

# Quality Attribute Workshop Experiences and Reflections

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development processes, organization, and business aspects.

## Abstract

This presentation will describe the experiences and reflections from three Quality Attribute Workshops for architectural design with three different scopes: evolution, revolution, and new design.

Our conclusion is that the different objectives and different set-ups of the QAW participants and their relation to each other have a direct relation to the outcome of the QAW voting procedure and to the management’s acceptance of the outcome.

## Introduction

ABB, a global leader in power and automation technologies, provides systems that enable utility and industry customers to improve their performance while lowering environmental impact. To that end, ABB must design and implement extensive software systems. Committed to technology leadership, ABB Corporate Research develops technologies for future products and services for ABB’s core businesses.

Industrial Software System complexity has grown in the same pace as the system’s

amount of software has increased. When the features that once were performed by hardware now are replaced by software, the software parts can interact with each other in a way the hardware parts could not. This is used to create additional value. To get a return of investment for both customers and development organization, the system has to be maintained and stay operational for decades, i.e. the system has to become sustainable.

Sustainable development of industrial software systems is a true challenge due to changes in concerns originating from: new technology, new stakeholder needs, new organizations, and new business goals during decades.

Organizational complexity involves many success-critical stakeholders, often located all over the world, who have to reach a consensus around the most important business goals for the system now and in the next future. Sustainable systems has built-in legacy heritage to consider as well as present software architecture and design when introducing new business goals and designing the future architecture.

## Experiences from three Quality Attribute Workshops

The Quality Attribute Workshop (QAW) is a facilitated method that engages system stakeholders early in the life cycle to discover the driving quality attributes of a software-intensive system.

We have hosted three Quality Attribute Workshops with three different companies. In one case the objective was evolution of the existing architecture. In the second case the objective was a revolution of the architecture and in the third case the objective was a new product design.

None of the companies had any previous experience with the QAW or with Quality Attribute Scenarios. The participants got the QAW description well in advance before the workshop and the business objectives presentation was prepared by a higher line manager. The architects prepared the architecture presentation. The workshop participants were selected by the participating companies guided by our advice about who could be the success-critical stakeholders.

In the case of the QAW with the objective of a revolutionary architectural change, the participants knew each other well, since they worked together on a daily basis. The participants had good knowledge of the business driver of the architecture and the outcome of the workshop was accepted. However, the nonexistent experience of quality attribute scenarios or QAWs led the participants to question the use of the outcome from the QAW.

In the case of the QAW with the objective of a large evolution of the architecture, the participants did not know each other that well due to distributed

working locations and distributed management. The result of the QAW was questioned by the upper management that felt the result was not in line with the presented business drivers and that the participants had used the opportunity to air their personal issues around the product. Our conclusion regarding the voting procedure is that it is very tactically performed by the participants and each individual preference is getting high scores instead of optimizing the value for the product as a whole. One possible improvement could be to use a pair-wise comparison on the scenarios using, e.g. AHP. Also, the voting was questioned as the collection of scenarios were on the one hand not perceived as complete but on the other hand assigning 10 points to 31 scenarios was considered arbitrary. Finally, management questioned the results as they were seen as biased by the selection of people attending the QAW.

Another issue that came up in all three QAWs was the issue of legacy requirements. The legacy requirements on performance and reliability were "ignored" during the voicing of scenarios and prioritization. Instead, the participants focused on evolutionary scenarios which they felt should trigger architectural change that supported their personal issues with the product.

The participants also felt that it took them a couple of hours to get into the concept of voicing scenarios just in time to wrap up the workshop. Our experience is that a rather mature organization, where software architecture is an established knowledge, is preferred when

performing a QAW. In one of our cases the participants had difficulties identifying quality attributes, especially in the material provided by product management and/or market function.

## Learner Objectives

The conclusion of the three workshops is that the QAW offers a method that triggers participants to voice personal concerns with the product, resulting in scenarios that can be used by the architect. The reflections we have made are:

1. The QAW needs some kind of "sandboxing" in terms of limiting the scenarios to a certain context. E.g. putting up rules saying that the scenarios must be in line with the business drivers or scenarios in line with the business drivers are prepared and the QAW is limited to the voting on these scenarios only.

2. Bringing together participants not knowing and/or trusting each other can lead to voting results that are not accepted. This could possibly be solved by having a QAW via a web interface. The web interface would offer the participants the opportunity to read up on business drivers and the proposed architecture. Further it could offer the participants the opportunity to describe their role, their scenarios, and to vote in an anonymous fashion.

3. The voting procedure on many scenarios tends to be fragmented, people lose the overview. A potential solution would be to create a utility tree with rating of business relevance and implementation effort instead of applying the regular QAW voting.