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NDT TRAINING, CERTIFICATION AND KNOWLEDGE MANAGEMENT – A HOLISTIC APPROACH

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Abstract

The importance of Training and Certification in the field of Non-Destructive Testing (NDT) is too well known to need repetition. An aspect, not so well recognized however, is the need for continued knowledge management of the Trained and Certified NDT personnel, so that the investment made yield the desired results. The field of NDT is fast changing and knowledge up-gradation is an important task. Knowledge of similar work done elsewhere, or even in the same organization some years earlier by other colleagues, is a valuable input, often ignored due to difficult access.

Indian Society for Non-Destructive Testing (ISNT) has taken a number of steps to strengthen the Training and Certification of NDT personnel in the country (and in some cases from overseas too). ISNT also takes care of the need for knowledge up-gradation of the practicing NDT personnel, through 'Journal of Non-Destructive Evaluation', textbooks, handbooks, proceedings of National Seminars, Workshops etc., all of which are valuable aids for knowledge management. But these aids, by their very nature, cannot address the specific needs of personnel in an organization. The organization is thus obliged to provide specific procedures, handbooks etc.

At present, these different resources are independent of each other with little or no integration. The need for an integrated holistic approach for Training, Certification and Knowledge Management is thus acutely felt, especially in large organizations, where job rotation and attrition of personnel due to resignation, retirement etc., brings new people to the old jobs. The need for capturing the knowledge and expertise gained by personnel over a period for the benefit of newcomers (to the job) thus exists.

In this paper, an integrated holistic approach to the development of a software package for knowledge base management system, which integrates NDT TUTOR, NDT EXAMINER and NDT EXPERT, is described. The detailed conceptual specifications of such software, right now 'on the drawing board' are presented. Development of the software is expected to take a few years and will be carried out with the resources made available by the author's organization or by ISNT. The software will be amenable for modification and customization to suit the different organization's needs.

Key Words: *NDT, Training, Certification, Knowledge Management, Holistic Approach, NDT Tutor, NDT Examiner, NDT Expert*

Introduction

Non-Destructive Training is now more than a century old. From the scientist's laboratory, many of the methods have made the all-important transition to the shop floor. So the methods and procedures originally developed by post-graduates and PhDs need now to be used by High School Graduates, Diplomates, or at the most Science Graduates. The area of application of the various NDT Methods ranges from simple to most critical component. The cost of making wrong decisions is thus enormous. The need for proper Training and Certification is thus keenly felt. In addition, the NDT methods and procedures have become so complex that no single individual can ever hope to master all of them. Thus even well trained and certified individuals need periodic refreshers in various topics and will need total training from scratch in new topics.

It is the author's experience, which is shared by several other colleagues that the academic and professional background of the candidates attending the Level I, Level II or Level III courses varies a lot. It is known that many students learn better from an interactive classroom environment compared to reading textbooks. It is also seen that those with theoretical skills face difficulty with practical aspects and vice-versa. With such a mixed setting it becomes difficult for the course director and the individual faculty to bridge the gap effectively. The multi-media NDT SOFTWARE will largely fulfill this need. The students can learn the lessons at their own pace and if needed, at their own place before coming to the formal training course. Those with less exposure to practical aspects will be able to electronically see the equipment, play with the controls and thus get a feel. Those in need of theoretical skills will have the benefit of reading the theory, seeing the explanations of the individual terms, read further background science theory and try a number of questions before they come to the class room.

Conceptual Specifications of Individual Modules

The conceptual specifications of the different modules are given below, so that further inputs from other professionals are obtained. Once these are finalised, the actual nut-and-bolt specifications of the software including the individual menus, front end and back end tools etc. will be finalised in consultation with knowledge management software developers.

NDT TUTOR

This module will be multi-media based, but centered around text. When the cursor is moved over a **highlighted** word (which may be new or difficult), a small balloon pops up giving a concise definition or meaning. If the word is clicked, it opens a hyper-linked dictionary or encyclopedia, which is common to both the NDT TUTOR and NDT EXPERT. Appropriate graphs, photographs, video clips and animation will be triggered to explain the topic. At every stage, there will be a provision for the reader to go forward, backward or jump back to the original place and continue.

The NDT TUTOR will provide for an individual to log-in, and will keep track of the lessons/units completed. It will also provide for self-evaluation by providing a question paper from a question bank. At the end of the test, the software will evaluate the student's performance and will provide feed-back and correct answers (with an analysis of why the chosen answer is not correct).

In organisations which have an intranet, the NDT SOFTWARE can be centrally installed and will allow multiple users to log-in simultaneously, the constraint being the bandwidth restrictions of the network to serve graphics, video clips etc. to the end-user.

NDT TRAINING INSTITUTES can use the NDT TUTOR software supplemented by suitable printed notes and thus maintain uniformity of standards in teaching throughout the country. NCB and ISNT should consider this aspect.

NDT TRAINER - EXAMINER MODULE

The NDT TRAINER - EXAMINER will help the faculty or the examiner to help prepare Timetable, individual lessons or modify the existing lessons. Suitable model questions can be prepared and added so that the candidates using NDT TUTOR module can gauge their understanding of the subject. Additionally questions, to be used for the actual examination can also be generated which can be accessed only by a multi-level password system so that unauthorized access is not possible. Objective questions will be generated for examination purpose whereas a mix of objective and fill in the blank type questions will be used to test the candidate's understanding of the subject.

This module again can be used by the various chapters of ISNT and other accredited NDT Training Institutes and Examiners to prepare Level-I, II and III Question Papers of uniform standard.

NDT EXPERT MODULE

The NDT EXPERT will contain a database of NDT DATA, TABLES, BIBLIOGRAPHY of BOOKS, JOURNALS, PUBLISHED PAPERS, NATIONAL AND INTERNATIONAL STANDARDS, ORGANISATIONAL SPECIFICATIONS AND PROCEDURES, DOCUMENTED EARLIER EXPERIENCES etc., so that as far as possible, the user gets all the required information without searching diverse resources.

The NDT EXPERT will accept queries in simple English language. When a query is typed in a box provided for the purpose, the software will look in the key words and will try to match it with one of the several standard questions, which are answered. Software Development Tools including ARTIFICIAL INTELLIGENCE (AI), NATURAL LANGUAGE PROCESSING (NLP) etc. will be used to this end. The NDT EXPERT will rephrase the original query into a standard form and obtain confirmation from the user that the rephrased query is correct. If it fails in this task, it will do a general search in other NDT sites such as www.ndt.net, www.asnt.org, www.ndtcabin.com, www.ndt-ed.org etc. and present the search results. If the search results fail to come up with a satisfactory solution, the Software Module will prompt the user whether he would like to consult other experts in the field. If the user responds with a YES, the software will automatically send the problem by email to a panel of editors/experts. The solution if possible will thus reach the person asking the question, within a reasonable time.

It is earnestly hoped that the web-site of ISNT will also provide for a discussion forum, chat room, mail the expert etc., so that user's queries can be answered.

CONCLUSION

The need for a holistic approach to NDT Training, Certification and Knowledge Management is brought out. To the best of the author's knowledge, no single software presently exists which can cater to all the needs of a large organisation. So it will be advantageous to develop such software taking the approach outlined above. The software can be so designed that it will be useful for various organisations with minimum modifications. ISNT, it is hoped will support this developmental effort.

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