anticipate when systems are initially built and often are subject to evolve as the system is operating. In all these cases, uncertainty and evolution are two faces of the crucial system-environment boundary. To cope with uncertainty and evolution, systems should be able to self-adapt in a dependable and verifiable manner.

The talk focuses on self-adaptation to changes that may lead to violations of non-functional requirements (such as reliability, performance, or power consumption). The proposed approach is based on monitoring, learning from raw data the changes that may lead to requirements violation, run-time model checking to check for violations, and dynamic reconfiguration to instantiate a new software architecture.

The approach described in the talk has been developed by the author in the context of the SMCcom project, funded by an ERC Advanced Grant.

Biodata:
Prof Ghezzi is an ACM Fellow, IEEE Fellow, Member of Academia Europaea, Member of
the Italian Academy of Scineces (Istituto Lombardo). He was awarded the ACM SIGSOFT Distinguished Service Award in May 2006. He is the current President of Informatics Europe and has been on the evaluation board of several international research projects and institutions in Europe, Japan, and the USA. His research has been focusing on software engineering and programming languages. Currently, he is especially interested in methods and tools to improve dependability of adaptable and evolvable distributed applications, such as service-oriented architectures and ubiquitous/pervasive computer applications.