The View Ahead: How You CAN Prosper as an Automation Professional in the Years to Come!

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A few years ago, we published a story called, “The Light at the End of the Tunnel Is a Train.” There are trends that are converging in the next decade or so that will utterly change the way process automation is done. Whether you are simply a process automation professional, or a system integrator, or a vendor, you need to understand these trends and adopt new stances, or the train will make you as flat as a penny laid on the track. And if you DO understand them, you can prosper in your career as never before.

These changes will come at you from every possible vector, social, economic, political and technical. These changes will not only alter the way we work, but what we will have to know to be able to work in
process automation, and maybe even where we will have to live, and who we may be working for.

I am a Baby Boomer. When I was growing up, it was a great future to work in manufacturing. But since the sixties really, it hasn’t been cool to work in a factory, or in a process plant. The best we have are working in IT, in law, in banking, in e-commerce…anything to avoid getting dirty in a plant. Even the engineers and scientists we are importing from places like Eastern Europe, India and China are unwilling to really pile in and get the job done, if it means getting grubby.

And everybody who was a little kid growing up in the 80s and 90s is well aware of what happened when dad
and mom gave their loyalty to the company: they got laid off, their pensions got stolen, and they had to go back to work doing stuff that paid them much less than they expected to get…like being a greeter at Wal-Mart. Furthermore, many of those jobs disappeared overseas as companies locked into short term economic thinking pursued the illusory labor and regulatory savings in places like India, China, Korea, Thailand, Indonesia, and Vietnam.

A lot of those people had been operating process plants when all of the operations were manual: look at this gauge, turn this valve one quarter turn. They were the people whose calibrated eyeballs could do a sweep of the control room instrumentation and get a clear picture of the plant’s operating state. They were the people who helped translate manual operations into closed loops and closed loops into distributed process control systems. To a very great extent, those people are gone in North America, and Western Europe. And here’s something nobody thinks about:
those people mostly never existed in the third world...by the time we started building plants there, they were modern automated plants.

The ones that escaped the cost-cutting axes of the last 25 years are now retiring faster than they can be replaced. “My institutional knowledge walks out of the plant every day at 4,” the plant manager says. Well, every day, some of it walks out at 4 and never comes back! So much has been lost that many process plants have completely lost the chain of knowledge handed down from older to younger employees. They simply don’t know why the plant is operating the way it does, or why certain things are done, and others are not done.
And the institutional knowledge they are taking is irreplaceable. For example, in many plants when multiple alarms go off together, the operators no longer know which to respond to first, and which are the most critical. And in alarm cascades, plant operators that don’t know those things are usually going to do something wrong. We’ve seen this numerous times, in numerous accidents.

Just as the process industry companies are beginning to realize exactly what they did to themselves in the 80s and 90s in layoffs and offshoring and other screw-jobs, they’re running smack into the post-Boomer demographics. While Boomers
were the largest generation in history, those that followed are much smaller, and there simply are not enough younger workers to fill all the existing jobs. Part of these jobs were absorbed by process automation in the late 80s and 90s, but the important jobs, the ones with the institutional knowledge are going begging. Companies used to have mentorship and training programs to bring younger workers up to speed with the institutional knowledge of their more senior co-workers…but those are typically gone now. And even bringing in workers from offshore isn’t enough.

And since training and mentoring and apprenticeships cost money, and the process industries are very cost conscious still, the first thing they’ve done is to turn to their automation vendors for help. And the automation vendors, having heard the siren’s call to move from being equipment companies to being service providers, are answering the industry’s call with staffing services, operating and maintenance services, and design expertise—some of the
people laid off by the process industries found new homes in the vendor community, and took their expertise there. Vendors are very clear that it is better to have somebody pay them once a month for doing stuff than to have somebody pay them once in a while for a new piece of equipment…and since many process plants don’t even have engineering talent, vendor companies are delighted to do the design engineering and even the integration for them.

