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Happy Balance in the Search for Quality

Juste milieu dans la poursuite de la qualité

Gleichgewicht im Streben nach Qualität

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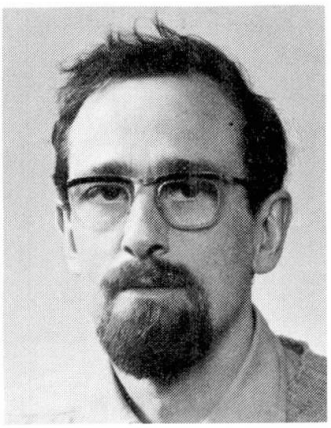

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SUMMARY

The importance of a clarification of terms, and of an appropriate application of quality assurance measures is emphasized. A direction is suggested for research to take, comparable to methods used in medical science.

RESUME

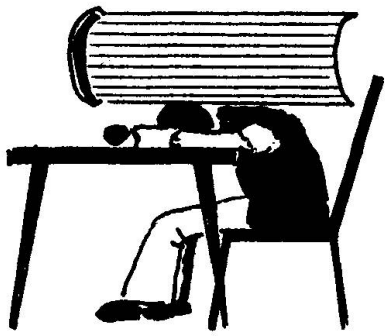
L'article souligne l'importance d'une clarification de la terminologie dans la planification de la qualité et la nécessité d'appliquer les mesures de contrôle en fonction des cas particuliers. Une direction est suggérée pour la recherche, comparable aux méthodes employées en médecine.

ZUSAMMENFASSUNG

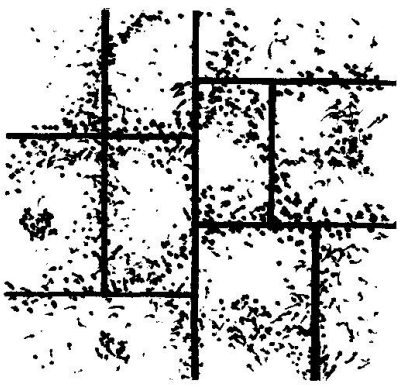
Der Aufsatz erklärt, wie wichtig es ist, eine klare Terminologie für die Qualitätssicherung zu finden. Von ebenso grosser Wichtigkeit ist eine angemessene Anwendung der Qualitätssicherungsmethoden. Für die Forschung wird eine Methodik vorgeschlagen, die sich mit derjenigen der medizinischen Wissenschaft vergleichen lässt.

Much effort has been spent on clarifying the logical structure of the quality problem, using various methods. The common result of this has been that ways were found to formalize, in terms of a classification of ingredients, in the sense of a checklist, or in formalized logic. It would appear then that research is ready to commence on the basic structure of the quality problem as we all perceive it, more or less clearly, in order to come up with commonly accepted models and a rudimentary vocabulary on the subject which would then be used by everybody.

The quality problem of structures has received the highest degree of attention in the context of nuclear power plants because, and perhaps rightly so, the public is extremely apprehensive about the consequences of failures of any kind. In this context therefore, in every country producing such products, a special effort has spearheaded quality assurance programmes usually ending up in a great deal of regulations and procedures, sometimes to the degree of becoming counterproductive. My pet example for this is the drawing that I have seen going out of the design office, bearing 35 signatures of people somehow involved with the process of making, issuing and checking this drawing. I know - my own signature was one of them - that the thought must have taken root in the minds of these people because it did in mine, that nothing could go wrong after so many had apparently checked it. Something did go wrong just de same: there was so much reinforcing steel shown on the drawing that it was impossible to place it all, and somebody on the site had to make the decision by himself to do something else.

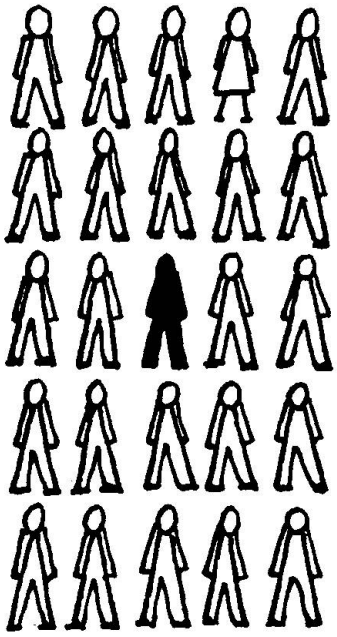


I also remember the rulebook about the quality assurance, it was a weighty document the production of which had cost a fortune, but which was not really read by the people doing the work, as procedures demanded were so cumbersome that they would have obstructed production. Shortcuts are of course the answer in any such case, which largely invalidate all the good effort which went into the quality assurance. As usual, the extreme is not the right place to look for the optimum, and those who burden themselves with too much weighty luggage of regulations and procedures may never reach their destination. The same line of thought has recently been brought up in the context of Codes and Standards which have become a nearly infinite jungle of prescriptions. I am sitting in two Code Committees and I have yet to see us make a Code shorther rather than longer everytime we touch it. I am also working as a practising engineer and I know what happens next: People are becoming confused and tend to ignore the Code, substituting it with their judgement or traditional "knowledge".

