



To test or not to test - that is the question...

However, is this really a **question**?
When asking multiple people you will get multiple answers. ...



THESE RANGE FROM “Of course we do have to test and we have to test everything! How can we assure safe operation if we have not tested it,” to “Only test high risk scenarios”.

There seems to be an agreement though that testing serves a purpose and can help avoid safety and operational risks. So it is not so much the question of testing or not. It is the definition of what to test and how to test it. This is where the opinions quickly start to vary.

When using numerical systems, one of the most important things to consider is the quality of the software, as this highly impacts the quality and the performance of the equipment.

The quality of the hardware is of course also important but we seem to have this under control as many good practices and standards exist to verify the quality of hardware.

When looking at software there is the issue of software “bugs”. As a Mr. Dykstra once said, “If debugging is the process of removing bugs, then programming must be the process of putting them in”. It is an illusion to think that “bug



free” software exists and this is a good reason for testing.

Also how to guarantee the correctness of software is an issue. For simple software applications this may be achievable, but as soon as software becomes more complex this becomes virtually impossible. Therefore it is common practice to verify the quality and behavior of numerical components in order to determine the risk levels associated with the use of the specific product or in other words to test the product.

Software testing can be defined as an empirical investigation conducted to provide information

about the quality of the system under test, with respect to the context in which it is intended to operate and with the intent of finding software bugs.

Personally, I like to see testing as an insurance policy against unacceptable risks. In the same way as we look at insurance policies, I believe that one should only get insurances for risks one cannot afford, or in other words we should only test what is necessary and try to avoid testing for the sake of testing as this can create a false sense of quality and assessed risks.

Every software product has a target audience. Therefore, when developing a software product, we must assess whether the software product will be acceptable to its end users, its target audience, its purchasers, and other stakeholders.

Testing is the process of attempting to make this assessment and therefore provides us with a comfort level and a certain level of quality guarantee and risk assessment.

When looking at the way we test I think that it is time to reconsider our testing procedures. As I indicated in a previous article, we need to reconsider our engineering rules

Biography

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when building modern systems. Equally I believe we must reconsider our testing procedures and methods.

When building automation systems we create a virtual reality, an image of our reality in software and this requires specific testing procedures.

As Roy Wilks defined it in 1983 the virtual world is a world **that is not there but that one can see**. So how do we test this non-existent but visible world?

To answer this question the airline industry can serve as an example. In that industry it has become common practice to build simulators to verify the behavior of an airplane under normal and extreme circumstances. Simulators are not seen as a means to eliminate the

cannot only be easily adapted to local and/or specific circumstances, the tests can also be standardized and highly automated. This allows for an optimization of the testing process, increased reproducibility of test scenarios and allows for results to be verified against one another, not only within one test laboratory but also between laboratories.

As I write this I realize that the use of virtual reality for testing power system equipment is still controversial.

I therefore looked up some quotes on the internet and I hope that the following can help us to overcome this controversy and move into the world of virtual reality in order to continue to safeguard the operation, protection and maintenance of an agile, flexible and cost effective power system.

"Everything that can be invented has been invented."

Charles H. Duell, Commissioner, U.S. Office of Patents, 1899

"I think there is a world market for maybe five computers."

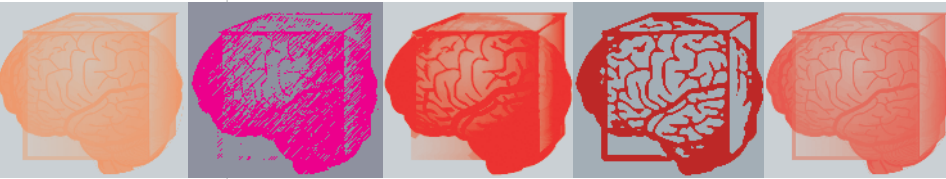
Thomas Watson, chairman of IBM, 1943

"But what ... is it good for?"

Engineer at the Advanced Computing Systems Division of IBM, 1968, commenting on the microchip

"Heavier-than-air flying machines are impossible."

Lord Kelvin, president, Royal Society, 1895



need for physical testing of the aircraft's behavior, but they do allow to stress test the aircraft under circumstances that are difficult to create in the real world.

It allows us to run aircraft into the ground without wasting airplanes and more important, the lives of pilots, flight attendants and passengers.

So I think we need to create virtual test environments using simulators to create virtual replicas of power systems, protection, control and monitoring systems and the communication between them in order to verify that systems are doing what they are supposed to do and do not do what they are not supposed to do.

A very important side benefit is that tests in a virtual environment

"I have traveled the length and breadth of this country and talked with the best people, and I can assure you that data processing is a fad that won't last out the year."

The editor in charge of business books for Prentice Hall, 1957

"Man will never reach the moon regardless of all future scientific advances."

Dr. Lee De Forest, inventor of the vacuum tube and father of television

"There is no reason anyone would want a computer in their home."

Ken Olson, president, chairman and founder of Digital Equipment Corp., 1977