

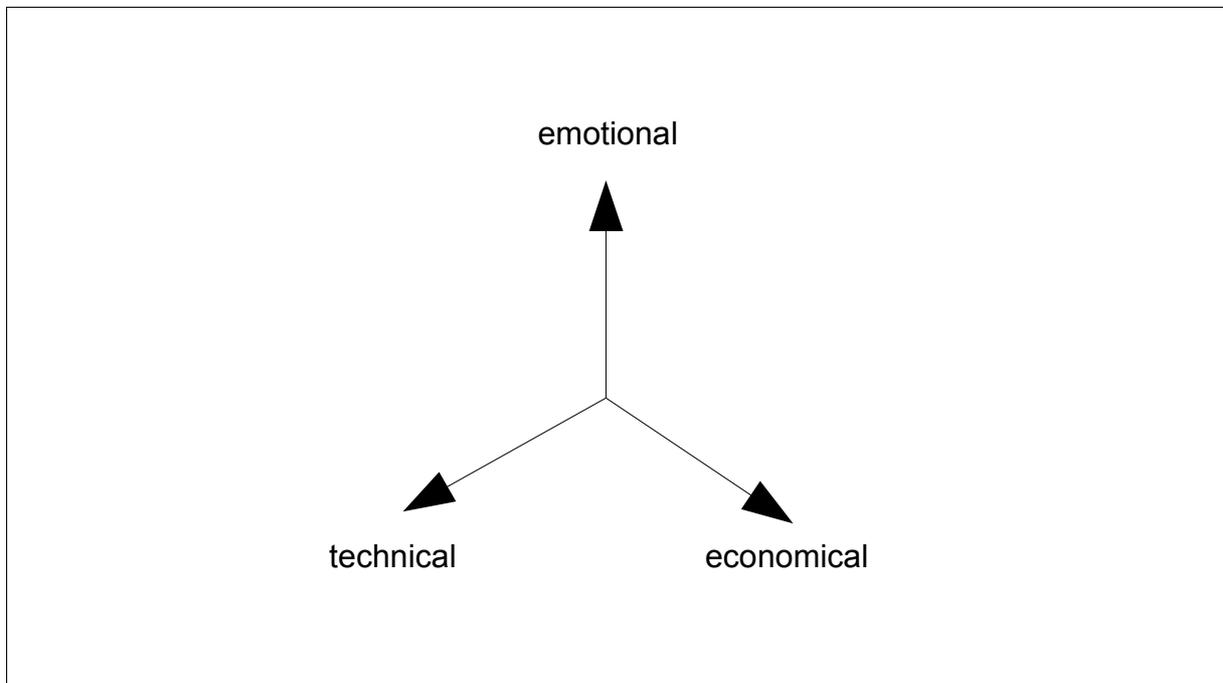
What is Quality?

If you ask people what their idea of quality is, most of the time you will get a boldly stated answer. The boldness reflects the strong believe in their definition of quality. Strange enough, you don't always get the same answer. A lot of times you get answers like „It's quality, when it's the customer, that comes back and not the product.“ But that is not a definition by which one can measure a product quality by looking at it. If you happen to ask an engineer, you may get an answer like “It's quality, if it meets the norms.”. Very rarely you get an economist's reply “It's quality, when the product can be used economically throughout the expected lifetime.” As we see, everyone has a concept of quality, but very rarely a complete one.

If you get the right mix of people together, trying to define what quality is, the conversation may become quite controversial, especially if a salesmen, an engineer and an economist are discussing the matter. Two things can be recognized: First, the definition of quality appears to be dependent on the point of view and second the definition quality is based on multiple aspects.

The Aspects of Quality

Quality is perceived through three aspects:



Quality from an Emotional Point of View

First and foremost quality is perceived as the compliance to our expectations of aesthetic. Is it, from our individual view, attractive? Beyond our perception of look and feel of the product also our emotional reaction plays a role: does it make us feel content, comfortable, secure? The emotional perception of the quality of a product is the fastest that comes to our minds and, if negative, overrules all other perceptions.

It's the emotional aspect of quality when we talk about customer satisfaction and that is because customers hardly ever do a precise evaluation of the technical or economical features of the product they acquired, not even in the professional field.

Consequently all marketing efforts circle around emotional aspect of a product and they make use of any means that helps to convince the customer that the product offered is what they are looking for.

Quality from an Economical Point of View

From an economists perspective, a product has to be, of course, first of all, economic. "Economic" means the cost of its use is below the gain that it creates, thus generating a profit. The economical view is the most radical view. If a product is as cheap as toilet paper and the costs of replacing is the same as the effort to tear a leave from the roll, then an economist will treat it accordingly, replacing it whenever it fails or its lifetime expectation ends.

Quality from a Technical Point of View

The concept of technical quality is easy to understand: the more the technical features of a product comply with the requirements the better the quality. The problem is: these requirements must be known beforehand.

Technical quality is well defined by measurements and norms, though sometimes the technical features of a product cannot be assessed easily, The quality of steel, for instance, requires knowledge of the manufacturing process and trust in the supplier.

The problem with assessing a product by technical means: a lot of times the number of technical aspects, that define the quality of a product is overwhelming. But, even worse, even for a small number of feature it's hard (or simply impossible) to assess the contribution of the individual aspects to the overall quality level of a product in comparison to each other.