The problem, of course, is that the vendor companies are having the same staffing problems that the process industries themselves are. The unpopularity of manufacturing jobs, plus the economic and career uncertainty of the past generation, coupled with the vastly smaller demographics of the younger workers in North America and Western Europe, have made the vendors’ grand plan to provide all this intellectual property, and institutional knowledge as fee-based services problematic too.
Of course, there is that train. As knowledge workers become more pervasive around the world, and as sensor and control technology continue to improve, we have the opportunity to do vastly more with considerably fewer “gauge watchers” and “valve-handle-turners” than we’ve ever been able to before.

What I find interesting is that the simple division of the world’s economies into First, Second and Third Worlds, or Developed vs. Undeveloped is coming unraveled. There are 250 million Indians who live at the same standard of education, training, and income as the United States (and 800 million who do not). Everywhere you go in the world, you see new tech
coexisting with old tech and even ancient tech. Many underdeveloped countries are installing the highest state of the art technologies in process plants, just as they bypassed wired telephone systems in favor of cellular technology. So, while today you can see a goatherd talking on a cellphone, while herding his charges, tomorrow that goatherd’s son will be a process engineer. We are going to have to live in a connected and much smaller world.

Economic dislocation isn’t limited to North America and Western Europe. Even Korea and China are finding that it is no longer possible to build some things there and be competitive on the global market. In 1905, over half the population of the United States worked in agriculture. In 2005, less than 10 percent still does. Even though the population has greatly increased, there is still a relatively low rate of unemployment. As jobs migrate, new jobs are created to fill the need. The tsunami of globalism is going to go all the way around the globe.
For years, the TLA consultants have been preaching Real Time Control for business and for process. And for years, the captains of industry have been paying lip service to it. But the change is finally upon us. Even SAP has come to the public realization that you can’t optimize your enterprise just with an automated balance sheet. With Microsoft and SAP supporting ISA95, and ISA88, it is a sure bet that the Great Divide between the business systems and the plant floor will be erased.

Even system integrators are changing, becoming more flexible, and moving into higher order integration. Companies like
Automation Alliance Group are creating new business models for expanding and providing services on a global basis, while remaining in essence local companies.

While some companies in some industries are still treating their human resources like their steel and nuts and bolts resources as completely replaceable commodities, other companies are beginning to understand the value of knowledge workers, and how much more profitably they can operate by giving the workers more control over their jobs, and by decentralizing decision making to the lowest possible level. In process automation this means that the newest plant operator or technician will need to know much of what an instrument engineer knew in the 1980s. In order to attract and keep people like that in a job market that will be a perennial seller’s market for at least the next generation, companies will have to offer benefits and perks like they used to in the 1950s.
Vendor companies, and process companies alike have already figured out what it means to “Think Globally, and Act Locally.” Look at Phoenix Contact. They’ve essentially split their entire company into three equal locations: Germany, USA and China. G&A, R&D, and manufacturing will all be split, with many things done at each location because now they will be able to work 24/7. The Phoenix Contact people even joked about it: “The sun will never set on our TransNational company!” Invensys, ABB, Honeywell, Siemens, all the major vendors are doing much the same thing. Yokogawa is so serious about proving that it is not just a Japanese company that it has relocated its entire international division to Singapore, and sent a key lieutenant of the Chairman to run it. Brazil and Venezuela have GDPs growing at 17%-- most of the increase in exports to China. We can’t plan on domestic vs ROW anymore. A company in the US whose exports account for only 10 or 20% of revenue is a company in serious need of a coffin.
The Chinese are right: “interesting times” are scary and fraught with danger. Revolutions never happen when the oppressed are the most downtrodden, but after they’ve been given some relief, albeit “not fast enough.” Most of the world is considerably more stable than it used to be, but there are still places, like Venezuela, Brazil, China, Indonesia, and the Middle East, where the economies are not yet large enough to support a sizeable middle class, and provide jobs for all the available workers. Workers who, for the first time, are exposed to all the goodies of Western Civilization… Some are happy and want the goodies, some are unhappy and don’t want them, and some are even jealous enough to want to steal them.

