Inside Bill Lydon's World of Industrial Control and Building Automation

Business Development Consultant Bill Lydon

Bill Lydon has the heart of a businessman. At an early age, he showed determination and progress. Lydon has gone from selling newspapers at age 12 to becoming a successful business development consultant working with various companies in the controls and automation field. In addition, he facilitates groups to solve problems and identify opportunities. In this interview, Lydon reveals his philosophy based on his experiences in the corporate world and forming a start-up company.

Q: How did your father influence your interest in electronics?

A: My father was an electrical engineer at Allen-Bradley for over 30 years so I was exposed to electronics early in life. We made a crystal set with an open crystal when I was probably about 9-years-old. I was really fascinated by it. I learned basic electronics by reading my father's copy of the American Radio Relay League handbook. This was a complete text on electronics from the basics to building amplifiers and radio transmitters. I drove my mother crazy because everyone knew they could give me their old radios and televisions. I would use them for parts to make amplifiers and mixers since I played guitar and a number of my friends were in garage bands.

Q: What was the most valuable lesson learned from your father?

A: You must understand the problem first before looking for solutions. Do your homework. People are quick to think they understand a problem without studying it to define the root cause. This was reinforced when I was trained to be a group problem-solving facilitator at the Creative Education Foundation, University of Buffalo.

Q: When did you begin to "sell" and "market?"

A: I was a paperboy for a weekly newspaper at 12-years-old, and it was also my first cold call selling job. Paper routes were assigned a territory, and I started with 80 customers on my route. In order to increase my route to 120 customers, I made cold sales calls to those people that did take the newspaper. I actually typed business cards on paper and had copies made to handout. I gave these to all my customers and prospective customers. It introduced me and stated that if they ever had a problem with the newspaper delivery to call me day or night.

I learned that people were almost always friendly if you approached them in an open manner and you could sell to them. Service is very important to people, and they rewarded you with tips! In those days a "paperboy" was in business for himself. You were a paper distributor buying at a discount and selling at list price. A paperboy had to order papers in advance and bought them at a discount. If your forecast was wrong, you lost money; the inventory had a shelf life of hours! You were responsible for collections. It was a great learning experience.

During college I had jobs selling tires and later men's clothing at an upscale store in Milwaukee. In both jobs I was working with experienced sales people and learned what constituted a good salesperson. People need to trust you, and you must have their interest at heart. This translates into listening to their needs, understanding and solving their problems, and providing customer service. You need to be a good listener and communicator to be a good salesperson.

Q: Where did you attend college?

A: I started college, but became a dropout. I just wasn't interested. However, I was fortunate to enroll into a unique two-year program at the Milwaukee Area Technical College. A man that left IBM started a program at the school to teach computer electronics, logic, and programming. He was a visionary. He only remained in academia about five years. He moved on to set up his own business in flight simulation. As a former IBM person he knew that schools had an advantage buying government surplus equipment which he did, and I was doing "hands-on" work with computers in 1970. Later, I attended Marquette University at night studying electrical engineering followed by business classes at the University of Wisconsin. I received credits for about 75% of an engineering degree and 75% of a business degree.

Q: What prompted you to join Johnson Controls (JCI)?

A: In my first real engineering position, I was employed by Sundstrand Machine Tool as part of a team developing new products for the direct-computer control of machine tools. Sundstrand was really pushing the

technology, and this was a serious application of real-time computing for controls.

However, Sundstrand was falling on very bad times with heavy competition in their basic business from foreign companies. I did research and found that Johnson Controls was just beginning to apply minicomputers to building controls. I interviewed with JCI, and they liked my background in real-time controls which was difficult to find in 1973. They showed me a room full of high-performance minicomputers in the development group and I was sold; let me play in this sandbox!

Q: What were some of the major things you accomplished at JCI?

A: One of my highly technical projects at JCI was to architect chiller and boiler plant optimization programs. I worked with an expert researcher at JCI in that field. My contribution was taking his concepts that were very elaborate and to develop methods to practically implement them in a product.

A major project was turning around the special projects group that did customizations of Building Automation Systems for customer projects. The entire effort was consuming too much manpower and losing money. Basically, our sales and design people were developing the solutions customers requested. This is a terrible way to do design. I stressed to our people that they should work to understanding the customer's problem and then propose solutions using as much standard product and software as possible. It took nearly one year to straighten this out, and I learned big lessons about managing developers, product management, and marketing.

