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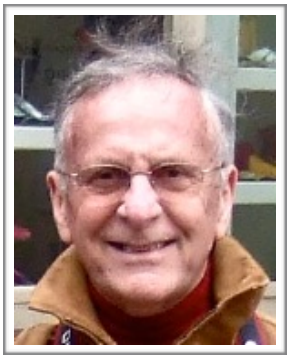

Why Castrate Systems Engineering? ***Why?***

Who benefits? Follow the trail…

So, Russia invades Ukraine. Surprised? What, after all of Russia's continuing pariah/terrorist-state behavior? Were you *really?*

Throughout the Cold War, the Russian Bear presented an ever-morphing Threat to her erstwhile WWII allies. We never knew what delightful 'nasty' she was going to come up with next.

Back in the '50s, INTEL warned of 100-at-a-time Soviet bomber-launched stand-off weapons to be spread across the UK. Existential stuff.

UK response? Fortress UK, as a Total Weapon System dedicated to *one purpose*—takeout the Soviet bombers carrying the standoff weapons *prior to their release.* Nothing less would do. OK. How?

So, long-range & 3-D radars; command and control centers; data links; Recognized Air Picture (RAP); Smart-Target Allocation; Remote-control & piloted Mach2+ interceptors: *all of them manned* ***socio-technical systems,*** all integrated into one total nationwide, rapid-response, air defense weapon system. Project Linesman. *Systems Engineering on the grand scale. Total Integrated Systems Design back in the mid-50s.* A decade before Apollo 11. Who'd have thought.

By 1983, the Soviet Threat morphed into MIRVs, or Multiple-warhead, Independently-targetable, Re-entry Vehicles—each missile carrying 'multiple' nuclear warheads, each aimed at different targets, this time across the US mainland. Also existential stuff. Many more Nukes, launched from space over a much greater area. Not nice. Unfriendly even.

US Response? President Reagan's Strategic Defense Initiative (SDI), "Star Wars." With fabulous weapons to takeout the Soviet Launch Vehicles (SLVs) as they lit-up their rockets on the ground. Nuclear-pumped Space-based Laser. Fighting Mirror, both to see the SLVs, and to blast them using that most powerful laser…plus a vast network of sensors and

surface-to-air missiles to intercept any warheads that got through, and any conventional weapons that the Soviets might send…

Of course, these super-weapons had to be integrated with sensors, communications, into a total, strategic defensive system. So, the US gathered together systems designers from Europe and elsewhere to join up with US systems designers to conceive and design a continent-wide systems architecture and command & control system for the integrated whole.

Unsurprisingly, perhaps, the Soviets got wind of what the West were up to, and decided that the "game was getting too rich for them." Whence Perestroika, Glasnost, Wall coming down, end of Cold War. Or so they would have us naïve Westerners believe. But, of course…

…Russia has continued with its spying, obfuscation, propaganda, cyber-warfare, blank denial, shifting the blame, assassinating dissidents at home and abroad, even manufacturing nerve agents, with total disregard for international law. And, all the while, Russia sits as a permanent member of the UN's Security Council, effectively blocking it.

And now, once again we have Russia *overtly* aggressive, while China rattles sabres in the South China Seas.

Whoops! Cold War warming up again?

No worries, we have our *trusty, tried and tested Systems Engineering,* ready to create innovative counters to whatever they come up with. Don't we?

Whoops again, *no we don't.* Systems engineering has been ***castrated***—somehow, today, it is, *allegedly,* no longer able to create socio-technical systems as it did, very successfully, from the 50s to the 90s: now, it engineers *products*. Which it calls systems, so it "engineers product-systems." Which, as every systems student should know, is a *non sequitur*…

An engineered product is *part, only, of a socio-technical system*. Engineered products are tools of one sort or another for humans to use. Tools are *artifacts,* not systems—incomplete without their human counterpart… Smart, complex, innovative, perhaps—but artifacts nonetheless…

In any socio-technical system, the ***whole*** is *designed for optimum performance/behavior/effectiveness:* the tool is matched to the human; the human adapts to the tool. Like a woodsman to his axe, a knight to his armor, an F1 driver to his car, F35 Lightning 2 pilots to their aircraft…

So, systems engineering conceives, designs and *optimizes* the socio-technical system as a *whole (holistic synthesis*) and subsequently produces a design requirement specification for any technological part(s)—*already matched to the human user/operator*. Who may require subsequent training and practice to adapt to the tool in operation. It's a 2-way thang.

All of which is in keeping with the definition of any system, viz: ***A system is…***

> *…an open set of complementary, interacting parts, with properties, capabilities and behaviors emerging both from the parts and their interactions to synthesize a Complex, Organized Whole of Material and/or Immaterial Things.*

To be a system, then, human and tool together must both interact and *complement* one another…Simples!!!

Actually, *not* so Simples. In the real world, all systems are OPEN. Meaning that they are open to their environment, which they influence, and which influences them. An Open System, by definition, is one that:

"…exchanges energy, information and material with its environment, ***and adapts to that exchange."***

Does so-called "engineering of 'systems'" *(de facto* artifacts) take account of this? Well, no…it's straightforward engineering, high quality but thinly disguised. Which brings us to the crunch questions:

1. Who decided to castrate Systems Engineering, and why?

Not those pesky Reds *again, surely—although they do seem to be the ones to benefit, and they do have just a bit of a track record. Look what happened to TSR2*[1]

And,

2. How do we get <u>real</u> Systems Engineering back–and updated– in time to cope with our rapidly worsening world…? Like NOW!

Don Del *August 2022*

Exit Stage Left, pursued by a Bear?

[1] UK's advanced Strike and Reconnaissance Bomber, cancelled in 1964 by Harold Wilson's Labour Government to "avoid offending Russia." Sic.