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## Checklist for the Reliable Performance of Tasks

Liste de contrôle pour l'exécution correcte de missions

Checkliste für die zuverlässige Durchführung von Aufgaben

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## SUMMARY

The adaptable and weighted checklist for the reliable performance of tasks reflects the present experience. Especially the human factor was considered which plays an important role in the renewing and widening of knowledge, in the information and communication between the participants in a task and in the motivation of coworkers. The checklist is an open one, i.e. it must be adjusted in any case by the responsible manager to the actual situation. However it provides the necessary basic knowledge for everybody responsible for the performance of a task.

## RESUME

La "liste de contrôle" de l'exécution correcte de différentes mesures à prendre pendant la construction, reflète les expériences actuelles. En particulier, le rôle essentiel de l'homme dans le processus de construction est considéré. L'importance de l'homme porte sur la mise à jour et la communication des connaissances, le transfert des informations et la motivation des collaborateurs. La liste de contrôle présentée, tout en restant ouverte, doit être adaptée aux conditions particulières de chaque situation particulière; elle fournit aux responsables d'une mission une aide précieuse dans la définition des activités appropriées pendant l'exécution d'un ouvrage.

## ZUSAMMENFASSUNG

Die anpassbare und gewichtete Checkliste für die zuverlässige Durchführung von Aufgaben spiegelt die gegenwärtigen Erfahrungen wider. Besonders berücksichtigt wurde der Faktor Mensch, der bei der Auffrischung und Erweiterung von Kenntnissen, bei der Information und Kommunikation zwischen den an einer Aufgabe Beteiligten und bei der Motivation der Mitarbeiter eine wesentliche Rolle spielt. Die Checkliste ist offen, d.h. sie muss von dem Verantwortlichen in jedem Falle an die jeweilige Situation angepasst werden. Sie liefert jedoch dem für die Durchführung einer Aufgabe Verantwortlichen ein hilfreiches Basis-Wissen.



## 1. INTRODUCTION

According to the published results of Matousek, Schneider and other authors, Fig. 1 delineates the present situation in the concept of safety in the construction field [1]. In the weak element of the chain you will find terms all concerned with the human factor.

