

## The Teachers

**Mr. Antonio Castellani** has more than twenty years of experience in Reliability and Logistics Engineering. He is involved both in technical and management activities in Space and Defense Projects. As Reliability Engineering Manager, he was involved in large programs, like IRIDIUM, Astrolink, Cosmo SkyMed, Cosmo Second Generation, GÖKTÜRK.



## The Company

Since 1974, INTECS has been operating at the forefront of the software market, where safety, reliability, innovation, and quality are essential ingredients for success. INTECS provides leading-edge software technologies to support the major European and Italian organisations in the design and implementation of advanced electronic systems for Defence, Space, and Civilian markets.

Intecs is ISO-9000 certified since 1994. Currently it holds **ISO 9001:2008** quality certification for software development in Defense, Space, and Civilian domains. Moreover, Intecs Defence and ATC Divisions were positively appraised at **CMMI® Maturity Level 3**.



## General Information

### Location

Upon request, the course may be held at Customer premises.

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*the Brainware company*

## Software Reliability Prediction and Estimate

*A three-days modular course*

## Software Reliability Theory

Software Reliability Assurance consist of the following possible approaches:

- Prediction: evaluates Reliability, (e.g. Failure Rate, and, hence, MTTF, MTBF) parameters based on detail information on software application architecture and attributes before the software code is written;
- Estimate: evaluates Reliability, parameters (e.g. Failure Rate, and, hence, MTTF, MTBF, as well as MTTR) based on failure data coming from the “field by fitting them to a suitable failure distribution.

Software Dependability main references are:

- ECSS-Q-ST-30C – Dependability, ECSS-Q-ST-80C - Software product assurance.
- MIL standards also address Reliability establishing proceedings to evaluate application MTTFs, MTTRs (MIL-HDBK-338B).

## The Course

The objective of the course is to make available SW Reliability fundamentals, addressing prediction and estimate main methodologies.

The course is organized in three days:

- Day 1: Introductory discussion of Software Reliability Engineering (SRE) main concepts, addressing basic approaches for MTTF, MTBF prediction and MTTF, MTBF, MTTR estimate.
- Day 2: Consolidated prediction methods (e.g.. Rome Laboratory Prediction Model, Putnam’s Model), and widely applied estimate models (e.g. Shooman, Musa) are presented.
- Day 3: In-depth discussion of selected topics.

Examples and exercises are significant part of the lessons.

## Intended audience

At least large part of Day 1 should be attended by:

- Project Managers and System Engineers who need to understand how to manage Reliability, Maintainability, Availability requirements in their projects.

The course should be attended by:

- Dependability Analysts who need to understand the approaches and models applied in Reliability Assurance process to be carried out within a system design and development project.
- System Designers and Developers who need to understand how to integrate actual design activities with Reliability requirements assurance process.

## Prerequisites

Participants are required to know software design and development fundamentals. Some previous knowledge of probability theory and related applications is desirable.

## Benefits

Most of Day 1 course will primarily familiarize managers and engineers with Software Reliability definition and evaluation methods. They will then be able to interact with own customers, higher-level project managers, their development teams, and suppliers (if any). Moreover, they will know where to find more information, when necessary.

In Day 2 and Day 3 course Software Reliability Engineers and Software System Designers and Developers will be provided with analysis tools and methods to be applied in software design and development projects.

## Material

The participants are provided with a copy of course handouts, including examples and exercises

## Course Outline

### Day 1

**Introduction Software Reliability Engineering (SRE)**

**Reliability and Maintainability parameters (Failure Rate, MTTF, MTBF, MTTR) Overview**

**Quantitative methods for software Reliability and Maintainability parameters evaluation**

**Software MTBF and Failure Rate Prediction**

**Software MTTR Estimate**

**Software Failure Rate Estimate across different phases**

### Day 2

**Software Application Failure Rate Prediction and Estimate**

### Day 3

**“Field” data collection methods and Reliability and Maintainability parameters evaluation**

**Hardware Software Interaction Analysis (HSIA)**

**Software Criticality Categories**