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## Dick Morley—“Father of the Programmable Logic Controller”



**Dick Morley is the founder of Modicon (now Schneider Automation, Inc.) and the inventor of the PLC.**

**Today, he continues his work as a nationally recognized expert in the field of computer design, artificial intelligence, automation, and authority on the factory of the future. Morley is an engineer, consultant and inventor, who holds more than 20 United States and foreign patents. He is also host of the annual “Greek Pride**

**Day” festival in New Hampshire.**

**In addition to his many rewards and distinctions, he is father of three children and foster parent to 27! He is the author of three books and numerous articles; his website is [www.barn.org](http://www.barn.org). His latest book is “Out Of The Barn.” Our contributing editor Perry Marshall caught up with Dick to learn more about the man behind the reputation.**

**Dick, tell us a little bit about your growing up years...family and local environment...ambition and pursuit of knowledge.**

I was born in Clinton, Massachusetts—was in the third grade in farm country. We had a whole farm and no other jobs with 100% income from the farm. Long ride to school, and the farm was run by my mother’s side of the family of German heritage.

From the third to the seventh grade, I was in what would be considered today as the “bad sections” of NYC. We were children, and we accepted what was. From seventh grade to the end of high school, Highland Park, NJ and then to MIT for 4 years with no degree. Took some subsequent work in mathematics in graduate school at Northeastern.

The farming years were most important I think. Everyone had to work. I vaguely remember that we were driving the tractor when we were 6 or 7 years old. The men and the women worked in the fields and the only thing the kids were good for was brain work not muscle work. We did the apple picking, driving the hay wagons and all the rest.

My first mechanical memory was my cousin doing repair work on the tractor to the head. The motto that came back from that whole farming experience was, “Never pick up anything twice.” This means that if you make a road, make it 9 feet wide and salt it so you never have to go back to it. If you put up a fence,

make sure it’s strong enough to last 10 or more years. Repair will kill you, maintenance won’t.

When in New York, I found that action and speed were important. In hindsight, we lived in places that were—by today’s standards—rather violent. Diplomacy did not work—action did. You learned how to be diplomatic after the action had been completed.

With reference to ambition, I really had none. I still drift through life. I have come to the conclusion that the process of being is better than the goal of being.

One of the more interesting experiences was the Saturday night bath. All we had was one wood stove in the place that had any output at all, and we heated hot water kettles. The baby got the first pass through the wash tub; then each of the kids and finally the adults once a week. The chocolate donuts from the German baker from downtown Clinton were the best things that I can remember ever tasting. For us, junk food was lobster, swordfish and shark. Since we were on a working farm, it took me years before I realized that every ear of corn did not have a worm in it. We sold the ones with no worms and we ate the corn after picking them out.

**“I have come to the conclusion that the process of being is better than the goal of being”**

You mentioned curiosity, ambition and pursuit of knowledge. This implies goals and a goal-oriented life. My private joke is that I’m the oldest teenager in town. Mine is a process of living rather than a goal. Much like complex adaptive systems, an emergency property of your behavior is what determines your life. So the behavior was; don’t get hurt; have fun reading about technology; take care of your parents; and eat well.

My books were science fiction and comics. The first hardcover book that I remember—but this can’t be true—was “One, Two, Three, Infinity” by George Gamow. I also remember that just before my teenage years of a book written by the Bell Lab “meister” entitled “Signals, Symbols and Noise.” It awakened my life to the visionary aspect of technology.

To give you some idea of how this process and emergent property works, it is the college of my choice—because I made no choice.

I was sitting in the last row of my English class in my sophomore year. We were assigned to write away to colleges. Our teacher put a whole bunch of colleges on the board and had each student select one. Each time one was selected, of course, it came off the list. By the time it got to me, the only college left was MIT. I had no idea what MIT was so I said, "I have no choice, I'll pick MIT." My English teacher said, "If you get into MIT, I'll eat my hat." That was the beginning of that behavioral role.

