

QUO VADIS QUALITY ASSURANCE?

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The PROSCAN project continued to develop successfully during 2004. The highlight of the year was the delivery and the commencement of the commissioning phase for the cyclotron COMET. The quality assurance activities will contribute to the success of the overall project. With a comparison to industrial quality assurance we would like to point out by which measures the quality can be planned and secured in this advanced project stage.

INTRODUCTION

"Quality exists, when the price is long forgotten!"

With these words, F.H. Royce, joint founder of the traditional carmaker Rolls Royce, is often quoted. In fact, Rolls Royce was almost for a whole century the worldwide epitome for legendary quality and reliability. But what has a Rolls Royce to do with PROSCAN? What is quality actually? And who within PROSCAN is responsible for this quality?

The answer to such or similar questions becomes more understandable looking at the background of the historical development of quality management.

HISTORICAL DEVELOPMENT OF QUALITY MANAGEMENT

Along general lines, three substantial episodes can be recognised in the historical development of industrial quality management.

1. Quality Control

Initially, quality was "in-controlled" by segregating incorrect parts at the end of a production chain. Thus not only defective production parts ended as junk on the scrap iron, but in addition the (expensive) production machines were unnecessarily occupied with defective parts from pre-processes (double cost-intensive). A quality improvement could only be achieved with intensification of the test depth, or by restricting tolerances. Quality was not quality in the today's sense, but was confounded with precision.

This precision is laborious and expensive. Therefore, the vehement resistance against the philosophy of modern quality management can be understood [1]:

- "we have been doing it this way for the last 30 years"
- „we are a research institute, not an industrial company“
- „we have no time for documentation“
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2. Quality Assurance (QA)

Very soon, it was recognised that one walked into a dead end with this laborious and expensive methodology. Thus, already in the 19th century one tried to regulate the "Quality" of a production with statistical methods. The goal was to recognise erroneous trends already at an early stage, in order to intervene before too many incorrect parts were produced. In this way, not only was the product itself

qualified, but also its production methods and processes with all their influencing variables. With the success that not only the rejection rate was drastically reduced but that it also produced a pleasant side effect: With the increasing understanding of the production methods and the resulting transparency, the processes also became statistically controllable. Using this basis, it was then also possible to meet quality forecasts. If a process worked so far with the quality "A", it will do it also in the future, if the ambient conditions are the same.

3. Quality Management Systems (QMS)

Starting from the previous error discovery procedures, systematic methods for error avoidance were developed, which were already applied before beginning the production. Quality is planned in advance. Thereby, measures for error avoidance have priority and not the additional elimination of errors. It applies the principle: One has not to look for or to eliminate errors, which cannot be made.

Since the 90's, the quality thinking is regarded more and more in a holistic way. A product is not only being developed in-house, but in close co-operation with the customers. Likewise, the suppliers are integrated into the company-owned processes. The entrepreneur is endeavoured to enable his customer to be successful.

Furthermore, demands of environmental and industrial safety are integrated more closely into the internal processes; new "integrated management systems" develop. Due to its cross-linking in the entire enterprise, Quality work increasingly becomes a top-priority case. This is also obvious from chapter five of the standard ISO 9000: "the responsibility of the leadership". Here, the permanent obligation of the top management to quality, including the demand for continuous improvement, is described.

TRENDS AND FUTURE

In Switzerland, not only industrial enterprises are developing integrated quality management systems. More and more hospitals, local administrations and service enterprises are also focussing on the advantages of a transparent management system. As an example, a quality prize was awarded to the regional hospital in Locarno in 2003. The SUVA even won the "European Quality Award"; in the year before, it was a dental practice that won. Furthermore, the ETH in Zurich undertakes efforts to compile the basis for a QMS, particularly within the IT division.

Why not also a large-scale project in a research institute?

What is Quality actually?

The term "Quality" not only describes a high value in the sense of "top Quality". In America, it is characterised as "Fitness for use". Quality is the ability to "fulfil fixed and preconditioned demands of the customer", over the entire product life cycle: From the idea, over development and realisation, up to the scrapping and disposal.

Thus quality is the holistic fulfilment of the customer's expectations!

Who is responsible for Quality in a project?