A few years later management decided it was time to make a leap in technology from centralized minicomputer-based systems to using the latest technology. I was assigned along with four other persons to a full-time skunk works for two years to research, architect, and design new products and systems applying new technology. This was really exciting; we had a budget and a blank sheet of paper! This was also a huge departure from JCI's normal method of doing things.

We had great brainstorming sessions sitting around a waste basket with a tape recorder running, eating peanuts in the shell, tossing the shells into the waste basket while tossing out ideas! These were free-wheeling sessions that generated great ideas. We had the tapes transcribed and later analyzed the ideas.

We also utilized outside resources like Battelle, MIT, and independent consultants. The result was a new microprocessor-based Building Automation system. I was assigned as JCI's first Product Manager to launch this product line. It was quite a ride with product sales reaching $60 million the first year.

I believe we owe the products' sales success to "covering all the bases." In our skunk works effort, we tried to understand JCI's successes and failures in Building Automation. We defined and orchestrated week-long, off-site meetings with sales people, field application engineers, and service technicians to understand the problems and exchange ideas about improving JCI's products. We followed-up with onsite customer interviews. The end result provided us with a great pool of knowledge for our designs. In one respect, launching a new product of this scale is similar to launching an invasion.

As this grew I was assigned to the newly-created position of Product Planning Manager for the division. My staff and I developed various analysis and business strategies for the division. We also did the initial business and marketing analysis for the Metasys product.

I was also assigned full-time for six months with the Boston Consulting Group to realign segments of the business. In addition to contributing to this activity, I learned some great business analysis methods.

Q: Was JCI still heavily involved in pneumatic controls when you joined them?

A: JCI was heavy into pneumatics at the time and many in the company thought JCI should forget about wasting money on these new computer systems. I was involved in many meetings with the general management where there were heated arguments about this issue. It is important to understand that Building Automation lost money for a long time. We basically existed because the president of JCI at the time, Fred Brengel, was convinced in his "gut" that this was the future. It is great to work at a company with a visionary president!

Q: When did the term building automation become popular? Was not JCI a HVAC company?

A: JCI was founded as a temperature control company. Warren S. Johnson, was a professor at the State Normal School in Whitewater (later known as UW Whitewater), Wisconsin. In 1883 he received a patent for the first electric room thermostat. Professor Johnson was irritated that the classroom's temperature was never right which led him into this development. Johnson and a group of Milwaukee investors incorporated the Johnson Electric Service Company in 1885 to manufacture, install, and service automatic temperature regulation systems for buildings. His genius led him to design pneumatic controls which were superior to electric for various reasons. The company was renamed Johnson Controls in 1974.

I do believe the term "Building Automation," which became popular in the 1970s, was created by JCI and brought to common use by JCI's Vice President of marketing.

The root of building automation actually dates back to large panels of gauges and pneumatic switches to remotely monitor equipment and control temperatures in buildings, sort of a pneumatic SCADA system. The next step at JCI was the relay data logger that operated like an old telephone system linking temperature sensors to a central panel and to a very crude electromechanical printer that was actually a calculator. These things were electromechanical monsters!

Q: Who were JCI's main competitors at the time?

A: Honeywell was the major competitor. JCI and Honeywell still argue about who invented the thermostat. Powers Regulator was the distant third competitor that through multiple acquisitions has become Siemens Building Technologies. JCI and Honeywell were the major innovators in building automation and competition really helped to force the companies to enhance their offerings.

Q: What prompted you to leave JCI?

A: I was reporting to a VP and got caught in a corporate restructuring where my position was eliminated. I had offers in the company if I would relocate, but I decided to remain in Wisconsin. In addition, JCI was a fun place to work for the first 10 years, but the last three years the environment became too "corporate."

Q: What is Event Technologies, Inc.? Who coined the name "GELLO?"

A: After my departure from JCI, I worked in sales and consulting in energy conservation and industrial controls. Eventually, I co-founded and operated a "soft control" company named Event Technologies, Inc. (ETI). The company had a vision of creating automation and links from the plant floor to the front office without the need for complex programming. Everything would be accomplished with simple visual programming. We developed an object-oriented software architecture with visual programming for controls and automation before Windows was available, running on UNIX-based platforms. Later the software was migrated to Windows 3.1. ETI was the first of a handful of new companies promoting innovative software for programming industrial controls. We all thought everyone would dump their PLCs and use PCs as the industrial controls engine.