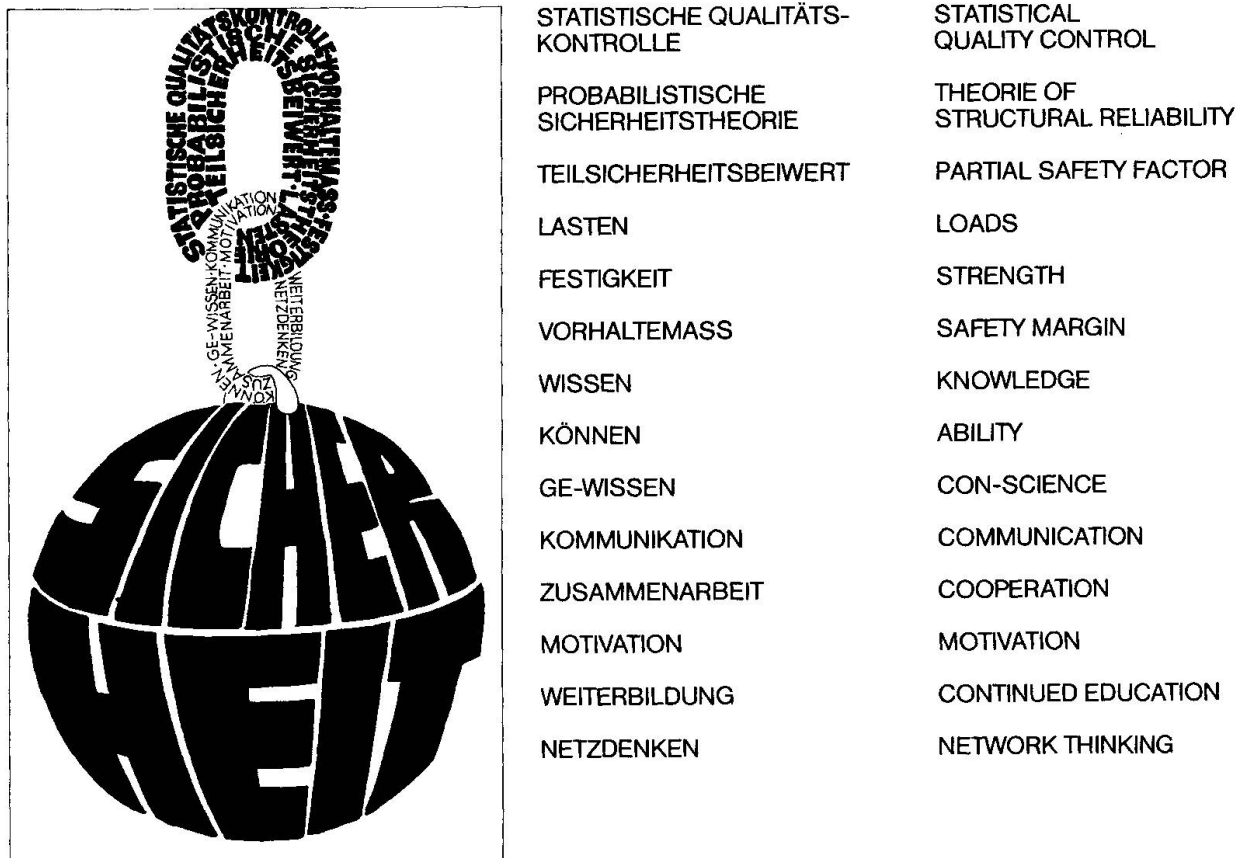


Fig. 1 Present situation in the concept of structural safety.

What can we do with respect to the weak element of the chain?

The complex of questions of safety, of a general concept of safety, and of quality assurance does not only affect the building construction but the whole range of human activities (e.g. air-traffic, nuclear technique, off-shore-platforms, medicine, EDP-software a.s.o.). These questions can be attributed to the basic question for the reliable performance of tasks.

In many areas of human activity strategies and methods were developed to perform tasks in a reliable manner. Because tasks are always planned and performed by men the human being is in principle the most important factor in the reliable performance of tasks.

It is not sufficient to detect human gross errors but we have to avoid them by using all possible means, at least we have to reduce them.

The basis of any decision of a man is the most appropriate definition of the actual situation and the appraisal of the further development. The engineer uses his acquired logical thinking (in general that means: Linear thinking: Each cause produces one effect and vice versa).



Today more and more we become aware that logical thinking is absolutely necessary indeed but in no case a sufficient means to grasp the situation. Albert Einstein said: "Imagination is more important than the knowledge". We have to apply our imagination in order to think in networks and with their support we can more comprehend the situation (Network thinking, that means: Each cause produces many effects and vice versa). Of course also then remains a rest of uncertainty - but small - which cannot be excluded.

Making aware the basic elements for the reliable performance of tasks the engineer and manager shall be motivated and encouraged to rely not only on his knowledge but also on his conscience in solving reliable his tasks. F. Nietzsche says: "To make aware is already progress".

The following "Checklist for the reliable performance of tasks" is a so called "Open Checklist" (Fig. 2). It shall only inform the responsible man for the performance of a task by means of questions about the current knowledge of influencing factors and their weight in a clearly arranged form and with adaptable intensity. Then he himself has to decide how he will perform his task with this knowledge as a con-scienti-ous engineer or manager.

The form of a checklist was chosen because this checklist is adaptable in the best way to the individual knowledge, to the experience and to requirements of the reader by the intensity of its questions.

The very concise form of the Checklist will be introduced by some preliminary remarks and supplemented by some explanations.

## 2. PRELIMINARY REMAKRS TO THE CHECKLIST

The framed questions 1 through 6 of this Checklist show the essential influencing factors in the reliable performance of tasks. According to the situation and if the expenditure seems sensible also the respective sub-questions can be consulted resp. complemented or extended.

In case of a positive response to the respective questions by the responsible man for the performance he will become conscious by an iterative process of the essential influencing factors for the reliable performance of the task. By this fact the most important pre-requisite is given for a creative, to the situation adapted and therefore reliable solution of the task.

Certainly this Checklist cannot substitute the experienced expert or manager. But it can in the right moment provide helpful experiences in a clearly arranged form. It can sharpen the managers conscience.