In conclusion, my formative years were farms and gang associations in New York City and intellectual properties at the university. The farm, I think, set up my ethical values. There's an old statement I like that says, "Here in the northeast, we can eat our produce in spring, summer and fall. In the winter, we have to eat off of last year's planning." It forced you to think ahead and complete the task and do it right to start with.

I enjoyed working with my hands. The books were technical and science fiction as the primary emphasis that I remember. Almost none of the classics and none of what used to be called the humanities.

### **What was your first real passion as a science project?**

Fascinating question. One of the things I do remember is that I did practically no science projects at all while I was in the suburbs of New York City (Astoria, Long Island).

Looking back now, I realize it was not a very healthy environment for children, but nevertheless, I was there from the third grade through the seventh grade. Before that, I was raised on a farm and I assisted, but not substantially, in engine repair, sharpening axes and driving the tractor. On the farm, driving the tractor was a kid's job because you couldn't do the heavy work. When you could reach the clutch pedals, you drove.

Afterwards, when we moved to Highland Park, NJ (near New Brunswick, NJ and Rutgers University), I began to take up some minor science projects. For example, I decided to build my own air conditioner—which was a failure. I made my own 4-cycle engine from a machine with steel—another failure. My life is littered with failures.

There were some things that were successful in erector sets; however, I designed and constructed several versions of a "walking machine" which worked very well. There was a robotic device balanced on two pods—one slow and one dynamically balanced on two legs that ran across the room at high speed. It was, in effect, unstable without dynamic motion control. The unit had no intelligence but generally moved on alternating pods.

During that time, I also played around a lot with chemistry sets. I was a typical kid—dogs, chemistry sets (primarily with explosives and visible reactions), log cabins, some electric trains, motors and some automobile work but not as much as you might expect.

The first real science project I became involved with was in chemistry in high school with an iodide formulation that was very explosive to the touch. We made some of that to see how it worked. We also played with DC excitation of a fluorescent bulb and used that to modulate voice. Two things happened. One was we could transmit over a photoelectric beam and secondly, because it was DC excited, you could see the bands of voice in the fluorescent tube. We then subsequently did a demonstration in the high school auditorium of connecting the stage to speakers in the back of the room on the balcony. To run the wires was almost impossible and we did it as an experiment. We also did some staging for magician's tricks both with lighting and smoke affects to get the thing going.

Most of my science projects were not research but fun. They were dynamic, reactive and they elicited a sense of wonder from my audience, consisting primarily of my mother and dad and my brothers.

In hindsight, I notice that I was a curious person with respect to the world around me while I was on the farm and when we moved to New Jersey. But the years in New York City seemed to be "lost." I checked with my two brothers—Bob and Jim—and found that, lo and behold, they can't remember anything that happened in NYC either, other than survival.

I don't know what my first real passion was other than the passion of living. I always have about half a dozen irons in the fire at any one time and I love the moment of discovery. Richard Feynman was a master at this. Feynman would ask, "Why does a piano smash when it hits the sidewalk?"

My question would be, "Why don't we make computers a certain way" or "What would happen if we didn't use thermocouples but back-biased diodes? "Can we build a..." and on and on.

I've gotten all kinds of awards. SOME of which I think are deserved. I've been in the technology business, the science and discovery business for so long now that it's a lifestyle rather than a talent or a gift. Much like the chef who has learned how to cook over many years. It's not a gift; if it had to be taken by fang and claw from the world around us.

Gifts are usually not accepted well. It's when you work for them that it makes a difference. So, us guys, who aren't as smart as you might think, have to make sure that our persona and act satisfies the audience.

**"Most of my science projects were not research but fun."**

## Can you tell me about the process of starting to discover what your true gifts really were?

I'm not sure quite what you mean by "gifts." I understand the question, of course, but it's a most difficult question to answer. First, because I don't consider myself extraordinarily gifted and second, because most gifts are, like Edison said, "One percent inspiration, 99 percent perspiration."

It seems to me that most of us are presented with what we call gifts during our whole lifetime. The secret is being able to open the door when Mr. Gift knocks on it.

