

## [Automation Profession: Dancing Backward in High Heels](#)

# Automation Is Being Recognized as a Profession, but the Bad News Is that You Need to Know More and More

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Full article can be found at

<http://www.controlglobal.com/articles/2009/AutomationProfession0909.html>

By Walt Boyes, Control's Editor in Chief.

[The Automation Federation](#) was set up by [ISA](#) to, among other things, be a cheerleader for the automation profession, and in lobbying the U.S. government on behalf of automation professionals, it's having some significant successes.

Recently, the federation produced a detailed description of what an automation professional's skill set needs to be for the U.S. Dept. of Labor, and on July 14, Sen. Barbara Mikulski (D-Md.) wrote, "The topic of automation cuts across all levels of industry, rather than serving as a stand-alone technology, and particularly affects the fields of control systems' cybersecurity, industrial wireless sensors, systems interoperability and other basic automation technologies necessary for the success of industrial enterprises."

As part of the report language to accompany H.R. 2847 (Commerce, Justice, Science and Related Agencies Appropriations Act) when it was reported out of the Senate Appropriations Committee (the bill has already passed the House), Mikulski continued, "NIST is encouraged to consult and collaborate with independent experts in the field of automation to support the agency's efforts in working with industry to increase innovation, trade, security and jobs."

That's the good news. We're beginning to be recognized as a discipline. There are still attempts to get rid of the control systems engineer designation in the U.S., which doesn't exist in other nations. This is partly because automation is a multidisciplinary activity, not just an engineering discipline.

### **Know-it-Alls (Almost)**

An automation professional's skill set is varied and large. As Mikulski wrote, automation cuts across all industry verticals, so not only are the technical skills required to understand how control systems function and are designed, but the domain skills in multiple verticals are also required, so we know how to use the control systems we install.

Control columnist Greg McMillan says no amount of advanced process control or fuzzy logic algorithms can compensate for a half-hour of physical loop lag time in a pH loop. This is a large body of knowledge. In fact, the late Vernon Trevathan, a Process Automation Hall of Fame inductee, who led the great Monsanto process engineering team, produced a book for ISA Press that was called *A Guide to The Automation Body of Knowledge* (2nd edition, ISA Press, 2006). A planned edition of the ABoK is projected to be twice as large.

ABoK was Trevathan's attempt to produce a one-volume overview of automation. There are 37 subject areas and an appendix (see sidebar). It shows how all-encompassing automation is in discrete, hybrid or continuous applications. The number of processes that can be operated in manual for any length of time, even in an emergency, is vanishingly small.

Further, we must also must possess interpersonal, project management, business understanding and project justification skills, besides our engineering and technical abilities.

Because engineering licensing requirements are different in every state and vary worldwide, ISA produced a certification for automation professionals with or without formal training. The skill set ISA described for certified automation professionals is at ISA Certified Automation Professional (CAP) Classification System ([www.isa.org/~CAPClassificationSystemWEB.pdf](http://www.isa.org/~CAPClassificationSystemWEB.pdf)).

## Where Do You Go to Learn?

The bad news is that automation is an interdisciplinary subject that simply isn't taught in school. You can pick up some automation technician skills in maintenance training programs, such as the Multi-Skilled Maintenance Technician Program that ATS Inc. produced with junior colleges in Illinois and South Carolina ([www.advancedtech.com/mstcp.aspx](http://www.advancedtech.com/mstcp.aspx)). Or, you can get some skills from union apprenticeship programs and training courses such as the IBEW's electrician apprentice program. A few companies provide on-the-job training, but only at the technician or basic operator level.

What you can't get is a full-scale college education in the disciplines that make up the profession of automation. There are reasons for this, and most of them center on how the discipline of engineering is taught in colleges.

For example, my own alma mater, the University of California at Santa Cruz (UCSC) established its Baskin School of Engineering long after I graduated, and it's now considered one of the finest engineering departments in the University of California system. Yet, if you examine Baskin's course descriptions and syllabi, you'll look for a long time before you find courses in industrial automation. You can find courses in control theory, sensors for environmental control, nanotechnology, and game system design, but few appropriate for working in automation. There is a degree offered by UCSC in mechatronics, but it's offered by the Theater Arts department. Go figure.

It seems the automation practicum just isn't academic enough for most engineering departments. Process Automation Hall of Fame inductee Russ Rhinehart from Oklahoma State University had his control systems program cut last year. Fellow inductee Dale Seborg from the University of California at Santa Barbara is highly unusual in that he insists that his graduate chemical engineering students learn practical automation. "Throughout my career," Seborg says, "a key research objective has been to help bridge the acclaimed gap between control theory and industrial practice. In particular, I require my Ph.D students to do some experimental work as part of their Ph.D program." That used to be okay.

In the past, companies would hire operators, engineers and technicians and spend one to two years training them. Even with the coming knowledge drought, companies are refusing to spend to bridge Seborg's gap. As a result, many people seek out training courses offered by ISA, vendors and others, such as IDC Technologies and the OPC Training Institute. Most firms won't pay for it, so you have to look at it as funding your continuing education.

I've described the automation profession as being similar to Ginger Rodgers, the famed 20th-century dancer and actress. She did everything Fred Astaire did, but she did it backwards and in high heels. We are dancing, and we are dancing faster. We are critical to the economic recovery, and we'll find out that managements are beginning to notice automation and automation professionals' effect on growth, sustainability and profits.

## The Disciplines of Automation

Here's a list of the 37 subjects in Trevathan's "ABoK." You can see from these chapter headings just how complex the profession of automation has become:

- Process instrumentation
- Analytical instrumentation
- Continuous control
- Control valves
- Analog communications

- Control system documentation
- Control equipment
- Discrete input/output devices and general manufacturing measurements
- Discrete and sequencing control
- Motor and drive control
- Motion control
- Process modeling
- Advanced process control
- Control of batch processes
- Environmental issues
- Environmental monitoring
- Building automation
- Alarm management
- Reliability
- Process safety and Safety Instrumented Systems
- Electrical installations
- Safe use and application of electrical apparatus
- Digital communications
- Industrial networks
- Manufacturing execution systems and business integration
- System and network security
- Operator interface
- Data management
- Software
- Custom Software
- Operator Training
- Checkout, system testing and startup
- Troubleshooting
- Maintenance, long-term support and system management
- Automation benefits and project justifications
- Project management and execution
- Interpersonal skills
- Control equipment structure