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"HUMAN ERROR" VS. "HUMAN NATURE"

Just as one should take human physical, physiological, and psychological factor strengths and limitations into account during the design process, one should also take human factor strengths and limitations into account when assessing the contribution of the "human element" in accident analysis. One must distinguish between the concepts of "human error" and "human nature." Human nature is the "given" and relatively unchangeable part of humanness. Human error can only be a valid concept under certain specific conditions.

This concept is at the core of human factors engineering. It recognizes that humans are complex creatures having not only a wide range of capabilities but also a corresponding wide range of limitations. Humans are bound by specific innate characteristics that are not subject to significant change, which dictate specific behavior under particular circumstances. Such behavior must be considered as part of human nature and not mislabeled as human error.

"Human error" may result from a combination of *human nature*, random error, *design induced human error*, and *true human error*.

"Human Error" vs. "Random Error"

True human error must be distinguished from "random error," a type of error related to "human nature." Random errors committed by system operators are non-predictable by both system designers and operators. An example of a random error would be the reflex action that causes a wrong control to be activated as the result of an unexpected mosquito bite (Hammer, 1991). Random errors can also involve improbable but "normal" extremes of human variation. For example, even persons who are well trained and have repeatedly used a well-designed system will occasionally make inadvertent errors related to rare and unintended (and uncontrollable) variations in required hand-eye coordination.

"Human Error" vs. "Design Induced Human Error"

"A major cause of [human] error is the error built in to the system during its development by inappropriate design practices" (Meister, 1971). An axiom of human factors engineering states that, "How a system is designed will dictate how it can and will be used." True human error must be distinguished from "design induced human error" where some (engineering or administrative) aspect of the system design (such as a lack of safety features, the presence of reasonably anticipated operator distraction or overload, or the presence of excessive or contradictory system demands) predisposes such error; that is, where the system operator is "set up" to make the error by some design aspect of the system. Such "errors," if they can rightfully be called errors at all, are predictable and therefore preventable through re-design. Design induced human errors can be viewed as procedural deviations that reasonable foresight should have anticipated as likely to occur under the design conditions created by system designers or managers. Reasonably discoverable foreknowledge that such errors might potentially occur implies a primary responsibility for such errors by those who failed to reasonably foresee them to the extent that such error could have been eliminated or minimized at the design (or administrative planning) stage of system development.

True Human Error

Although human error can be simply defined as "any person's actions that are inconsistent with established behavioral patterns considered to be normal or that differ from prescribed procedures" (Hammer, 1991), if culpability is to be assigned to such error, the "established behavioral patterns" (considered "normal" by whom?) and "prescribed procedures" must be reasonable under the circumstances.

True human error is most properly defined as an action that would not have been committed (or an action that would not have been omitted) by ordinary, reasonably prudent persons under the same or similar circumstances, while taking common human factor limitations into account, and after eliminating other forms of "human error" from consideration.

True human error may be error that is deemed to be inconsistent with well established behavioral patterns or that differs from well established prescribed procedures after (a) it has been determined that system designers or managers did not fail to reasonably anticipate or foresee such (or similar) error, (b) the system in which the error takes place has been designed to minimize such errors, and (c) persons involved are well informed (properly and adequately trained). Such training must include not only an understanding of the full nature (consequences) of potential errors and the proper procedure to avoid them, but it must also assure the system demands imposed on such persons that might detract from correct performance have also been taken into account and eliminated, or at least minimized and deemed acceptable by applying all readily available safety or human factors engineering or administrative means. Otherwise, such distractions or system features that fall short of reasonable system design or administrative standards must be recognized as mitigating factors to the designation of true human error.

True human error can only be said to occur when the system in which it takes place has been well engineered (according to the basic principles and reasonable application of safety engineering and human factors engineering) and the demands imposed on adequately trained system operators are realistic in relation to human factor (human nature) capabilities and limitations of such persons. Only under such circumstances is the system operator truly free to choose his or her actions.

One method that can be useful to distinguish between true human error and other forms of alleged human error is to ask this question: If a thousand reasonably prudent persons were placed in the same or similar circumstances, would a significant number make the same or similar error? If so, one's search for causation must go beyond the apparent identification of simple human error.

"Dynamic" vs. "Static" Human Error

"Static" human error can be thought of as error that occurs under relatively quiescent conditions; that is, it is error made while one has almost unlimited time to focus on an issue with relatively little distraction. It is, in effect, error made while having time to "put your feet up on your desk" and contemplate.

"Dynamic" human error, on the other hand, is error made "in an instant" when related conditions or activities involve significant complexity and distraction. That is, dynamic human error is error made in "the heat of battle" or while engaged in some form of dynamic activity.

"Primary" Human Error vs.
"Incidental" Human Error

"Primary" human error can be thought of as error made by those who have a primary assigned or special responsibility and the special expertise to focus on the subject matter of the error. An "incidental" human error, in contrast, is error made by those who have a secondary or oversight responsibility or lack the special expertise to focus on the same issue.

Thus, a "primary" error made by a professional, if made by a layman, would be an "incidental" error; a "primary" error made by a "teacher," if made by a student, would be an "incidental" error; a "primary" error made by top management regarding the establishment of adequate work procedures, if made by a worker in the absence of such established procedures and adequate training, would be an "incidental" error; and failure to incorporate a safety feature into a particular system design would be a "primary" error on the part of the system designer, while not being able to compensate for or cope with the lack of such a safety feature on the part of a system operator, would at best be called an "incidental" error.

Select References

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