I guess I remember a couple of items in history. When I first went to school, very early on—before the third grade I believe—I learned how to read before most people and they had a game/test in school. The teacher would write down a number from zero to nine and the kids would try to guess it. There was yelling and hollering and they finally decided that was pretty good—all these kids trying to guess the number.

There was a problem though—I seemed to guess the right number an inordinate amount of time. Pretty soon there was the principal and a number of other teachers and they would make a demonstration about how I could guess the number she had written on the paper well before, with a higher percentage of accuracy than common sense would dictate. They decided it was some kind of psychic gift or some such nonsense.

No one dreamed of asking me how I knew the number. Finally, one of the teachers asked me about the number and I pointed out that since we could see the eraser of the pencil, the eraser traced the same path as the number and it seemed to me that it wasn't a guess and it was very simple, indeed. Most gifts are perceived that way—as somehow mysterious and strange when, in fact, most of the solutions and explanations are relatively simple.

The other that occurs to me is when I was in high school I had rheumatic fever. I was bedridden for many weeks and missed most of the report card term, roughly one month, as was in vogue at that time. In particular, English was an interesting subject because I could return, take the test, and pass with flying colors. I got very good grades on my English tests and my teacher came over to me and said, "Richard, you got good results on your tests and your grades are very good, but I'm going to give you a D. "Why?" says I. "Because smart people like you have life too easy."

That was also an awakening: "If the light's too bright, put a shade over it."

**"Most of us are presented with what we call gifts during our whole lifetime. The secret is being able to open the door when Mr. Gift knocks on it."**

These stories are, in hindsight, interesting. But at the time they occurred, I thought nothing more of the matter and moved on. My gift for languages was negative indeed. It took me four years to get three years of Latin under my belt, although I took four years of physics in the class of '54 at MIT. I never got a degree. The primary reason was because at the time the requirements included having to learn a foreign language.

Great writers, astronomers, painters and artists have the particular talent of working on their strengths, not their weaknesses.

When I was very young I could speak and understand German so I elected to study German. But I could not get it through my cement skull what the language was all about. Interesting that the gifts are not so much gifts as selection of where to put your neurons. Do you put them in languages or do you put them in technology?

I learned something from Tiger Woods. He pointed out that he works on his strengths in his golf game, and not his weaknesses. That makes him a better golfer, and in some sense separates him from the normal, well-rounded golfer. The answer is—don't be broad and well-rounded—be narrow and deep. Put what little brain power you have and exercise that talent well.

## What was the first major disappointment in your career and how did it affect you?

I guess I've got to set the stage for this one, as well. The question implies that I have a goal in mind when I do something. Au contraire, noble editor. I have a process in mind. My fun and challenge is the process. I fully understand that 80% of what I attempt to do is going to be goal failure but not process failure. In other words, it's much like skiing or riding a motorcycle. As a downhill skier, I don't "go" anywhere. It's the ride.

**"Innovation comes from the road and the observation of it, not the destination of the road."**

As a motorcyclist, while my wife is driving the car and I'm riding the bike and she says, "I'll try to find the shortest way home," I say, "I don't want the short way home. I want the long way home because of the ride, not because I wish to go home."

The question implies that there is a disappointment in not getting home or to the right house on time or on schedule. Any one of my friends will point out that I'm not a very good manager. But I am a good thinker and innovator. Innovation comes from the road and the observation of it, not the destination of the road.

This concept is hard for most people. For instance, if I would like to be a chef—and we owned a Thai restaurant at one time—I would certainly want to

cook. It does not mean that I want to eat. The question is that if I bake a cake and don't eat it all, is that a disappointment? No. In fact, I need not eat any of the cake and, as a matter of fact, I may not even finish the making of it, if I'm teaching a student how to bake a cake. There is pride in the work itself and the ability to work is only limited by the hours in the day and the 70 years of life.

In the sense of the question, there are a great many disappointments. We do angel and small company investments and a large percentage of them "fail." We estimate that half of them break even (the living dead) and only 10 to 5 per cent succeed in the sense of decent payback for the investment made. Are we failures as angels and venture capitalists? Probably not. The portfolio of life experience, not the individual events in it, are the stew of life.

