INSIDER
INDUSTRIAL AUTOMATION & PROCESS CONTROL

MANUFACTURING IN THE AGE OF DISRUPTION

In this issue:

The Future is not coming. The Future is here. Unfortunately, it sure looks like it might be a little dystopian.

I am a professional futurist. That means I think about what the future will be like. The future of manufacturing in both the discrete and process industries will be very different from what we've known. There are all sorts of huge issues facing manufacturing executives now that were never supposed to happen.

Climate Change

After we have argued for a generation whether climate change was real, we now can see that it is very real, and it doesn't matter how much of it is human-caused or not. Climate change is having a huge effect on civilization as a whole, and it will do nothing but get worse.

The problem with these issues is that they are complexly interrelated, and each aspect of these issues acts as a force multiplier to other issues. We know that climate change leads to environmental degradation, and to food insecurity. Overpopulation and crowding aids the propagation of global pandemics, and as we have seen in China, pandemics produce political instability. So does climate change, as we see in Syria, Somalia, and Eritrea, as well as Central America. Political instability affects supply chains, again leading to food insecurity. Hungry, starving people are susceptible to both pandemics and political instability. It is a giant whack-a-mole problem that needs a solution.

Environmental Degradation

We now know that the environment is degrading. Increased drought, heavy fires, and loss of habitat are hurting the environment, and the flora and fauna of both the land and the oceans. But we didn't know, until a couple of years ago, that the dangerously low stocks of Pacific salmon are being damaged, not by the dams on the Snake River (although they

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ISSN: 2334-0789

aren't great) but by chemical contamination from of all things a chemical spalled off of tires as they rotate. It is a chemical called 6PPD, used in the manufacture of tires. As microscopic pieces of tire spall off, this chemical becomes 6PPD-quinone, and has been found to enter the surface water and groundwater streams. We know beyond a shadow of a doubt that 6PPD-quinone is deadly to salmon and steelhead stocks.

This is only one example of environmental degradation caused by humanity that is impacting the food we eat. There are many more, too many to enumerate here.

Another is the impact of heat and smoke from wildfires on the grapes harvested in California, Oregon, and Washington. Too much smoke contamination makes grapes taste horrible and make very poor wine. Grape mashes are used as animal feed, so it isn't just wine drinkers who have a problem.

Massive drought is causing migrations, starvation, and political unrest in Africa, the Middle East, and Central America. Drought is also affecting Texas, Arizona, New Mexico, and much of California and Nevada. Drought affects the number of crops that can be raised there, and those states grow a lot of our food.

Supply Chain Issues

The recent pandemic spotlighted already existing serious issues with global supply lines. Back in the days when we believed in a global economy that was stable and growing, it made some sense to make products and components in "low cost of manufacture" countries and count on "just in time" shipping to get them to the assembly floor when they were needed. In light of the events of the past several years, manufacturing theorists and futurists like me are furiously revising our advice. What good is it to make your widgets where it is very cheap, only to find out that you can't get them to your plants in the USA or Europe? And thanks to the prevalence of "cyberspoofing" products, the components you are buying may not be the ones you think you ordered. Ten or eleven years ago, a friend at Schneider Electric told me that 200 times the actual manufacture of Square D relays were being sold around the world. I doubt that the problem is limited to Square D and that the numbers are going down.

Supply chain issues are related to climate change. Floods and tornados and hurricanes and typhoons destroy manufacturing plants. Storms sink ships. Wars damage infrastructure and ecosystems.

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Global Pandemics

We had been ducking a whacking big pandemic for thirty or forty years, when the Covid-19 pandemic hit. The fact that somebody could be in a wet market in Shanghai, and less than twenty hours later, be in Chicago, or New York, or London, or [insert name of other big city] means that the traditional means of preventing pandemics (time, distance, poverty, etc.) just would not work. Now we are looking at multiple pandemics for the foreseeable future. We now know how much pandemics can disrupt our society, our infrastructure, our manufacturing, and supply chains. The supply chains are *still* not back to normal, and probably won't be for another year at least. Pandemics take away both educated and uneducated people who die or become chronically ill. One of the recent issues with Covid-19 is the number of children entering foster care because they are Covid orphans. Long Covid is real, and it is consuming medical resources even now.

Food Insecurity

Climate change and economic recession caused all or partly by pandemic effects, and economic recession caused by war and the rumor of war—these are all causes of food insecurity. Food insecurity is a nice, clean synonym for hunger, starvation, disease, and deaths, all caused in a world where we raise enough food to feed more than twice our current population.

Political Insecurity

As climate change, pandemics, environmental degradation, and failures of supply chain happen, and continue to happen, and happen more frequently, political insecurity also increases. A case could be made that Russia's expansionism in Ukraine is less about shoring up Russian defenses against NATO and more about absorbing the enormous grain harvests Ukraine has been producing. Climate change and drought was one of the principal causes of the Syrian revolution and the resultant migration to Europe mostly in dangerous, leaky boats. Political insecurity begets political insecurity, and eventually can cause widespread conflicts even when nobody really wants one. Remember the start of World War I?