It is a characteristic of a QMS that quality thinking is expected from each employee in every function or position. Quality is not left to a position or a department, but it is the professional responsibility of every single employee. This stands out in particular with the internal customer / supplier-model, in which every sequencing process is seen as an internal "customer" at operational level; every former process is seen as an internal "supplier".

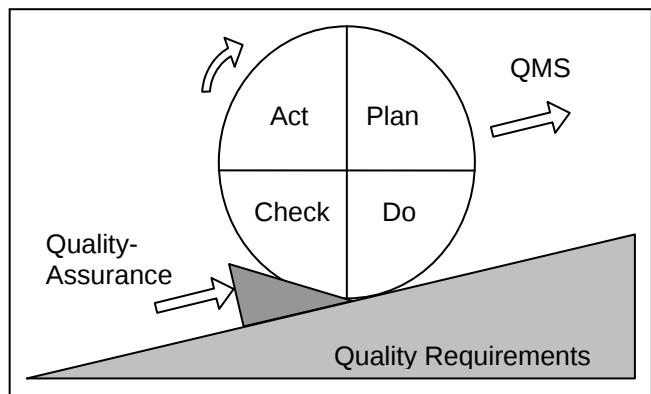
The motivation of the employees receives special attention. The human being as a factor of success is important for quality. The leadership of the superiors is of big importance, assuring the continuous improvement of quality in a special way. With clear objectives, there is enough space for individual initiative. Thereby, the creative possibilities and the special skills of the employees will tap their full potentials.

Quality has always been worked out at the immediate location of service; where the research, development, manufacture and operation take place. There is no domain in an enterprise in which quality plays no roll. From this it follows that the Top-Manager supports exactly to quality in the same way as the developer, the crane operator or the receptionist. Every person is fully responsible for the quality of his own work.

The contradictory correlation between the three critical factors of success of a project, quality, costs, and time, will only be controlled in future, if all employees aim consequently for continuous improvement.

Continuous Improvement

The interrelationship between QA and a QMS is showed in the following picture: The Deming-Wheel, which shows the increasing quality requirements, is pushed upwards on an inclined plane by all employees. With an inadequate QA, the tediously pushed up wheel rolls back. QA contains all organisational and technical measures; the management defines and realise the quality policy and strategy.



Plan = all planning activities

Do = all manufacturing- activities

Check = all verifications

Act = to be understood as continuous improvement, which has to be repeatedly planned, realised and examined in detail.

As an example, the quality requirements are shown. It would also be possible to take the requirements of the legal authorities or of the operational safety.

ACTIONS FOR QA IN THE PROSCAN PROJECT

IQSoft as Centre of Information

For a better management of the versatile tasks described above, there is a need for a tool to manage pending items, including the possibility of finding project relevant information quickly and efficiently. Furthermore, the information has to be recorded and entered in a simple way.

The resulting information and knowledge centre should be applied and distributed project-wide. Everyone with access permission to the system should be able to find the desired information within a few minutes.

Finally, we chose IQSoft from IQS in Zofingen, Switzerland. This software product has also been used successfully at PSI in the radiation protection department.

Documents

IQSoft is able to manage all kind of specifications and resulting test documents in the sense of the ISO 9000. Only the header data are written into the database. The document itself is integrated and reachable with hyperlinks. This has the advantage that the document integration is independent of the format. Even "old" documents could be integrated easily. Furthermore, documents could be linked to machines and equipment, which speed up the search dramatically. For efficient search procedures, a keyword list can be used.

Meeting Minutes

Meeting minutes and resulting issues can also be displayed. From the origination, to the history onto the analysis and release, dataset inputs can be written directly into the database. Therefore, decisions are documented transparently and are traceable, even when the decision process lasts for a long time. The open issues can be printed and mailed automatically to the relevant persons. With some experience, the meeting chairman will be able to write down the minutes during the meeting and mail to the members on the same day. Furthermore, finished tasks can be closed on the actual date without waiting for the next meeting. Software training is planned for the beginning of 2005.

Equipment

The history of equipment like quadrupoles or vacuum valves could be archived in the IQSoft equipment area. Experiences made with the single components could be saved systematically and, if necessary, be opened. All kind of documents (e.g. orderings, test specifications and protocols, manuals, history data, schemata etc.) can also be followed by hyperlinks. IQSoft becomes a central tool for the maintenance staff. Furthermore, even the spare part management could be tracked (begin of 2005).

