



Thoughts on Complexity, Trust, and Truth

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How does complexity relate to the terms trust and truth?

Many publications overuse and misuse the term *trust*. I've always felt that trust was an affirmation of truth; however, today, it seems that trust is no longer associated with the term *truth*. (Note that the etymology of trust is as follows: true, truer, truest, trust.)

According to Wikipedia, "truth is most often used to mean being in accord with fact or reality, or fidelity to an original or standard." According to dictionary.com, one

definition of trust is "reliance on the integrity, strength, ability, surety, and so on of a person or thing; confidence." (Most of the other definitions of trust at dictionary.com apply to legal/financial matters.)

And, fortunately, for this short editorial, "complexity" needs no official definition. We understand it because we live it. So, do "complexity" and "trust" and "truth" relate? And if so, how?

To ponder this question and then move toward what I think is the obvious conclusion that they do, consider the following examples (and there are hundreds if not thousands more):

- › the Boeing 737 MAX airplane advanced flight deck (in particular, the complexity and unsafe design of the autopilot system)
- › the Boeing CST-100 Starliner spacecraft used in the Orbital Flight Test ("capsule performed a series of unnecessary orientation-maintaining firings of its small reaction-control thrusters, using up lots of propellant in the process," which was due, in part, to mission clock failure)
- › Chernobyl, which had complexities in the design that made it unsafe, in addition to overly complex operations, facilitating human error

in Petroski's book *To Engineer Is Human*, the chapter on accidents waiting to happen and the Hyatt Regency walkway collapse (https://en.wikipedia.org/wiki/Hyatt_Regency_walkway_collapse). The original design was too hard to manufacture parts for, so they came up with a modification that doubled the weight in need of support.


The question of “complexity relating to trust” parallels C.A.R. Hoare's comment (in his 1980 ACM Turing

Lecture) about making a system simple enough that there are obviously no errors or complex enough that there are no obvious errors. What Hoare appears to be saying is that complexity and trust can be rivals. I agree.

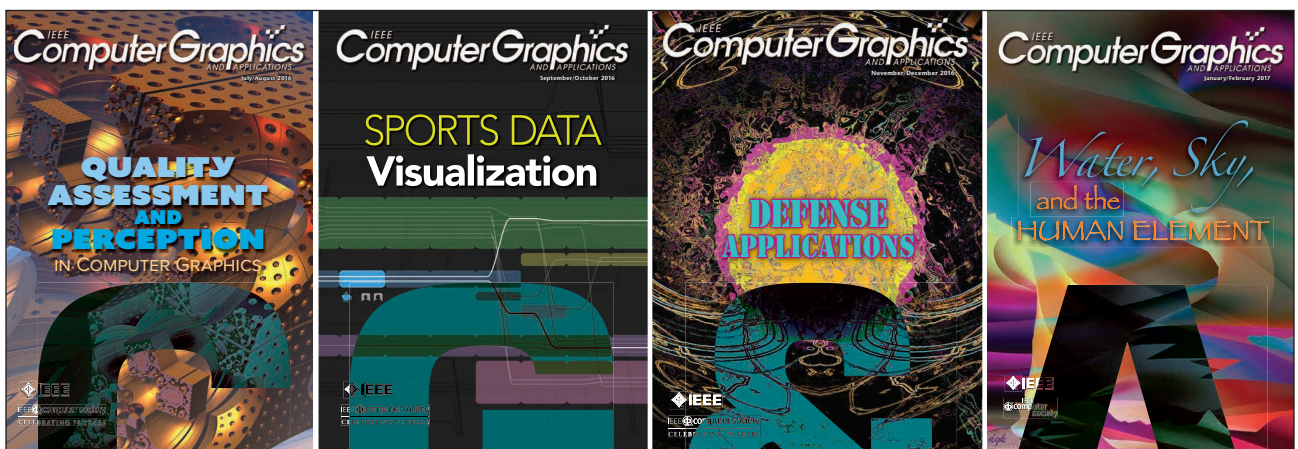
On this topic, I'm often humored by folks who are more concerned with wording than semantics. For example, would you rather have a trustworthy system or a reliable one? How can you answer such a question? Does reliability subsume trust, or does trust subsume reliability? I argue that trust and truth are the goal, and reliability assessments and measurements are

mere evidence of that goal. That is my two cents.

In summary, we know that future system complexity is a nonstopable, escalating reality. We also remember the difficulties we had with building “trustable” systems when complexity was far less, that is, in the good 'ole days.

So, where does that leave us? Just a thought. 

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Digital Object Identifier 10.1109/MC.2020.2980763