"So What Is There to Do?"

Unlike V.I. Lenin, who famously used that phrase, I don't have an answer. Not really. But the definition of insanity is to continue doing the same thing over and over, expecting different results. What we really need, I suspect, is to radically re-think how we organize ourselves. What we want is a stable, coherent world in which the insecurities we have been talking about. What

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we need to do to ensure that the world becomes stable and coherent in the future is the most important conversation we can have.

A COHERENT MANUFACTURING POLICY?

By John Bernaden (co-founder of the Smart Manufacturing Leadership Coalition) with comments by Walt Boyes

Should there be a single, coherent manufacturing and industrial policy? I think so, and so does John Bernaden, who led Communications for Rockwell Automation for many years. I joined and participated for many years in the Smart Manufacturing Leadership Coalition at John's encouragement, and I believe that because of his very foresightful leadership the concepts of smart manufacturing have entered common usage.

While John and I disagree on much, politically, I do agree with nearly all of his argument, and I am featuring it here:

Who should lead US industrial policy?

I led the call for President Obama to appoint a U.S. Manufacturing Czar while unveiling my proposed Smart, Safe and Sustainable Manufacturing policy at the National Press Club (9/9/09). But Manufacturing Czar Ron Bloom failed to get competing federal agencies or Congress to agree on a U.S. Industrial policy, and he quit after 2 years. President Bush had named the first U.S. Asst. Secretary of Manufacturing who similarly quit after 2 years with few results.

Inter-Agency bureaucratic infighting is way too strong for us to believe that another Manufacturing Czar, as now proposed by bipartisan Senators will be successful. So, if Czars can't get competing federal agencies to work together in a single US Industrial Policy — President Biden and the Congress should agree to legislatively empower One Agency to lead U.S. Industrial Policy.

ISSN: 2334-0789

https://www.axios.com/2021/03/29/white-house-chief-manufacturing-officer-biden

Then we can let the in-fighting go public as each federal agency lobbies for the leadership role:

DoD's military-industrial complex again? From Eisenhower to Nixon, the Pentagon's defense contractors monopolized global manufacturing for decades.

Then Reagan pivoted to a peaceful US industrial policy as Captains of Industry like the four Generals— GE, GM, General Mills and General Dynamics— joined Malcolm Baldrige's Commerce Department campaign to stop Japan with multinational conglomerates.

After Mac's tragic death, State and Treasury Department "neocons" continued the Globalization campaign to advance democracy by creating middle class consumer markets in every nation including China.

Today, DOE and EPA industrial policies now promote green manufacturing by creatively destroying the fossil fuel industry to curtail climate change.

I take issue with John's characterization of what the Department of Energy and what little the toothless EPA are doing. There are all sorts of good reasons to curtail climate change, as I discussed in the first article this month (above).

Union Luddites also want industrial policies that make factories more labor-intensive to protect jobs – building back better manufacturing the way it was last century.

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I am not sure that unions are full of Luddites anymore. One of the reasons for moving offshore was to reduce employee count and cost by moving to what were then called "low cost of manufacture countries." The unions are correct in pointing out that manufacturing there is only efficient if the supply chains are robust and continue to work—and we've seen that not work well.

> Lastly, NSF scientists and universities believe they should be in charge of the Nation's 21st Century Smart, Safe and Sustainable Manufacturing strategy. With Billions of dollars in recent windfall funding from the Competes Act, NSF could wisely recruit UCLA CIO and oil & gas expert Dr. Jim Davis to champion the smartest U.S. Industrial Policy. In 2010, I co-founded the Smart Manufacturing Leadership Coalition, Inc. in Washington DC with Dr. Davis—the seminal godfather of all smart manufacturing scientists.

I wholeheartedly agree with John Bernaden. Dr. Jim Davis deserves much attention and credit for his work developing modern manufacturing theory and driving the SMLC toward the Federal grants that allowed it to continue its work.

> However, my favorite Agency to lead US Industrial Policy is USDA. What?? Yes!!! USDA's fast-tracking farm-to-fork food manufacturing policies. Smart farmers already own many food factories, biofuel processing plants, as well as supply chains. CHS, Inc., a $34 Billion Agriculture Cooperative even smartly acquired oil refineries & pipelines to ensure farmers a long-term supply. Food is critical to national security and health. DoD and State strategically export Ag surpluses to support missions. FDA/NIH says, "all food is medicine." And the greenest Green Manufacturing is food.
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> Most importantly, USDA has led historic Agriculture sector productivity— it's main metric

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that should determine which agency leads our U.S. Industrial Policy. Productivity, productivity, productivity has been the manufacturing mantra for generations. However, the U.S. manufacturing sector's annual productivity growth has now declined to nearly zero for the first time in history.

The greenest Green Manufacturing is food.