The name "GELLO" was coined by our chief software architect, Dean Hansen. GELLO is an acronym for Graphically Enhanced Ladder Logic Objects. One of our other software people created an icon of a parfait glass with Jell-O cubes in various colors. I decided to use it as a key icon for the company.

Q: Who do you feel is the inventor or leader in the softPLC market?

A: I believe Ron Lavallee, who created the FloPro software, is the inventor of the softPLC market. He provided new ways of implementing controls that were significantly different than the relay ladder logic approach and persuaded a group at General Motors to use it in a major production facility.

Q: You mentioned that most softPLC companies are out-of-business, but who would you consider survived?

A: In my opinion, there are no survivors. In a discussion that Ron Lavallee and I had a few years ago, he said a major controls user considered that the big benefit of the softPLC vendors being in the market was to force PLC companies to lower prices and add functions.

Q: The demise of the PLC with ladder logic programming has been predicated for years, but it is still here. What is the reason?

A: I think ladder logic is similar to spreadsheets; it will be part of the programming of controls for a long period. It is universally understood. Just like spreadsheets when you are required to implement more function, it becomes difficult and the user needs other tools to solve the problem.

Let me provide an analogous example. The developments at JCI had been carried out in assembly code. When I was on the skunk works, we decided to develop in Pascal because it was a structured and procedural language. When we brought this into the mainstream development group at JCI, some of the assembly programmers complained that it was too restrictive. They didn't understand that we were developing complex items and needed a better language to accomplish our task. This is similar to the situation I view with automation and controls. Automation and controls are getting more complicated and requiring better software tools and languages.

Q: IEC 61131-3 programming is quite popular in Europe, but has failed to catch on in the U.S. Will this change?

A: This is changing quickly as users are discovering the benefits of employing IEC 61131. A great example of this is the packaging industry users such as Hershey, Pfizer, P&G, Unilever, Nestle, and others working with OMAC. They have agreed on standard control for packaging machines based on IEC 61131. They have gone further by defining a library of IEC 61131 function blocks vendors must use to implement packaging machine applications.

The U.S. controls industry has always resisted standards and has been the last to adapt. U.S. controls manufacturers resisted IEC contactors and the DIN-rail standard for years but finally consented.
The Fieldbus war is another example where open standards were not available until long after the computer industry had open protocols.

In my opinion the reason open standards have taken so long to become used in the U.S. market is because of the dominance of a few vendors in the region effectively creating a closed market. It was not in the interest of the U.S. vendors to have open architecture products and this closed approach made it difficult for foreign vendors to penetrate the market. You could not find a foreign PLC in an American automotive facility until the last few years. This has been changing with the globalization of business and acquisition of U.S. companies by foreign ones. Now a sector of General Motors has standardized on Profibus I/O! The world is indeed getting smaller.

IEC 61131-3 is the market standard in Europe, Japan, and China. I think IEC 61131 is at the stage where adoption is accelerating in the U. S. as we are becoming a global economy, and the complexity of real-time control and automation is increasing. As Managing Director for PLCopen, North America, I am seeing the push by users for the use of IEC 61131-based products. All major vendors now have products that support the standard.

Q: Engineers perceive building automation and industrial automation as separate markets. What are the similarities and what are the differences?

A: There are subtle differences, but cost is the major one. Building automation systems are an inexpensive version of an industrial system. Controls response times are slower; the equipment does not need the electrical and physical protection required of industrial controls equipment.

Building Automation has a place in industrial plants for a number of reasons. I am writing a book on this topic for ISA (www.isa.org) and making a presentation at ISA Expo 2006.

Q: HVAC control loops are slow-acting, and now we see Ethernet being added to controllers. What advantage does Ethernet provide to building controllers?

A: There is a big installation cost advantage, and the promise of higher integration leading to benefits by using Ethernet. Ethernet is being integrated into the utility infrastructure of buildings just like water and electricity. This 'data utility' is employing Ethernet for computer networking and telephones so it is natural that the BAS use this infrastructure. Today, it is cheaper to purchase and run CAT 5 than control wiring. The wire can also take more abuse when installing.

Since control loops generally are self-contained in one controller, the communications performance really is not an issue.

Q: When will we ever see Ethernet-connected sensors and actuators in building automation?