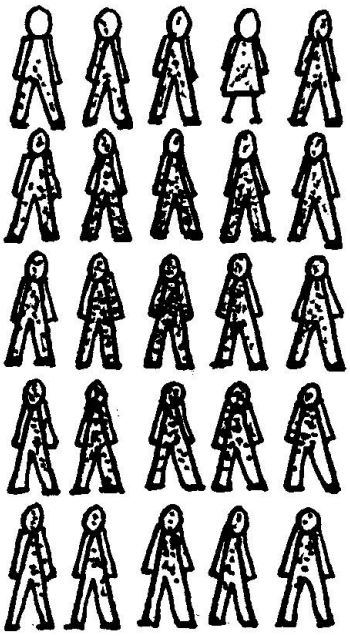


For the practising engineer who wants to stay in business, quality assurance is and has always been, a task to be performed on the basis of common sense, and within the limited resources of time, mind, energy and money he was able to put into it. The concepts we are discussing here such as hazard scenarios, weak points, checking, control etc. are all more or less consciously known and used in the everyday building process, and we have heard many suggestions that this is being done to a satisfactory or even surprizingly high degree of success. The difficulties start of course where we are trying to clearly define these concepts which are flexible and fuzzy by their nature, and to cast them into a system of sharply defined

rules and methods. In order to demonstrate methods and relationships, we are invariably using the most simplified and trivial cases which makes it appear as though the methods were perfectly adequate to reflect all of reality. Living in that reality, I cannot escape the suspicion that we are in fact simplifying so much that a great deal of the essence is getting lost in the process.



One instance where this occurs is the typical model we are used to consider in our discussions where one single error or circumstance can be made responsible for the quality problem. In reality, this case is quite rare and our liking for the simple model clearly dates back to the days when we thought that to find the guilty man and to punish him, would solve the problem. Real circumstances are usually quite involved and I have often felt that every participant carries a piece of responsability when something goes wrong. After all, he could have recognized the fault and induced correction, had he only paid enough attention. Where is the error then ? The North American practice of sueing everybody for damages before even trying to determine who is at fault, presumably recognizes this basic uncertainty.



If it is true that reality is more complex than can be reflected by the models and formalized quality assurance procedures we have been able to produce so far, the conclusion appears to be quite clear: Known models and methods may have a great educational value but they cannot yet serve as exclusive replacements for the traditional commonsense approach. Portions only, or particular aspects of the reality of the building process and quality considerations can be rationalized presently and formal methods instituted to cover them. The overall quality assurance however, cannot yet be left to this approach, as it is necessarily incomplete. Especially when looking at gross errors and their characteristics, one is baffled by the great diversity of coordinates they can assume within the building process. Given the fact that the products of construction industry are essentially one of a kind, as opposed to the typically serial manufacturing processes of other industries, it appears quite futile to install detailed procedures for quality assurance with a "one size to fit all" idea in mind. Perhaps the best answer is presently to use formalized quality assurance methods with prudence and to set them up with as little detail and as much flexibility as possible. As always, true optimization results with the middle-of-the-road being recognized as best solution.

We must keep in mind that to replace thinking man with any sort of mechanism, however reliable and sophisticated it may be, will inevitably produce results in kind, i.e. predictable properties and quality - but for the gross errors which by their nature, are quite unpredictable. Mechanical or electronic devices, preplanned and regulated procedures, and even man himself when he operates within a rigidly preset functional frame, is much too inflexible to effectively deal with gross errors.

If used by themselves, without involvement of motivated and informed people, formalized methods will tend to spend much effort on trivial or unnecessary matters while missing the gross error, just because it happens not to fit any of the categories listed in the programme.

Similar thoughts apply to the use and state of the (partial) models available today for the analysis of quality. All are representing certain aspects of the building process, or of error history, like when one looks at a complex geometric body from different angles. Until the time, when a complete model becomes available if ever, integrating all aspects and

correlations if ever, present day models can only be used in conjunction with informal experience and commonsense..

The analysis of data such as failure accounts may eventually have to proceed much along the extremely empirical methods commonly used for instance in medical science. In that field, complex scenarios including many ingredients which are not well known at all, are related to therapeutical measures which have been studied with heavy emphasis on the phenomenological aspects, because truly causal links are difficult to establish.

It was suggested earlier that the building process is quite comparable to a living organism, the final detailed analysis of which will forever escape us. This does not mean that we cannot find means even now to correct its ills and help it along, much like the doctor is doing when he persuades me to take these pink tablets so that my body will somehow receive the message that it should stop the particular ailment it bothered me with. It will, as we all know, in due course find another way to malfunction, sometimes quite related to the pink tablets which suggests that we might be well advised to use some caution when introducing miracle medication to the construction process, for example in the form of formalized control procedures which if overdone, may kill creative work.