



# The SEI Quality Attribute Workshop

## Clarify Architectural Requirements to Ensure Successful Development

### Design with Assurance

Before your development team builds the system, your design team needs to clarify the capabilities it needs to deliver. To begin its work, that team needs to understand the business and mission goals of stakeholders in the context of requirements for quality attributes such as availability, security, and interoperability. Such quality attributes influence decisions about software architecture.

The SEI Quality Attribute Workshop (QAW) provides the means to identify important quality attributes, derived from business and mission goals, before there is a software architecture. Clarifying quality attribute concerns early provides architects with more insight into what is important and why, in turn improving their ability to create architectures that better meet organization needs.

### Scenario-Based QAW

In the QAW, an external team (such as SEI facilitators) holds meetings among stakeholders during which scenarios representing the quality attribute requirements are generated, prioritized, and refined.

From these discussions, system designers gain insight concerning

- stakeholder assumptions that may not have been expressed during elicitation of goals
- which quality attributes are pulling the architecture in different directions, informing subsequent tradeoff decisions

### QAW Benefits

- Increase stakeholder satisfaction with the developed system
- Avoid rework and save money, by clarifying critical requirements and achieving them in the initial version of the system
- Increase communication among stakeholders, especially early in the development process
- Provide improved support for analysis and testing throughout the life of the system
- Deconflict assumptions about system requirements early

### Scenarios are key in the QAW method

Stakeholders may state goals such as “The system shall produce reports for users.” System designers need more information.

A scenario sheds more light on the performance aspect of a goal, as in “A remote user requests a database report via the Web during peak usage and receives the report within five seconds.”

Note that the initial goal hasn’t been lost, but the scenario further explores its performance (a quality attribute) aspect.

As a result of a QAW, designers gain a list of prioritized, refined scenarios for the system. The scenarios have several uses, such as establishing measureable objectives that guide design trade-offs and providing evaluation criteria for candidate architectures.

## Steps in a QAW

### 1. QAW Presentation and Introductions

QAW facilitators describe the motivation for the QAW and explain each step of the method.

### 2. Business/Programmatic Presentation

A stakeholder presents the business and/or programmatic drivers for the system.

### 3. Architectural Plan Presentation

A technical stakeholder presents the system architectural plans as they stand with respect to early documents, such as high-level system descriptions, context drawings, or other artifacts that describe the system's technical details.

### 4. Identification of Architectural Drivers

Architectural drivers often include high-level requirements, business/mission concerns, and various quality attributes. During this step, the facilitators and stakeholders reach a consensus about which drivers are key to the system.

### 5. Scenario Brainstorming

Stakeholders generate real-world scenarios for the system. Scenarios comprise a related stimulus, an environmental condition, and a response. Facilitators ensure that at least one scenario addresses each of the architectural drivers identified in Step 4.

### 6. Scenario Consolidation

Scenarios that are similar in content are consolidated.

### 7. Scenario Prioritization

Stakeholders prioritize the scenarios through a voting process.

### 8. Scenario Refinement

For the top four or five scenarios, the following are described:

- the business/programmatic goals that are affected by those scenarios
- the relevant quality attributes associated with those scenarios

## Why concentrate on software architecture and quality attributes?

- The software architecture serves as the blueprint for both the system and the project developing it.
- It carries system quality attributes such as performance, modifiability, and security, none of which can be achieved without a unifying architectural vision.
- It provides an artifact for early analysis to make sure that a design approach will yield an acceptable system.
- It enables system developers to identify design risks and mitigate them early in the development process.

For more than two decades, the SEI has been instrumental in the creation and development of the field of software engineering known as *software architecture*.

## About the SEI

The Software Engineering Institute is a research and development center that works with defense and government organizations, industry, and academia to advance the state-of-the-art in software engineering and cybersecurity to benefit public interest. Part of Carnegie Mellon University, the SEI is a national resource in pioneering emerging technologies, cybersecurity, software acquisition, and software lifecycle assurance.

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