Naturally the individual expenditure for the reliable performance of tasks will vary within wide limits: From the quickly only intuitive found solution to systematical well weighed work preparation. However experience teaches us that bigger tasks cannot be reliable performed without systematical preparation, especially because of the unavoidable division of labour.

Many of the possible solutions which are expressed in the questions seem at the first glance as obvious. But that does not mean that they are consciously and systematically applied.

The numbers in the circle  refer to the explanations.

# Adaptable<sup>①</sup> and weighted<sup>②</sup> Checklist<sup>③</sup> for the reliable performance of tasks

by Dr.-Ing. Hans Blaut, Munich, May 1983

$$T = m \times k^2 \times i^3 \times a^x$$

1.

Has the task resp. performance in the sense of a vision been clearly described and defined? <sup>④</sup>

Have there been made statements about the following details of the task...

- 1a about the aim?
- 1b about the scope?
- 1c about the structure?
- 1d about the requirements?
- 1e about the time span?
- 1f about the cost frame?
- 1g about the starting situation?
- 1h about the consequences to third parties? <sup>⑧</sup>

2.

Has there been found and compiled in a work plan for the solution of the task...

- the required means?
- the required co-workers?
- the required measures (know-how)? <sup>⑤ ②⑤</sup>

Have hereby been...

- 2a evaluated own experiences?
- 2b evaluated outside experiences? <sup>⑨</sup>
- 2c conducted a Fault Tree Analysis? <sup>⑩</sup>
- 2d conducted an Event Tree Analysis? <sup>⑪</sup>
- 2e conducted a use analysis (Wertanalyse)? <sup>⑫</sup>
- 2f searched for creative solutions (e.g. by applying creativity techniques)? <sup>⑬</sup>

3.

Have there been supplied, with view to the aim and in due time, the required means and co-workers? <sup>②⑤</sup>

- 3a Has there been worked out a network (CPM, PERT) for time and cost?
- 3b Has there been organized a Quality Assurance System and Quality Assurance Manual? <sup>⑭</sup>

4.

Have there been taken the required measures in view of the aim and in due time? <sup>②⑤</sup>

- 4a Has there been worked out a network (CMP, PERT) for time and cost?
- 4b Has there been organized a Quality Assurance System and Quality Assurance Manual? <sup>⑭</sup>

5.

Is the necessary information and communication guaranteed between all participants involved in the task? <sup>⑥</sup>

- 5a Have all participants a clear, impressing description of the aim (vision)?
- 5b Had the participating persons the opportunity to get to know each other in their work and personally? <sup>⑮</sup>
- 5c Had the participating persons the opportunity to add their own ideas for solving the task? <sup>⑯</sup>
- 5d Were the various partial tasks and the appertaining competences assigned to the participating persons? <sup>⑰</sup>
- 5e Are there distributed frequently to the participants news about the situation of solving the task? <sup>⑱</sup>
- 5f Do the participants regularly receive a confirmation about their work and also, if necessary, constructive critics? <sup>⑲</sup>
- 5g Have all participants received a feed-back on the results achieved? <sup>⑳</sup>

6.

Were all participants in the task challenged by motivation in the ambition to perform the task in any case also in case of resistances? <sup>⑦</sup>

- 6a Were to co-workers selected according to talent, education and experience in view of the task? <sup>㉑</sup>
- 6b Were and will be the immediate and real needs of the participants observed? (Needs-pyramide of Maslow; Motivators and Maintenance factors of Herzberg) <sup>㉒</sup>
- 6c Are the co-workers led to events of success by their immediate superior? <sup>㉓</sup>
- 6d Gives the responsible man for the overall performance a good example for his co-workers? (possibly a fascinating example) <sup>㉔</sup>
- 6e Has the responsible for the performance of the task made provision for his own that he is motivated again and again for the task, especially in critical situations?

Fig. 2

### 3. EXPLANATIONS TO THE CHECKLIST

- ① The contents of the Checklist can be adapted as the circumstances may require. However, the six framed questions represent the heart of the matter.
- ② The questions of this Checklist were weighted by the influencing factors which are summarized in a formula. This formula cannot be interpreted as a pure mathematic formula but shall only show the weights of the influencing factors in the language of the engineer.
- ③ The form of the Checklist is especially appropriate to make conscious experiences in a concise and clearly arranged form. Furthermore, the questions produce associations and stimulate the creativity.

