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Designing Visual Displays and System Models for Safe Reactor Operations Based on the User's Perspective of the System

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Summary Abstract

INTRODUCTION

Most designers are not schooled in the area of human-interaction psychology and therefore tend to rely on the traditional ergonomic aspects of human factors when designing complex human-interactive workstations related to reactor operations. They do not take into account the differences in user information processing behavior and how these behaviors may affect individual and team performance when accessing visual displays or utilizing system models in process and control room areas. Unfortunately, by ignoring the importance of the integration of the user interface at the information process level, the result can be sub-optimization and inherently error- and failure-prone systems.

Therefore, to minimize or eliminate failures in human-interactive systems, it is essential that the designers understand how each user's processing characteristics affects how the user gathers information, and how the user communicates the information to the designer and other users. A different type of approach in achieving this understanding is Neuro Linguistic Programming (NLP).

The material presented in this paper is based on two studies involving the design of visual displays, NLP, and the user's perspective model of a reactor system. The studies involve the methodology known as NLP, and its use in expanding design choices from the user's "model of the world," in the areas of virtual reality, workstation design, team structure, decision and learning style patterns, safety operations, pattern recognition, and much, much more.

NEURO LINGUISTIC PROGRAMMING

NLP is a methodology which entails using a set of specific, easy-to-learn techniques for gathering precise information, assimilating that information into useful patterns, and then using the information toward completion of explicit outcomes or goals. Within the NLP methodology is the representation systems of: *visual, auditory and kinesthetic*, which are the modalities of the strategies with which we use to access and process the information around us internally. By knowing a person's strategy, we understand how a person builds his or her model of the world, and utilize this to realize the needs and comfort parameters of the users to obtain optimum reliability and user performance.

NLP also involves such methods as observing neurologically based responses of the eyes to ongoing stimuli provided by the investigator. Once general patterns can be detected, then more explicit distinctions can be generated which reveal strategies that are outside the normal, conscious awareness of the subject. These strategies can then be utilized in assessing a variety of necessary categories of information with respect to the user's total experience of a system. The means by which the experiential information is gathered is through such techniques as, established **Favored Representational System (FRS), Meta Modeling and Synesthesia**.

Favored Representational System

The favored representational system asserts that many individuals tend to value and use one representational system: *visual, auditory or kinesthetic,* over the others to perform their tasks and operations. This preference is generalized to many different types of tasks, even to those for which the preferred representational system is inappropriate or inadequate.

Meta Model

The meta model is a linguistic tool used for determining whether a person has generalized, deleted or distorted experiences in his or her model of the world. By using the meta model technique, the communicant can replace or repair the deficient communications with more explicit, accurate descriptions that are then used in the construction of the design model of the system being experienced.

Synethesia

Synethesia is the crossover or transfer between the representational systems of visual, auditory and kinesthetic. This technique allows for replacing information (given by the user) in its sharpest most possible form, concise details (that are required for diminished "error free" systems) are gathered and incorporated into a system's model. This endeavor provides the optimum in reliable knowledge that can be extracted from willing users and provides a foundation from which calibration of the paired relationship of language and nonverbal behavioral indicators can be accomplished.

Derived from all these efforts is the expectation of developing a general model that can be applied to the design of visual displays and operations (processes, procedures, etc.) based on the user's perspective model of a system.

STUDIES

The results of the studies conducted characterized specific user comfort parameters, and revealed that though the users may be operating the same system or process, their perceptional model of the system can be vastly different, based on the processing characteristics of the user.

For example, the visually oriented individuals did not favor any specific realm of colors, instead they concerned themselves more with the acuity and resolution (brightness) of the colors being used and colors that were "easy-to-see." Whereas, the auditorily oriented individuals favored "pure" earth-tone colors of yellow, green, blue and orange, and disapproved of colors that were lower levels of saturation, e.g., yellowish-green, greenish-brown, and so forth. Individuals of kinesthetic orientation also leaned towards colors that were earth-tone based and that made them feel bright (happy, soothing, relaxing, etc.), e.g., greens, yellowish-green, light blues.

In describing system models the visually oriented subject related the system in terms of shape, sizes, color, distance, texture, whereas, the auditorily kinesthetic subjects described the system in terms of process. With the use of meta modeling and synethesia, a "picture form" was extracted from these latter individuals.

CONCLUSION

What has been found from these studies is that by using the user's comfort parameters, more positive outcomes will be attained in the areas of (1) shorter learning curves in the use of newly developed visual displays, (b) less frustration and resistance by the user in accessing and utilizing displays, procedures, etc., (c) realization of the elimination of (or less emphasis on) **adaptability** from the user will guarantee that the designer will obtain more reliable and precise information from the user at the conceptual stage of the design model, and (d) that the user can be asked to describe in detail his experience of a model in which all deletions, distortions and generalizations are filled in or explained using NLP.

In the end, whether developing visual displays, system models, safety procedures, or process controls, the designer needs to be aware of the different impacts the three basic neurological inputs have on the way people access and process information around them.