A: Yes, in time, we will see these devices. There are two issues that need to be resolved before Ethernet can be used in a majority of applications to connect sensors and actuators: 1) The RJ-45 connector, while inexpensive, is not designed to handle the vibration and other issues for reliable controls. The industrial community is developing options with M12, M8, and other connector solutions that are too expensive for BAS. 2) Ethernet requires hub and spoke wiring. Sensor networks have been multi-drop to save wiring and termination costs.

Q: The BACnet and LONworks war continues. Which standard will emerge for the building automation industry?

A: My research indicates that LON is deeply entrenched as the sensor-actuator standard with BACnet as a distant second. LON has been adopted by a broad base of vendors. It is distributed, multi-drop network architecture. The LON challenge is to present a cohesive, technically viable IP solution.

Two major developments are impacting building communications, namely WEB services and wireless. The two competing BAS WEB services standards are oBIX and BACnet Web Services. This is again competing standards that should mean there will be faster progress. Wireless is full of hype, but the most sensible thing I have seen is the cooperation of the ZigBee standard with BACnet that has been announced recently.

Q: At one time there were only three major vendors of HVAC controls. How has open systems destroyed this model?

A: Open systems did create access for more companies to compete in the market. We saw this coming when I was still at JCI and, and we adjusted by selling shared savings and building services which made it difficult for the small controls' companies to compete. Honeywell and Siemens followed the same strategy to one degree or another.

I think the model evolves. Many of the open-architecture companies have been bought or are in trouble because they took on too much overhead trying to act like a JCI or Honeywell. Many moved into system integration and building services, but they could not generate sufficient sales volume to grow. In essence, they were copying the big guys. This put these companies in direct competition with their dealers while increasing overhead costs in a business where they could not win. This is very similar to the mistakes made by Digital Equipment and Compaq before they crashed. The problem being that you compete with your own dealers. Companies need to carefully select the competitive dimensions in which to build business.

The big long-term change in the market is the growth and dominance of the independent building automation system integrator. In order to grow, the major BAS companies began to provide services performed by HVAC and

mechanical contractors taking away business from the independent contractors. This business is stable and profitable. To compete, many of these independent companies have become building automation system integrators. These are strong companies that can compete locally with the major vendors on engineering, installation, and service. Open architecture means that the brand of BAS these companies sells is not the key to their relationship with customers. There are a solid group of these independents that have better overhead cost structures than BAS companies and develop strong loyal relationships with customers.

Q: How do you view Tridium by Honeywell? Is there no longer an alternative?

A: Personally, I hated to see it happen, but this resulted from having venture capital investors not committed to an industry. The VC job is to build-up an investment and cash out. It is hard to believe that this will not change the industries' opinion of Tridium.

Hopefully, Honeywell can manage this to keep Tridium as a leading technology provider in the industry.

Q: Looking 10 years into the future, what technologies will have a profound impact on building automation systems?

A: Wireless is starting to have an impact. The hype would lead you to believe that it will replace the majority of wired sensors. We don't have enough wireless deployed in the field to identify potential problems.

I would expect better HVAC systems that deliver comfort, air quality, and are low-energy users. VAV (Variable Air Volume) is the most widely used today. However, many of the systems do not deliver good comfort and air quality for a number of reasons.

Throughout the years, I have seen systems using more distributed computing and bandwidth rising. The same has occurred in general computing. This trend will continue.

Software to dynamically-control building systems would be a major step forward. Environmental control in most buildings is terrible, even if they have an expensive BAS installed. I would expect to see systems that offer improved control with significantly less engineering required.

Q: What is your philosophy based on your experiences in the corporate world and forming a start-up company?

A: There is seldom if ever a single "Silver Bullet" that solves a business problem. If you look at successful companies, they do a number of things right. Some things may standout and are perceived to be the ones that made them successful which is deceiving. It is difficult if not impossible to be perfect in all areas, but the combination of things a company does needs to equate to a positive.

You must develop, hone, and adjust your strategy to be successful and then use good tactics. I really love the quote from the Chinese General Sun Tzu, "**Strategy without tactics is the slowest route to victory. Tactics without strategy is the noise before defeat**." It sums up the challenge.

If your strategy is to produce the highest-quality products at the lowest cost, you are just trying to improve on best practices. That's not a strategy. This is operational effectiveness, and the things that you need to do to 'play the game.'