But let's get back to what you mean by disappointments. When I was very young, I found that I could make an electromagnet by wrapping wire around a piece of steel. In this day and age, that still seems like magic and it certainly was at that time. Later on I knew about electromagnetism and electricity but at that young age I didn't know about it. I took the iron and wrapped a wire around it and found I could make the electromagnet.

That was fascinating. Of course, to the young, unformed cement in my skull. I said, "Gee, if that's the case, then I should be able to take that same electromagnet and drive it from a speaker on the radio and take another electromagnet and have a speaker across the room that wasn't wire-connected. I could make a wireless connection between speakers." Son of a gun, it worked. The problem was, and my disappointment was, that Maxwell and all radio people had discovered this way before my time—I had discovered something that had already been discovered long ago.

I don't know how this affected my life but it certainly pushed my thinking further into the future so that when I invent something, I want to make sure that it was, indeed, innovative. I have a small bumper sticker in mind as I'm writing this. It says, "Engineering is solving problems, innovation is making problems."

So really, this question is the toughest of all. My job and accomplishment is in attacking the problem, not solving it. I have difficulty talking about the word "disappointment." My biggest disappointments are generally with people. People do things that I find I'm disappointed in. My disappointments are that people believe in the horoscope, crop circles, alternative medicines and the like. Those are disappointments in my life. People look at things and certainly adhere to the bumper sticker that says, "Believing is seeing."

**I'm going to guess that corporations and quarterly profit types, ruthlessly pragmatic people in the business world, have sometimes not understood your obsession with "the process."**

**"Engineering is not solving problems, innovation is making problems."**

I don't consider the business types ruthlessly pragmatic, but instead, realistic. It turns out that profit is the protein of a business or enterprise. And as such, the animal we call an enterprise must survive on a day-to-day basis. It must have water and food like any other organism in the universe. We cannot feed them once every ten years.

There are animals, such as polar bears that can go for weeks without food and do so on a continuous basis. But most of us have to have something to eat at least once a week and water at least once a day.

On that note, we have to satisfy their needs. I really do try to take my far-out projects that have a life span of, say, five years and make sure that each stage of that project has a benefit to the enterprise, funding the endeavor at least once a year. In other words, every year they should get a chance to eat.

I'm reminded of the people of the equator who, when they're hungry, take a banana off the tree. That's not pragmatic. I'm also thinking about the people of the frozen north who, on a daily basis, can barely survive.

The temperate zones, however, are where you find the people who have the ability to plan. As I sit here in the middle of New Hampshire, for example, I notice there's a foot or two of snow outside and it would be impossible to live here without planning. We have here approximately eight months of excellent growing weather. We can eat and live quite well.

But, you say, "What do we eat in the winter?" We eat the plans we made in the summer. So we have to both eat and plan. But we can't plan too far ahead.

We do, however, buy houses that way, raise children and the like. We have what amounts to a 20-to 50-year life plan. You may go to high school, choose your career and operate in that career mode for 30 to 40 years. Not unreasonable.

Business leaders are not ruthlessly pragmatic, but I think they understand instinctively that they have to deal with keeping the organism alive and then make choices. Wealth is defined by me and my motorcycle buddies as "the ability to have choices." On that basis, we have to be wealthy in the short term so we can be wealthy in the long term. And the future feeds off the plans made today.

The position you are in today descended from decisions you made five years ago. Almost every CEO

I've spoken to understands that. People like Dick Morley, however, have trouble understanding that they also have to make payroll next week. Both of us are needed, but as Edison said, "It's one percent inspiration, 99 percent perspiration."

**I suppose people come to you from time to time because of your reputation, and they have a business or technology project they want help with—but they don't understand how you think. So how have you dealt with that?**

People do come to me from time to time because of my overblown reputation and they have a business or technology that they want help with. Most of the time, however, they have a direction they want help with. I feel like Lucy in Charlie Brown—"Psychiatry-5 cents."

It turns out my physics training was excellent for this. It allows me to look at what is rather than what should be.

