"Resilient and Antifragile Ambient Systems"

Resilience (from Latin *resilire*, "to spring back, start back, rebound, recoil, retreat") plays a central role in several disciplines. Definitions of resilience can be found in ecology, business, psychology, industrial safety, microeconomics, computer networks, security, management science, cybernetics, control theory, as well as crisis and disaster management and recovery. A general interpretation of resilience may be considered that of "the ability of a system subjected to faults and changes 1) to continue distributing its services 2) without losing its peculiar traits. **Antifragility** goes one step further and suggests that certain ambient systems could systematically improve their system-environment fit, when subjected to faults and changes. Thus an antifragile system would not "stay the same"; rather, it would "get better" with each new experience.

The **engineering of antifragile computer-based ambient systems** is a challenge that, once met, would allow ambient systems to self-evolve and self-improve by learning from accidents and mistakes in a way not dissimilar to that human beings are capable of. Learning how to design and craft antifragile systems is thus an extraordinary challenge whose tackling is likely to reverberate on many a computer engineering field. New methods, programming languages, even custom platforms will have to be designed. The expected returns are extraordinary as well: Antifragile computer engineering promises to enable the realization of truly autonomic ambient systems able to

- meta-adapt to unprecedented conditions and circumstances;
- self-adjust to dynamically changing environments;
- self-organize so as to converge to proactively optimal strategies to sustain scalability, high-performance, and energy efficiency;
- personalize their aspects and behaviors after each and every user.

And to learn how to **get better while doing** it.

As a design aspect cross-cutting through all system and communication layers, antifragile engineering will require multi-disciplinary visions and approaches able to bridge the gaps between "distant" research communities so as to

- propose novel solutions to design and develop antifragile ambient systems ;
- devise conceptual models and paradigms for antifragility;
- provide analytical and simulation models and tools to measure a system's ability to withstand faults, adjust to new environments, and enhance their resilience in the process.

The main topics of this special issue of the Springer **Journal of Reliable Intelligent Environments** include, though are not limited to:

- Conceptual frameworks for antifragile systems, ambients, and behaviours;
- Dependability, resilience, and antifragile requirements and open issues;

- Design principles, models, and techniques for realizing self-resilient and antifragile systems and behaviours;
- Frameworks and techniques enabling the definition of resilient and antifragile ambients;
- Methods and approaches coupling ambient intelligence with antifragility;
- Antifragile human-machine interaction;
- End-to-end approaches towards antifragile services;
- Autonomic resilient behaviours;
- Middleware architectures and mechanisms for resilience and antifragility;
- Theoretical foundation of resilient and antifragile behaviours;
- Formal modeling of resilience and antifragility;
- Software engineering for resilience and antifragility;
- Architectures and design patterns;
- Machine learning as a foundation for resilient and antifragile architectures;
- Antifragility and resilience against malicious attacks;
- Antifragility and the Cloud;
- Service Level Agreements for resilience and antifragility;
- Verification and validation of resilience and antifragility;
- Antifragile and resilient services and components.

Important dates:
Submission deadline: **July 3, 2015**
First feedback: September 4, 2015
Final decisions: October 9, 2015.

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