In comparison, according to a recent Kansas City Federal Reserve report, U.S. agricultural sector productivity has been consistently growing 1.42 percent annually for the last Century! If the U.S. manufacturing sector productivity had grown at that same rate, our nation's industrial output would be five times greater today. America would be known not only for our agricultural exports, but our manufacturing surplus exports too.

The ideal U.S. industrial policy shouldn't try to pick winners and losers or the most productive companies. Government should aim to advance policies that can lift the productivity of the entire U.S. industrial sector, year after year, decade after decade like USDA policies have done. USDA policies have achieved this historic 100-year proven track record at improving productivity in three general ways.

First, USDA gets farmers to follow the Science. New scientific ideas such as for better seeds, energy and chemical use successfully flow from Land Grant Universities to state and local ag extension offices with agents who then drive them out into the farm fields. Unlike "the valley of death" where scientists say too many new ideas die before making it to the factory floor, long-term productivity growth in U.S. agriculture starts with R&D-driven growth from the stock of scientific knowledge.

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Second, USDA policies successfully advance technological innovation and the on-going structural transformation of agriculture—along the entire farm-to-fork supply chain. For example, over the past 100 years, labor use in agriculture fell by 80 percent due primarily to various types of automation and machinery. Unlike public outrage and political repercussions from the loss of 5 million manufacturing jobs, USDA policies have successfully managed our nation's seismic shift that eliminated ten times that many employees or nearly 50 million agriculture jobs.

Third, USDA policies literally promote "cooperation" not competition. Major cooperatives like Ocean Spray, Land of Lakes, and Dairy Farmers of America legally enable farmers to benefit from near-monopolistic cooperation in harvesting, manufacturing and even jointly marketing their production. If a traditional group of manufacturers cooperated in this manner, DOJ would claim collusion, price fixing, and bring many other charges. However, giant multi-billion-dollar cooperatives already cooperate in many ways essential to getting IT-connected smart manufacturing data from the farm to the fork. Bragging rights between two smart farmers nowadays is whether "my server farm is bigger than your server farm" due to the valuable big data they're harvesting. USDA policies champion these savvy Co-ops.

With food and drug production being our nation's second largest manufacturing sector — next to the military-industrial complex, and with an east coast intellectual movement radically resetting our nation's Agriculture sector by fundamentally re-classifying all food as being "medicine," as well as Congress already starting to shift overarching responsibility for our nation's agriculture sector away from USDA toward the Food and Drug Administration through the Food Safety Modernization Act, hopefully we wake up soon! Leveraging the long-term drivers for agriculture productivity growth could provide an unorthodox answer regarding how to unleash the

ISSN: 2334-0789

next Industrial revolution and a surge in U.S. manufacturing productivity growth.

I think we could do better than "classifying all food as being 'medicine.' The FSMA, passed in 2011, seeks to improve food safety by preventing contamination, rather than responding to it. I agree with the goals of the FSMA, but I agree with John that the potential for bureaucratic difficulties is great. Also, the USDA tends to be more environmentally sensitive than other agencies, and that's a good thing too.

The point is, as John clearly says, that we absolutely must have a coherent national policy on manufacturing. There are too many storm clouds on the horizon for us not to have one.

INDUSTRIAL STORYTELLING, PART TWO

Your story must be relevant to everybody. It needs to be relevant to your ecosystem of customers, potential customers, bystanders, stakeholders, competitors, "Uncle Tom Cobbley and all."

I want to give you some examples of commercials so you can see what I mean. First is a series of commercials for Salesforce.com featuring Matthew McConaghey making a serious plea for us all to work together to move our civilization forward. It has a great message, but as Joy Ward notes, "it doesn't have anything much to do with Salesforce.com, and all you see is the Salesforce logo on the last screen." It has wonderful production values, and is a great story, but it is not a great industrial story.

ISSN: 2334-0789

The second is the series of commercials by Subaru which extoll the car company's charitable activities in favor of pet rescue, National Parks, and other great charities. Joy Ward says that Subaru "owns" using dogs in their commercials. "Anytime you see a dog and a car in a commercial or an ad," she says, "you immediately think 'Subaru' instead of whatever brand made the commercial." The Subaru stories work because they show how Subaru relates directly to the issues that are important to their customers.

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The art of storytelling in the industrial environment is about telling your story simply while communicating complex concepts about your company and your products. The way to accomplish that is relevance. Relevance to the needs and desires and wishes of your customers, not relevance to your products. Here's part of a communication I received today from an industrial controls company. "We're happy to report that you will be among the first to hear about [our] insights on the latest trends in industrial automation and networking, events, and special offers. We are constantly working to deliver you up-to-date content that can help you and your business grow." See how the relevance angle is emphasized.

Here's a secret. Customers assume your products are fit for the service. You don't have to keep telling them. What they want to know is how to use them in their application. If you can show them that, you can make your pricing somewhat elastic. But you have to tell the story in useful and interesting ways.

More about storytelling next time!

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ISSN: 2334-0789

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ISSN: 2334-0789