Logbook

The possibility of using an electronic logbook also exists.

SUMMARY AND PREVIEW

With the acquisition of IQSoft, an important foundation stone for an efficient knowledge and information centre has been laid. The user is guided through the application "along the way", fulfilling the normative requirements. By the consequent use of IQSoft for the described functions, it will establish rapidly.

With further steps such as the recording of processes of all operating departments and the connected definition of the process characteristics, and by composing, implementing and upholding a quality manual, the way leads more and more into the direction of a QMS.

Only through the steps described above can a new culture grow, which will reach into the thinking processes of each and every employee. The initial reservations will decrease and the advantages of an "all included thinking" will rapidly unfold its positive effect.

The quality-philosophy will become established because of a clear management commitment, combined with the innate active support of the quality thinking, and finally the project PROSCAN and the whole institute will win.

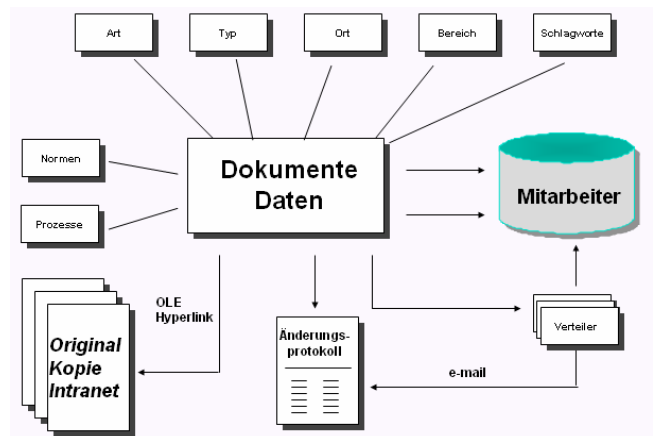


Fig. 1: IQSoft Module Documents and Data.

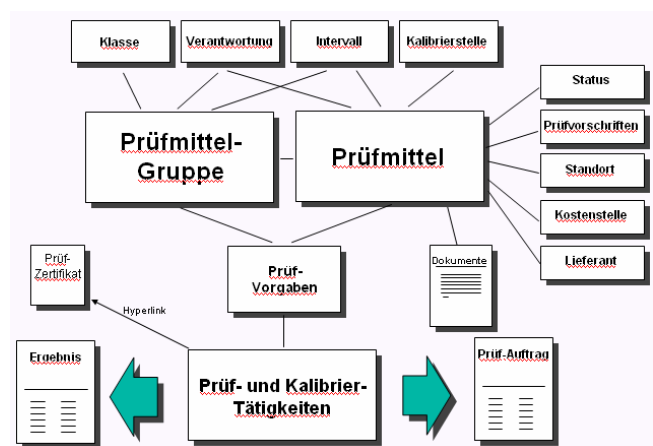


Fig. 2: IQSoft Module Equipment Control.

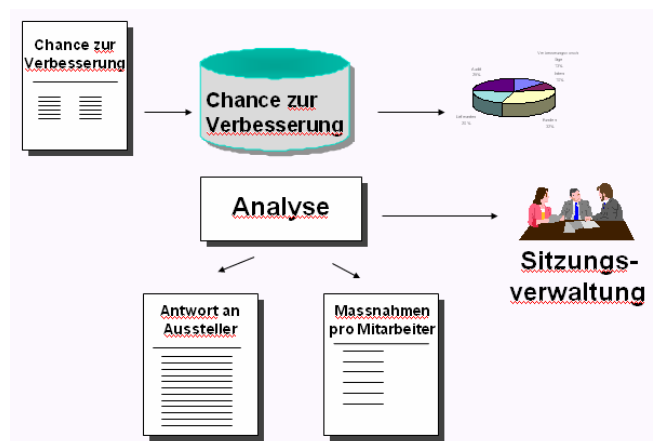


Fig. 3: IQSoft Module Improvement

REFERENCE

- [1] W. Roser, J. Duppich, *Project documentation for PROSCAN – The challenge to collect large amounts of paper and data*, PSI Scientific and Technical Report 2003, Vol. VI.