Many times they don't understand how I think and I sometimes don't understand how they think. It's what makes the world go around. Let me give you an example.

In England, they drive on the left hand side of the road. We, in America, consider that the "wrong side." We should, however, only consider it the other side, not the wrong side. They don't understand how I think and that's fine as long as I can deliver for them. I feel like the car mechanic or the chef. No one needs to know what we do in the kitchen. The process in the kitchen is unknown to the casual diner and should stay that way. Most people I know who worked in restaurants don't like to eat in the ones they worked in because they saw the process.

**As a young man, how did you feel about the business world?**

When I was a young man, I didn't think much about business, or for that matter, much of anything except technology. I read Popular Science, Popular Mechanics, had erector sets, Tinkertoys, electric motors, chemistry sets and all of those good things. I did not have an MBA kit or a social studies or geography kit or a "cool" kit. Most of the kids I hung out with were dealing with the world as it is (by facts), not the world populated by opinion.

Have you ever noticed that on public TV they never show the life of the corporation? They show the life of some obsolete tribe, the life of the Aztecs, the Romans, the religious lives, all of the various liberal and conservative factions, but I've yet to see the life of the corporation presented as a live, dynamic entity.

Remember, these organizations—such as the army and the corporations—support our whole species, not

just a style or an ideology. I feel about business the same way I feel about an ant colony: it needs support and protection in order to thrive.

**As far as "people" disappointments, what were some early projects that were rough in the people department?**

**"The people who are most dangerous are the chameleons."**

That's an intriguing question. I'm having trouble thinking about a true disappointment, but I have come up with surprises. There are four

kinds of people as Napoleon said: busy bright, busy dull, lazy bright and lazy dull. The most dangerous are the busy dull and the most useful are the busy bright. The lazy dull and the lazy bright are critiques of society in general, they seldom contribute in any form.

There is another common thing we talk about here. There are various people we call good guys and bad guys. Now, the bad guys we can deal with as well as the good guys. The reason we can deal with those, and they're never disappointing, is because we know, generally, what reaction and direction we will get, given we stimulate these people in a certain way. And these people can trade things just like driving on either side of the road.

The people who are most dangerous on the highway, however, are the chameleons. They drive on both sides of the road. The chameleons are most difficult to deal with and are the most disappointing. A good guy, for example, who suddenly does something unforeseen to his comrades, or the bad guy who is suddenly a good guy. The chameleons are the most dangerous because of their unpredictability.

My son, Robert Morley, died after eight years from aplastic anemia, at the age of 32. If there was stem cell work during his life, there's a strong chance he would be alive today. I consider the liberal fascists and the conservative communists who hold their idealism above human life as a disappointment.

Another disappointment I had was with Jesse Jackson in Florida. Although I do not approve of his idealism, I was disappointed in the fact that he did not work for his idealism before the elections but complained after the elections. If Mr. Jackson had worked hard before, he would have gotten his man in. I somehow thought that Mr. Jackson was more intellectual and idealistic than that. In other words, I hoped he would work for the cause to win, rather than for the publicity opportunity of after-the-fact rhetoric.

In project work, I seldom, if ever, am people-disappointed. I find I have to avoid certain people and "do it myself," but in general all of us are alike. It's our expectations that give us the trouble.

We expect too much from ourselves and from our comrades-in-arms. If we keep our expectations in the

animal kingdom rather than the moral, idealistic kingdom, we are seldom disappointed; life goes on and we can deal with the world the way it is. One of the late-night talk shows—I think it was Jay Leno—had someone like Tom Hanks on. Tom Hanks' career went up and down. Jay Leno asked him how he solved the problem and Tom Hanks said it was only three words that helped him solve the problem. They were “Deal with it.” If you have a flat tire, fix the flat. Don't be disappointed that the tire went flat.

We teach our foster kids that everything that happens to them is a result of the process they were in and that it's their own fault.

