## *Another Agonizing Reappraisal: The Connected Enterprise*

We are now in the second month of Putin's war on Ukraine as I write this. The first blow in the war was a cyber attack on Ukraine. So far, the cyber war has been very quiet, and it is difficult to know what the successes or failures are on either side. But one must note that the cyber war is going on and is real. Russian cyber operators are dueling with Ukrainian and NATO cyber operators, and the only way we'll find out anything is if one side or the other craters in public. But the fact that Putin has attacked the world order that developed out of World War II and the end of the Soviet Union by itself has raised the overall threat level in cyberspace. What happens in cyberspace doesn't always stay in cyberspace.

For over a couple of decades now, we have all been talking about connecting manufacturing and distribution enterprises internally and externally. I wrote a book, *Real-time Control of the Industrial Enterprise* with Dr. Peter G. Martin (then of Schneider Electric), about how to do this. And I believed in what I wrote. I believed that it should be possible to connect enough of the enterprise so that each enterprise could be connected not only on the operations side (which we have been able to do for years) but also on the financial side so that corporate management could respond in near realtime to changes in market conditions and truly create an agile enterprise. I still believe that this is a possible dream. But what we have learned about the brittleness of enterprises and supply chains from the pandemic and from Putin's invasion of Ukraine has made it difficult to see this as a goal instead of a dream.

> **"If you have data that you do not want to lose, keep it off the Internet."**
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> **--Marty Edwards**

When he was Director of ICS-CERT in the Department of Homeland Security, Marty Edwards used to go around giving speeches in which he would say, "If you have data that you do not want to lose, keep it off the Internet." Usually, he spoke before groups where everyone else was talking about how great connecting their enterprises was. His message was unwelcome then, and it is unwelcome now, and is usually ignored as fast as possible. But as time has shown, Marty was not wrong. Not then, and not now.

### The Concept of the Connected Enterprise

The connected enterprise is an artifact of the connected world, made possible by the public and private accords made during and after World War II. The connected world was supposed to be a static collection of industrialized countries that would continue to expand and add more countries as they industrialized and joined the First World. The myth of the connected world

was that industrial countries would never attack each other because it would be bad for business.

When the movement of manufacturing to "low cost of manufacture" countries began, the idea was that this would eventually raise those countries to the First World, and in the meantime, First World manufacturers would achieve profits from lower cost labor and materials. And this worked for decades, sort of. Until we started to run out of lower cost labor and materials.

The problem arose when the home offices tried to manage, even micromanage, their assets in lower cost

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of manufacture locations. As Dr. Martin and I showed, it was not only possible but easy to integrate the operations side of those assets. But the financial side continues to give trouble. Part of this is that the operations side operates in real-time or near-real-time, while the financial side continues to operate through accounting roll-ups which can be as much as 60 days delayed from real-time. As any controls engineer knows, it is not possible to control a process with a loop lag time of days when the process is running in real-time.

So, even a generation ago, connectivity theorists were positing that a real-time supply chain and financial controls would solve the problem of enterprise agility. That way, a plant in Thailand would not keep making, say, rayon when there is already a glut on the market. By the time the manufacturing data could reach the head office, it could be a month out of date. The idea of instantaneous digital connectivity was supposed to correct this problem. And it would, if only the world was really a stable, near-static environment.

### Agile, Nimble, Brittle

While enterprise connectivity requires a stable and near-static economic and political environment, the current world situation is neither stable not static. Even with actual security and new concepts like blockchain, it continues to be woefully easy to disrupt an enterprise. Enterprise connectivity never was intended to deal with inimical third parties out to disrupt communications in the enterprise—man in the middle attacks, ransomware, phishing schemes, and just plain denial of service attacks have all been considered to be random and unusual, when in fact, they are neither random nor unusual. Bad actors, often located in Russia, China, North Korea, and other nation-states on the outs with the stability of the world order have made it necessary for there to be a considerable overhead for protecting the enterprise from attack vectors from both within and without. At some point, this overhead is going to erase all the gains from enterprise connectivity itself.

The fact is that connected enterprises by their very nature are brittle and breakable. The considerable number of cyber actions against corporations and government entities around the world cannot be explained away by saying that poor defense against cyber-attacks is the problem. No, the problem is that enterprise connectivity is inherently brittle and subject to attack. And if you add in war, or other societal upset, the enterprise's connective tissues are increasingly brittle and subject to higher levels of attack.

**Real World Issues with Connectivity: Operating in Uncertainty**

The war in Ukraine has only highlighted the problems of trying to run a global manufacturing enterprise in an uncertain environment. There are lots of other uncertainty issues besides war, or that may lead to war. Climate change is a huge issue. Food and water shortages are becoming commonplace in Africa and in some areas of Asia. If these shortages get worse—perhaps we should say w*hen* these shortages get worse, wars will likely break out over who gets the resources. An example of an underlying hot spot: the Colorado River no longer empties into Mexico. All the water is used up in the United States. There are hundreds of these potential hot spots throughout the world.

Enterprise connectivity is now seen for what it is: brittle. What we do about it remains to be seen. Some companies have seen this coming and reacted to it already. Others are still waiting for the analyst firms to tell them what they should do.

What do you think?

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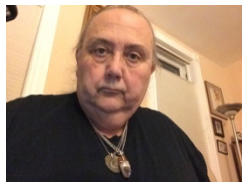
**WALT BOYES is a principal with Spitzer and Boyes LLC. He is a Life Fellow of the International Society of Automation, a Fellow of the Institute of Measurement and Control, a Chartered Measurement Technologist, and a member of the Association of Professional Futurists. He also acts as Editor of the alternate history magazine,** *The Grantville Gazette* **and is Editor in Chief of** *Eric Flint's Ring of Fire Press***. Walt is available for consulting and for speaking engagements both in person and online. Contact him at waltboyes@spitzerandboyes.com.**