It used to be thought that North American and Western European companies, both vendors and integrators, would simply move into the Third World as soon as the undeveloped countries developed enough to make the market worthwhile. While the North American and Western
European companies waited, indigenous integrators and vendors developed in many “Third World” areas, and now are competing straight up for the same projects. Maverick’s Global System Integrator Alliance shows one of the reactions of First World companies: make alliances with these indigenous companies.

In the early days, we were all concerned with sensors, measurement and final control elements: how to build the watch. Later it became imperative that we know how to tell time: how to close control loops. Our skill sets expanded yet again when it became obvious that it wasn’t enough to be able to build the
watch and tell time, but now we had to know what the benefits of being on time were: expanding the benefits of control to the entire plant via distributed control systems. Even though this is where a lot of us stopped, it just isn’t enough. We know how sensors work, we know how loops work, and we know how to control a process. Unfortunately, the required skill set has expanded again. Now we have to understand scheduling. Our primary value is to see to it that information from the plant is transmitted to the enterprise. We’re now working on fourth order concepts.

And we’re finally going to have to address the issue of how to measure what we do as automation professionals. As Dr. Peter Martin of Invensys says, “If you can’t measure it in financial terms, it never happened.” We are going to have to re-frame our skillset so that we can define and describe everything we do in terms that the CFO can understand…because then the CFO and the CEO can explain to Wall Street why all of the
productivity gains of the last 30 years have come from operating unit optimization strategies and automation.

Looking a lot like George Jetson’s control room, this 3-d visualization station is a working control room in an ExxonMobil refinery facility. An instrumentation engineer at a Lyondell plant told me recently that he is expecting his standard technicians to know much more than they used to have to know, and pay scales and job descriptions are lagging behind what they need to know to just do their jobs. Ian Nimmo, President of User Centered Design Services, says, “In a properly run plant, the operator should not have to intervene in the plant operation except in the case of an upset, and any time the operator has to do anything, it is an upset.”
Taken together, these disruptive technologies will create tomorrow’s process plant. Small teams of engineers and operators will use integrated simulation to model the plant, and in turn, push that data into design/draw software which will produce the plant and the control system designs. AIDC sensors will continuously update the “live as-builts” for maintenance and management.

The operator will be a supervisor, making sure that the real-time performance management systems, the advanced process control systems, and the asset management systems are working properly through new inputs via wireless and the ability to go mobile: to access the control system from anywhere in the plant.

Big Changes Ahead: Technical
- Disruptive technologies R us:
  - Collaborative engineering
  - Integrated simulation and design/draw software
  - Remote server applications, XML, B2MML and web services
  - HMI and human factors engineering
  - Automatic Identification and Data Capture (AIDC)

Big Changes Ahead: Technical
- More disruptive technologies R us:
  - Robust wireless systems for monitoring and control
  - Mobile computing
  - Online analysis systems (PAT)
  - Smart sensors and controllers
  - Real-time performance and asset management & real-time finance
System Integrators, vendors and end users alike are asking their people to do more with less, and that means smarter people, with smarter tools, and a clear grasp of the way the process works. This means that the market for knowledgeable automation workers is actually increasing worldwide. But this will be automation workers who understand the entire picture from the sensor to the enterprise. As Process Automation Hall of Famer, and founder of WBF and S88, Lynn Craig, famously says, “Control engineers are being dragged kicking and screaming back into the world of manufacturing.”
The biggest trend is the globalization of manufacturing, and with it the globalization of automation and system and enterprise integration, and the hottest technology is the tool set that is giving us the ability to easily work globally.

We are in a remarkably different place than we have been over the past 30 years. We are in demand. We are scarce, and we now have the tools to prove that we are not only necessary, but irreplaceable. Imagine what would happen if
all of us walked off our jobs for 60 days…but we don’t have to do that. What we MUST do is to stop thinking like instrument engineers, like control systems people, and start thinking like real automation professionals. We have a larger, deeper skill set that we need to learn than any other discipline. It isn’t enough to be an engineer…in fact, many automation professionals aren’t engineers. We must be able to engineer, to plan, to manage projects, to understand many kinds of processes in many different industries…in a way, we’re like Ginger Rogers. She could do everything Fred Astaire could do– and she did it backwards, and in high heels.

So, let’s dance!