### **Tell us about the AEG acquisition of Modicon and then the Schneider ownership.**

If my memory serves me right, AEG was not the first acquisition of Modicon, Gould was. Gould was an old line battery manufacturer run by a fellow named Ivelsector, which Fortune Magazine called of the five toughest bosses in take USA. I admired him because I thought he was a realistic, as opposed to a politically correct, MBA.

Nine years after the technical founding of Modicon, Gould acquired them. Gould had acquired Modicon in 1977 as part of Gould's expanding into a mini-conglomerate. Second generation Gould management were (or wanted to be) Jet-Setters and they tended to run the now public corporation as they had a privately held Gould. They bought a Florida executive jet service, a polo resort; and gave Prince Charles and Lady Diana a Condo as a wedding present.

After that acquisition, AEG acquired the Gould Automation Group in the early '80s. At that time, Modicon was the major component and the money-maker for the Gould group. Schneider acquired Modicon via the Gould/AEG Automation Group and still owns them.

One of the reasons we sold was because in the early days of the Modicon board there was a desire of some of the investors and venture capitalists to liquidate their holdings—a reasonable desire. After all, it had been a decade. But also, the new conglomerate hit financial skids and, pushed by analysts, cutbacks became the order of the day. Viable assets like Modicon were on the block. After a major goof by top Gould-Modicon management, AEG acquired Modicon. I think this was about 1988 or '89.

AEG had an awkward two chains of command handling their American assets and they also got into financial trouble. The German Gov't leaned on Daimler-Benz to bail out AEG and D-B pushed AEG to stop the bleeding. In 1994, AEG sold half their interest of their PLC & industrial controls business to Schneider

(Brussels) who controlled Telemechanique automation products. In 1996, Schneider bought AEG's half and became Groupe Schneider.

The last survey we did on venture capital indicated that the average time from the back of the envelope to full liquidity is nine years. Most “overnight” successes take the better part of a decade. Certainly a long night.

To some extent, the acquisitions are merely the stockholders, not the companies. I was neither truly an employee nor a member of the corporation other than a board member and consultant to the Modicon group. My role was primarily the design, at least in concept, of the first units and guidance thereafter. The early units clearly had my hand in them, but on the later units I felt like a pearl. As you know, a pearl is an irritant that gets covered with a comfortable, smooth, hard coating and later in life, expelled from the organism.

My association with the technology was from 1968 to after 1998, clearly a long reign. It lasted longer than the stockholders' acquisition.

From my point of view, the stocks and who owns them is, in part, the paperwork. Since I am merely an actor on the stage of a Woody Allen movie, the character I play (i.e., the one who owns the stock) is a flashing involvement. A deep involvement, certainly, but I know there will be another movie to act in and another owner. The technology, however, marches on.

My deep concern with the ownership was whether or not the ownership with the board became truly short-term financial, blocking what I consider to be the geek-like process of technological evolution. The mutation we call the programmable controller needs to evolve to optimize its status on the landscape of survival.

In other words, the Gould/AEG/Schneider sequence of ownership from a private company had little or no effect upon me. I remember clearly when Gould sold to AEG. We had a big meeting down on Cape Cod and I was wearing a Gould tie on purpose.

I stood on the stage, took off my tie, put it on the ground and stamped on it. My short and entire talk was:

## **“Modicon is back.”**

The crowd was in ecstasy. Remember, the village I live in is populated with engineers.

**“Most ‘overnight’ successes take the better part of a decade.”**

**OK, so you're the famous inventor of the PLC. How do you view that accomplishment in the context of the other things you've done in your life?**

Interesting question, but again, it is a sequence. In the past I have been involved with things such as the ABS system in your car, the floppy disk, magnetic thin films and super computers. I think that the PLC is certainly the "biggest and most important thing for society that I've ever done other than my 27 foster children plus my own three.

**I'm a firm believer in the mafia rules:**

- Take care of your health
- Take care of your family
- Then take care of your business

For me, business is the conversion of basic ideas on the innovative trail to deliver to the marketplace better things for better living, to paraphrase an old General Electric motto.

In other words, the PLC is important to the automotive discreet and process business. Discreet (things) and process (stuff) is significantly involved. My philosophy is that since nobody wants their children to work in automotive plants or chemical plants putting tires on Buicks and making chemical fertilizer—these jobs have left the country.