- ④ The precise and impressive description of the task supports the concentration of all forces and stimulates the finding of solutions.

- ⑤ The question about the means and about the know-how (measures) works like a wedge which divides the block of tasks in two essential parts. Since the know-how is more important than the material means,  $k^2$  was chosen; because the right know-how gives so much flexibility that one can find a good solution also with "unsure" means.

The engineer deals during his education and in his work mostly with influencing factors  $m$  and  $k^2$  but less with the factors  $i^3$  and  $a^x$ .

- ⑥ The information and communication between all persons participating in the task were weighted symbolically with power cube because the factor "information and communication" and the herewith related organization plays a main role in the frame of the work division nowadays.

Many engineers do not always realize the importance of the influencing factor  $i^3$ .

- ⑦ The factor  $a^x$  shows the ambition for the performance of the task. The exponent  $x$  can be both a positive or negative number. Thus it shall be expressed symbolically the decisive weight of this factor. A negative  $x$  would reduce much the factor  $a^x$  and therefore also the overall performance; Demotivation can block the contribution of other influencing factors for the performance.

On the other hand a positive  $x$  can compensate imperfections in other influencing factors.

- ⑧ During the past years engineers experienced that the performance of their tasks (e.g. construction of a power station or of a incineration plant) was hampered resolutely by initiatives of citizens or even frustrated.

While defining the task the reaction of the affected persons has to be taken into consideration.

- ⑨ There is no doubt that solutions of tasks are always newly invented with great efforts because the engineers do not find it worthwhile to search for already existing and published solutions and do not profit of them.

With the help of literature data files it could be solved very quickly.

- ⑩ A Fault Tree Analysis points out qualitatively the net of possible reasons for a defined undesirable event (fault); refer to DIN 25424, part 1.

- ⑪ An Event Tree Analysis points out qualitatively the net of all consequences of a defined undesirable event.



- ⑫ The Use Analysis (Wertanalyse) is a method to improve the use. This method is characterized by the fact that by applying a systematic manner there will be achieved with great probability and without detours an optimal solution which meets the latest status of knowledge and the specific requirements. Reference is made to DIN 69 910, Wertanalyse - Begriffe, Methode. Berlin 1973 or VDI-Taschenbuch T 35: Wertanalyse: Idee, Methode, System. An introduction by the VDI-Gemeinschaftsausschuß "Wertanalyse", Düsseldorf 1975.
- ⑬ The most known creativity techniques are Brainstorming, Brainwriting, Synectic, Morphological Box (Zwicky).
- ⑭ Please refer to standards for quality assurance (e.g. DIN 55 355 or KTA 1401 or SN 029100).
- ⑮ If co-workers are personally acquainted the cooperation is generally more fruitful.
- ⑯ The personal engagement of the participating persons grows if they can add their own ideas.
- ⑰ This item refers to a good organization.
- ⑱ This information is very important for the personal engagement.
- ⑲ Every man needs an acknowledgement from time to time that he is on the right way with his work, especially because of the always more complicated division of work nowadays.
- ⑳ The selection of the right co-workers has to be rated very high. The co-worker should be in possession of the most important required attributes. A specific further development is possible but many times very time consuming and costly. Therefore, the own initiative for further development, arising from good motivation, gains importance.
- ㉑ Today the findings of Maslow and Herzberg belong to the standard knowledge of leading staff.  
Lit: Malsow, A.H.: Motivation and Personality, New York, 1970; Herberg, F.: Work and Nature of Man, Cleveland, USA, 1966.
- ㉒ This is the most important task of a good superior. Only by the success of his co-workers the superior himself can be successful.
- ㉓ The example of the superior is the best way to motivate a co-worker. That is more effective than many words.
- ㉔ Because of the unavoidable division of labour it is very important that all participants personally take part of the success of the whole task at least by information.
- ㉕ Naturally the manager responsible for the reliable performance of task has to check all means and measures, not matter whether they are provided by the own organisation or by cooperating organisations.

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