There's a fundamental distinction between strategy and operational effectiveness. Strategy is about making choices, trade-offs; it's about deliberately choosing to be different.

The irony is when we look at the companies that we agree are successful; we also agree that they all clearly do have strategies. Look at Intel, Toyota, Coca-Cola, FedEx, Domino Pizza, Wal-Mart, CISCO, Dell, Proctor & Gamble, and H-P. They all have or had winning strategies. Yes, some of these companies were winning and now have problems; the lesson is you need to periodically do a check on your strategy since the environment changes.

The essence of strategy is that you must set limits on what you're trying to accomplish. The company without a strategy is willing to try anything. If all you're trying to do is essentially the same thing as your rivals, then it's unlikely that you'll be very successful.

Part of a good strategy is to pick the competitive dimensions where you can exploit the weakness of enough competitors in the market to build your business.

The power of an idea is underrated, and most people do not spend enough time thinking. An example of the power of the idea is "Myspace" which was sold for $580 million recently. Ideas are the "lifeblood" of an enterprise; this is the reason successful companies periodically have off-site facilitated sessions to develop new ideas and strategies.

These are quotes from some really excellent executive leaders I have worked for throughout the years that have stuck with me:

"**You don't make money for doing the easy things everyone else is doing**."

"**When you're the fastest gun in the West, don't get into knife fights**."

"**Let's not drink our own bathwater**."

Leadership still counts. Leadership and integrity go together.

About his business...

Bill is a business development consultant working with companies in the industrial and building automation industries to create actionable marketing programs that increase sales. This is accomplished by first developing a strategic marketing focus to build a battle plan for success followed by creation of marketing and sales action plans. In some cases, Lydon fills the role of Business Development or Marketing Manager temporarily or long-term for a company based on their needs.

Lydon e-mails **FREE** weekly sales tips to people that sign up a **www.getmarket.com** to help them increase their sales effectiveness.

1952 Studebaker

In memory of his father, Ralph Lydon, Bill wrote an article about the family car. We would like to share Bill's wonderful story with you.

My Dad's Studebaker

One of the vivid memories I have growing up is of our 1952 Studebaker which was the family car, (one and only car in those days).

Let me tell you more...

Dad being an engineer knew every detail of our four door, flat-head six-cylinder engine, three-speed manual transmission with overdrive Studebaker Champion.

The Studebaker took us on many trips including our annual Christmas and summer trip to Grandma and Grandpa's house in Sparta, Wisconsin. Dad planned the time of departure, and we "hit the road" through hot weather, rain, thunderstorms, sleet, and snow many times over two-lane highways. I think this was part of a pioneering spirit and determination of his Irish ancestry.

We always made "good time" as my dad would say and my mother said a few prayers to get us there safely. I do remember two necessary and sufficient conditions required to pass cars on the old two-lane roads, overdrive and my mother uttering the words, "mother of God help us!"

Dad could pack that Studebaker and use every bit of space. Christmas was usually spent at Grandma's house and somehow he was able to sneak our gifts into the car without our knowledge.

One of the most memorable trips was to California in the old Studebaker. Dad took out the back seat and made a frame that fit on the floor so the baby red mattress could be laid on it for the three kids (Peter had not yet arrived). This provided more room in the back seat and storage space underneath for luggage and a cooler to keep milk, soda, cold cuts, cheese, and other items.

Dad bought a swamp cooler for the trip to California; it hung from the side of your car window. Fill it with water which soaks pads inside and the air moving through creates evaporative cooling. (Similar to the way evaporating sweat cools the human body.) I was getting a practical lesson in thermodynamics and enthalpy. (Which in later years I would use on a daily basis designing energy conservation systems.)

The next big lesson came after we bought a new car, and dad decided that he and I were going to overhaul the Studebaker engine, transmission, drive train, and brakes. This was a major undertaking that I think was designed as a learning project for me. We took apart everything and he explained each piece, how we would recondition items and replace others. Dad always explained things, and I learned about cars, engines, engineering, and mechanical principals behind the designs. It is hard to gauge all the things I learned from that experience.

Dad gave most of his tools to his grandson Rob (my son), and he has used them to work on and rebuild cars. Robert will be graduating soon as a mechanical engineer; he and Grandpa talked quite a bit about engineering and cars. I know Dad and Rob really enjoyed these discussions.

When I see Rob using some of the old tools, it brings back vivid memories of overhauling the old Studebaker.