Because those jobs left the country, our competitive survival depended upon automation. The jobs leaving caused automation to occur. Automation did not push the jobs out. The jobs pulled in automation.

Some of the theories of innovation and the PLC indicates strongly that the inventions make themselves and the so-called inventors are merely the closest bystanders when the happening occurs. My daddy told me, "Tis better to be lucky than smart."

**"Automation did not push the jobs out. The jobs pulled in automation."**

I get asked the same thing about writing books. It isn't the writing that's the enthusiastic process, it's the "having written" that's the important part. Most of the true stories of my comrade inventors indicate that the real story is not the story you read in Time Magazine. The real story is one of annoyance, pain, hobbies and "why don't they?"

We don't seem to have a goal, we merely seem to have a process. Invention, innovation and "the importance of the invention are outcomes of the inherent process of trying to build sand castles on the beach.

**What do you feel the biggest chasm is right now that needs to be crossed for automation to move forward?**

The classical manufacturing business has moved out of the US. Right now, most of the factories we are involved in are assembly processes, not manufacturing processes. China is a huge percentage of the world's manufacturing at the moment and is in the de facto manufacturing department of most American companies. This is not because we feel as though that's the way it should be, it's just that the factor of ten difference in cost and the willingness to take it on are important.

**"Bankers do not grow a community, the use of the bank's assets in taking risk does."**

Although laudable in many cases, environmental concerns, zoning and lack of engineering and manufacturing heroes block the growth of manufacturing here in the U.S.

As an example, machine tool business and manufacturing business for the US is down quite a bit. This is not because the machines that we purchase, either here or globally, are not effective; it's because no high school graduate dreams of running a CNC machine. They prefer guitars, movies and sports.

I'm reminded of the Forbes list of the 400 richest people in America several years ago. About 30% of them did not have a college degree, and there were very few entertainers, sports figures or company presidents on the list. It was primarily populated by driven people, many in the growth of the technology arena we call engineering, innovation and development.

Moving forward across the chasm of innovation and improved productivity is culturally difficult in the manufacturing segment. In pharmaceuticals, your children's education and fighter aircrafts, we have no problem making innovative statements. But in manufacturing, we look for the dreaded four-letter words:

**"Near-Term Cost."**

The emphasis on cost, instead of value, is our blockage.

The only way to create wealth is with innovation. This essential truth must be transmitted to the next generation of doers in the application of automation technologies.

I'm a small player in the angel investment business. We accept individual risk because the portfolio rewards are high. The risk-reward ratio is the key element. Zero risk is a mathematically impossible goal to achieve, but what can be achieved is value across the portfolio that steps forward on the risk-taking landscape.

As Shaw says, "All progress depends upon unreasonable men." Bankers do not grow a community, the use of the bank's assets in taking risk does.

In order for us to have automation move forward, we must embrace modeling, the magic of predictive technology, the disassembly of IT standards and the acceptance of "what is," not "what should be."

*Our thanks go to Ken Ball for contributing to this article. Ken Ball is recognized as a long-time writer and publisher in the automation business.*

*He began his career as an engineering physicist. Ball had some experience with Martin Aircraft's advance design department on a nuclear seaplane project and in unsteady flight trajectory analyzes. He joined Mine Safety Appliances (MSA) and developed trace gas detection instruments.*

*In 1967 Ball joined Rimbach as an editorial director for I & CS until Rimbach sold out to Chilton Publishing and Chilton decided to re-locate the Rimbach Group out east. That's when Ball set-up his own business in the early '70s in which he did some simple systems engineering plus technical writing.*

*On a contract basis, he has been the editorial director for ISA's InTech and Programmable Controls Journals. He also applied his skills as an editor with the Carbide & Tool Journal and the Abrasive Engineers Magazine.*

*While working on Programmable Controls, he became friends with Dick Morley and participated in the "Club-of-Detroit" meetings. Since that time he has been collecting material on the PLC, incorporating it into articles as needed.*

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