Governing Energy

Man Machine Codependency

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One of the emerging trends in automobile design is the intelligent-car. This vehicle comes close to driving itself by alerting the driver to vehicles in blind spots, providing assistance backing up and automatic breaking as examples. Some even put forth the construct of "self-driving."[i]

As beneficial as these advancements are, there can be drawbacks. With the advent of automatic transmissions and the almost complete loss of traditional standard or "stick shift" how many of today's drivers can actually drive the traditional sports car? In this case, the implications appear to be minor as not many automobiles even have the standard transmission as an option. [ii] In other instances the ramifications maybe more acute.

We also see this phenomenon in mathematics where students trained using calculators and spreadsheets may struggle to understand the basic math operations. Slide rule generation undergraduates were forced to develop an understanding of the mathematical structure/relationships of the problem being solved due to the limitations of that technology.

For example, for this (then) student the use of the slide rule required me to devolve the problem into its component parts. This process led to a better understanding of the problem and its mathematical structure as well as helping establish an *order-of-magnitude* for the expected solution. Routine use of terms such as, significant digits, scientific notation, estimation and Powers-of-Tem have now been lost in the lexicon of many today.[iii]

Following a seminar on the slide rule, one University of California, San Diego student remarked, "*I like being engrossed in the calculations, instead of just punching them into my calculator. I make less mistakes, and find I know what I am talking about …*"[iv]

Another way to frame this discussion is as *cognitive training*. Sometimes referred to as "brain exercise" this approach helps individuals improve their core abilities as well as develop the self-control necessary for the successful completion of a function or process.[v]

Software systems may not calculate properly. Many may not be aware that any computer is basically a Babbage "Analytical Engine" circa the mid 1800's.[vi]

Most now take the output of digital calculators as gospel. But, what if these current algorithm developers miss something? Do many really understand the structure of the problem they are attempting to solve?

Another example, earlier versions of a popular spreadsheet had known statistical inaccurate algorithms. One professor is reported to have told his students not to bet their jobs on its accuracy.[vii]

Now, statistics is widely used in Big Data and Bet-Your-Career, even Bet-Your-Company decisions. Moreover, we trust our very lives to the accuracy of software calculations and the quality of the data input into the system.

In 2009, Air France Flight 447, an Airbus A330 disappeared over the Atlantic Ocean during a routine flight from Rio de Janeiro to Paris.[viii] The subject of a recent documentary, the apparent ice buildup on the aircraft pitot tubes (sensor used to determine airspeed) and the autopilot disengaging required the pilots manual fly the aircraft.[ix]

Apparent confusion in the cockpit, one pilot pulled the aircraft up thinking he was at a lower altitude and need to climb. He stalled the Airbus while the other finally understanding the situation urged him to descend and gain airspeed.[x] Perhaps, the pilot was disoriented due to bad weather, nighttime, or lack of sleep.

However, when forced by circumstances to manual pilot the aircraft one might surmise that like the software algorithm developer who relies too much on the accuracy of automated mathematics there might have been a degradation of fundamental flying skill set.

Our digital world provides all with a quality of life and entertainment only dreamed of by previous generations. However, there is an inherent risk if we rely on technology too much. We may lose our abilities to understand the problem we are solving, and whether the technology accurately supports that process.

How does your organization assure that its workforce retains fundamental problem solving capability?

About the Author

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End Notes

[i] http://www.extremetech.com/extreme/132812-mit-develops-intelligent-car-co-pilot-that-only-interferes-if-youre-about-to-crash

[ii] http://www.roadandtrack.com/boot/whats-really-killing-the-manual-transmisson

[iii] http://sliderulemuseum.com/Manuals/M175_Pickett_TeachingGuide_601.pdf
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[vi] Shemwell, Scott M. (1993). Management Theory - Evolution Not Revolution, Proceedings of the 11th Annual Conference of the Association of Management, 11 (2), pp. 74 - 78.
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[viii] http://en.wikipedia.org/wiki/Air_France_Flight_447
[ix] http://www.telegraph.co.uk/technology/9231855/Air-France-Flight-447-Damn-it-were-going-to-crash.html
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