

# About Resilience

— From Dependability to Resilience —

Jean-Claude Laprie



WG 10.4 — 54th meeting  
June 27-30, 2008, Alyeska, Alaska, USA

# Resilience

▣ in dependability and security of computing systems

▣ in other domains

## ❖ Adjective Resilient

- In use for 30+ years
- Recently, escalating use  
→ buzzword
- Used essentially as synonym to fault tolerant
- Noteworthy exception: preface of *Resilient Computing Systems*, T. Anderson (Ed.), Collins, 1985  
«The two key attributes here are dependability and robustness. [...] A computing system can be said to be *robust* if it retains its ability to deliver service in conditions which are beyond its normal domain of operation»

Adaptation to changes, and getting back after a setback

Material science  
Social psychology  
Child psychiatry and psychology  
Ecology  
Business  
Industrial safety

## ❖ Fault and change tolerance

**At stake:** Maintain dependability in spite of changes

**Dependability:** Ability to deliver service that can justifiably be trusted

**Resilience:** persistence of service delivery that can justifiably be trusted, when facing changes

Nature

- Functional
- Environmental
- Technological

Prospect

- Foreseen
- Foreseeable
- Unforeseen

Timing

- Short term
- Medium term
- Long term

Threat evolution

👉 The definition does not exclude the possibility of failure

Alternate definition of dependability:

Ability to avoid unacceptably frequent or severe service failures

**Resilience:** persistence of avoidance of unacceptably frequent or severe service failures, when facing changes

**Resilience:** persistence of dependability when facing changes

# Technologies for resilience

Changes → **Evolvability**

👉 On-line: Adaptivity

Trusted service → **Assessability**

👉 Verification and evaluation, on-line assessment

Ubiquitous systems → **Usability**

👉 Human and system users

Complex systems → **Diversity**

👉 Taking advantage of existing diversity for avoiding single points of failure, and augmenting diversity

