

Software Quality Measurement Simulation Tool

The ITISQS Quality Measurement Simulation Tool is a web-based educational platform designed to help students understand and apply international software quality standards. It simulates the **ISO/IEC 15939 – Systems and Software Engineering: Measurement Process**, using ISO/IEC 25010 and ISO/IEC 25023 as foundational quality models and metric sources.

The tool guides users through the full measurement lifecycle from defining quality goals to analyzing quantified results, offering an interactive learning experience in evaluating software product quality.

Main Objectives:

- To increase awareness and literacy about software quality standards (ISO 25010, 25023, 15939).
- To simulate real measurement processes, allowing students to practice defining, measuring, and analyzing quality attributes.
- To identify the strengths and weaknesses of software systems using objective, numerical indicators.
- To support learning-by-doing in software quality assurance and measurement engineering.

Underlying Standards Frameworks:

Standard	Role in Tool	Application
ISO 15939	Defines the Measurement Process	Used to structure each tool step (Define, Measure, Analyze, Report).
ISO 25010	Defines Quality Characteristics	Used to select evaluation criteria (e.g., Functionality, Usability, Reliability).
ISO 25023	Defines Metrics	Provides quantitative indicators and measurement formulas.

Step-by-Step Usage:

1. Define Evaluation Scenario

Select between:

- **Predefined Scenarios:** e.g., *E-Commerce Platform*, *Student Portal*, *Mobile Banking App*.
- **Custom Scenario:** Define your own project context, purpose, and evaluation scope.

2. Select Quality Characteristics

Choose quality characteristics from **ISO 25010**:

- Functional Suitability
- Performance Efficiency
- Reliability
- Usability
- Security
- Maintainability
- Portability
(Each can be expanded to its sub-characteristics, e.g., *Operability*, *Adaptability*, and *Fault Tolerance*.)

3. Assign Importance Weights

Allocate a relative importance (%) to each selected characteristic.

- Total must equal **100%**.
- The system validates balance and provides guidance if limits are exceeded.

4. Select or Add Metrics

For each characteristic:

- Choose from default **ISO 25023** metrics (e.g., *Mean Time to Failure*, *User Error Rate*).
- Or define your own metric by entering:

- Name
- Formula / Unit
- Target Value / Acceptable Range

5. Input or Simulate Data

Enter observed or simulated metric values.

Example inputs:

- *Response Time* = 2.4 s
- *Defect Density* = 0.5 / KLOC
- *User Error Rate* = 0.06

6. Analyze and Visualize Results

After input submission:

- The tool computes normalized scores (0–100 scale).
- Results are visualized via a **radar chart** and a **summary table**.

Quality	Score	Weighted	Interpretation
Characteristic			
Reliability	85	17.0	Strong
Usability	65	16.3	Moderate
Security	42	4.2	Weak

7. Interpret Results

Below the chart, the system automatically summarizes:

- **Strong Areas:** $\geq 80\%$

- **Moderate Areas:** 60–79%
 - **Weak Areas:** < 60%
- Each area includes contextual comments and improvement recommendations.

Example Scenario:

Scenario: Web-based Student Portal

Selected Characteristics:

- Functional Suitability (30%)
- Usability (25%)
- Reliability (20%)
- Performance Efficiency (15%)
- Security (10%)

Example Metrics:

- Functional Correctness = 0.95
- User Error Rate = 0.07
- Mean Time to Failure = 120 h
- Average Response Time = 1.2 s
- Vulnerability Density = 0.02

Result Summary:

- Overall Quality Index = 78 / 100
- Strengths: Usability, Performance Efficiency
- Weaknesses: Reliability below the expected threshold