Mutual Influences

None of these three aspects is independent from the other two. Any change to one of theses aspects results in a change of the perception of the other. For instance, where a product fails to provide sufficient technical quality it loses also from the viewpoint of economical and emotional perception.

Goals of Quality

To get a better understanding of quality in its three aspects, lets look at the goals we try to reach with quality.

Minimizing Risk

Minimizing risk is the most important of all goals. Intuitively everyone understands the connection between technical features and functional loss. Insufficient dimensioning or selection of materials lead to failure while serving the task. In Germany systematic quality assurance started in the 19th century with trying to avoid casualties that resulted from steam boiler explosions.

Minimizing risk is strongly connected to the emotional aspect of quality, but it is also connected to the economical aspect. Typically risk is avoided by technical redundancy and technical buffering, i.e. all parts of the solution and the machine as a whole has to have a proven technical quality beyond "good enough".

Cost Control

Second to the minimizing of risk, comes cost control. The goal is simple: we do not want to lose our investments due to insufficient quality. In the late 80s of the past century Total Cost of Ownership came into broader knowledge and with it the long term effects of (bad) quality. The connection between costs an quality is less intuitive and requires the observation of both.

Cost control can be in conflict with the emotional aspect of quality as well as the technical. A product that is just good enough from the economical perspective may have an unattractive, because that is where money is

saved. Cost control may be objecting to technical requirements, when e.g. replacing a product is cheaper than buying the more expensive product that lasts longer.

Confidence

At first glance confidence seems to be a purely emotional aspect, but when it becomes part of a go/no-go decision it turns into a factor that has an economical and technical aspect.

Productivity

In the seventies of the past century the success of the Toyota Productivity System demonstrated the power of Total Quality Management in reducing costs and boosting productivity. The influence of quality on production is non-intuitive and therefore it can be hard to convince people to make an effort in quality beyond risk and cost control. Looking at the software products of today, the advantage in productivity that quality brings is yet to be discovered in software development.

Perfection

Perfection is when valuing the emotional and technical aspects of the quality of a product overrule the economical aspect. Perfection is not a quality goal, perfection is a business failure.

Quality and Emotions

Is the emotional aspect of quality relevant? Especially engineers tend to consider the emotional aspects of a product as useless, romantic rubbish. What they forget is that we cannot strip our emotion from our rationality. We are only able to convince our emotional side with our reason. Where a product fails to convey confidence it will not last for a long time. On the other side we automatically ascribe anything that has an appealing outer appearance a higher inner quality. And what we find appealing is defined by our individual believe and taste.

The other way around, the quality of a product influences our emotions. Good quality makes us feel content and secure, bad quality irritates and causes anxiety. These emotions in turn have an influence on the economic and technical evaluation of a product. If the feeling is bad we will tend to assume higher costs and less compliance to technical specifications.

The separation of the three aspects of quality is artificial. No-one ponders quality by only one aspect. Especially the emotional perception of quality is always involved. A good technical design gives an engineer a good feeling, so do economical figures to an economist.

Interaction between the Three Aspects of Quality

The following example demonstrates the mutual influence, that the three aspects of quality have on each other.

In an environment of anxiety people tend to be more critical about the quality of a product, especially if it's about their own job. This leads to lower productivity, because better quality requires more effort and more time. On the other side relaxed, self-confident people are easily pleased with their own product. If it does not affect productivity, a self-confident team has a productivity advantage over anxious teams. Winning teams gain confidence and may become more productive in the result. Being too self content, of course, can lead to a drop in quality, which can make them lose the competition due to insufficient quality.

Assessing Quality

What happens when we try to asses quality? What we do is: we collect data and based on these data we come to a conclusion, that we consider to be fundamentally rational. But at a closer look, the outcome of our

evaluation is already influenced by deciding which data to collect. And the influence grows by choosing the weighing of a factor. And these decisions are mostly based on experience – and gut-feeling, i.e. not so rational after all.

All measuring of quality is post mortem. Only the technical aspects of a product can be evaluated beforehand. How good a product actually is, how long it lasts and what costs it causes can only be measured once it is in production. The life time-span can only be determined, when its lifetime is over. Technical features therefore are only indicators, how good a product is and how long it will last.

What is not Quality

Quantity, speed, aesthetics, popularity and price are characteristics of a product that have nothing to do with quality.

Confronted with this list everyone agrees, but think about it: Between a thick and a thin book, which one do you consider to provide more information when that is all the information you have, beside the look of the cover? And don't you let yourself be impressed by the maximum speed of a car you will never be able to drive legally¹? Do you dare to buy an outsider's product just because it's the better deal? And when has it been the last time you have been fooled by the looks of a product? Don't we all assume that something that is higher in price provides better value?

In situations of insufficient knowledge we turn, in lack of alternatives, to the wrong perception of quality for evaluating products. This happens all the time throughout our everyday live and work.

Quality and Software Testing

Just as software differs in its nature from traditional products, it also differs when it comes to quality and quality assurance. For software testing is the main measure for assuring quality. But testing evaluates the quality of a product at the end of manufacturing process, which, for non-software products, leaves only limited possibilities to remedy any defect detected. But as software can be fixed much easier than traditional products it has become an accepted method to improve software in its quality. Nevertheless it is still post mortem and that is why it does not provide an advantage to the productivity of the software development process. To make quality assurance in software development a productive advantage requires turning to quality assurance methods, that improve quality during or before the act of software-engineering. This will be the challenge for the future of software development methodologies.

1 Except in Germany