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In R&D centers worldwide, molecular biologists are working with mechanical engineers. Physicists are

The Times They Are A'Changin'

19 DECEMBER 2003

Bob Dylan's classic says it all. Yes, times are indeed changing. Benjamin Disraeli, 19th century British prime minister, said that "Change is constant." So, if change has always been with us, and is a constant part of our lives, what is different about the transformations that are happening now?

Plenty. This time the changes are coming at us in layers of complexity so difficult to forecast that career preparation takes a backseat to developing another skill: *adaptability*. It is the flexible career strategist who will make the successful entrée into the industry job of the future--and who will stick it out the longest. You can prepare all you want to, but if you get out there into the job market and find that companies are looking for something else entirely, you've got to be able to adapt.

I've just returned from the NanoCommerce 2003 conference. I believe that we will soon see technological changes of such magnitude that our place in this future will be a moving target. Today, and for the next year or two,

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choosing a discipline is still fairly easy; the landscape for technical jobs is broad and includes hundreds of niches, each of which may form the basis of a good industrial career.

But this is changing quickly. Niches are drying up and new ones are forming. Disciplines are converging, more rapidly than ever. In every scientific discipline someone is announcing--credibly, in some cases--the end of "traditional" science in that field. We've entered a new era. Shooting for the moon or stars is old hat. We are going the other direction. In the new era, it pays to *think small*.

The Race to the Bottom

Nanotechnology is not one technology; it is a collection of technologies, much like biotechnology. Whereas sciences such as physics, molecular biology, and chemistry are (mostly) discrete and unrelated, with planes of intersection, certainly, and overlapping regions, they all seem headed down the same path, toward a common goal. The keynote speaker at the NanoCommerce conference called this the "the race to the bottom."

Scientists of the future will think about invention quite differently than they do today. Instead of chipping away at large objects to make small ones, or combining large pieces into a larger whole, future inventors will assemble new inventions by moving nature's building blocks on the atomic and molecular levels. The only difference between dirt and a potato, as one speaker noted, is the way these building blocks are arranged. Once you realize this you get an idea of the tremendous power that exists to be harnessed in the new field--or fields--of nanotechnology. It won't happen until someone hits the grand slam, finds the holy grail--choose your favorite cliché--the development of a "molecular assembler." Right now, dozens of firms, in many nations are involved in the race to construct a device that can construct other things from scratch. The entrepreneur who makes the molecular assembler a reality may end up as the next Henry Ford.

Or maybe not. Who knows if it will ever happen?

As Yogi Berra once said, it's tough to make predictions, especially about the future. That's the funny part about change: You can't forecast it. It's a thrilling vision, but it could be smoke and mirrors, drummed up to increase investor enthusiasm and to make a few people rich. But even if nanotechnology falls short of the vision of its ardent supporters, the times they are, indeed, a'changing. Career paths are converging; disciplines are merging and some will get crowded out. The key to dealing with rapid change isn't anticipating it, but adapting to it once it happens.

The Convergence of Existing Disciplines Creates New Fields of Work

The birth of new scientific disciplines isn't new. Biochemistry came into being as the result of collaboration between biologists and chemists, and biophysics has established a foothold when physicists took an interest in biological problems. Kevin Ausman, executive director for operations at the Center for Biological and Environmental Nanotechnology at Rice University, describes the process this way:

"Scientific disciplines proceed through a period of stasis until a profitable area of overlap with another discipline is identified. At that point, intense collaboration proceeds until either the interesting work dries up or a new discipline is established at that intersection." The bottom--the place at the end where all things converge--is one heck of a big and complicated intersection.

"What makes this time in history so unique is that not only have these scientific disciplines come to a profitable intersection, but there are

engineers meeting at this point as well," continues Dr. Ausman. Engineers often start work on a problem only after the scientists are finished with it. And scientists and engineers are famous for not being able to work together well. The nanotechnology revolution could change those perceptions forever.

In R&D centers worldwide, molecular biologists are working with mechanical engineers. Physicists are engaged in problem-solving with their colleagues in chemistry and fluid engineering. Materials scientists and software engineers are huddled, working on common ground. ... Gradually, the *independence* of the ivory tower is moving to the *interdependence* seen most often in entrepreneurial companies.

In that kind of environment, the flexible person wins out.

The Second Curve of *Your* Career--Where Will It Take You?

Ian Morrison, president of the Institute for the Future, wrote a business book on forecasting change--*The Second Curve*--that was popular in the late 1990s. Morrison describes his theory of change and what it means for companies. *The Second Curve* also addresses career management.

"Managing [a company or a career] in this world of change is a lot like playing three-dimensional chess where you've got to see both near and far at the same time as you prepare to move up, down, across, and sideways," says Morrison in his introduction to the subject of adaptability.

Morrison's theory is that there are two "curves" that you must pay attention to in the development of your business (or career). One of these is the traditional first curve, in which you are learning and developing expertise on a given discipline. If you are a molecular biologist, this first curve may have you starting out as a junior member of the lab and eventually ending up a principal investigator. You see your path ahead of you on this curve. What gets most people into trouble, according to the author, is when they neglect to look for the inevitable "second curve" which intersects the first at some point down the line. The second curve can carry your career into dramatic new areas.

"To start with, you must understand the sources of the second curve," Morrison says. "It is a phenomenon that is fueled by massive forces of change over which you have no control, such as new technologies. You'll have to confront second-curve career choices. Do you hang on to the perceived stability of a dying first curve? Do you jump to the second? Staying put may be a mistake, but jumping too soon to a

premature second curve can also get you into trouble. You need to formulate strategies--both personal and professional--that will help you deal with change. Because the biggest mistake--the fatal mistake--is to do nothing."

Your Adaptability Strategy

Here are some ideas that will get you thinking about your personal strategy for adapting to change--and convincing employers that you can change:

- Employers appreciate multidisciplinary backgrounds. Make a note of each experience you've had working with various disciplines, and especially your shared accomplishments. Keep a record of these going back to your earliest education for discussion in future interviews.
- In your journal reading, do you see a subniche in your discipline that has the power to explode in an entirely new direction if developments continue? Is this "second curve" something that you could conceivably be involved in? Would you like to be? What could happen to your niche if you stayed the course instead?
- Are there other technologies (such as my example of nanotechnology) that could collide with your field in the future? What will happen to the traditional career paths if this occurs?
- Develop a "change chart." Identify every time you've made a significant change in direction, and what the benefit was to your job skills. What occurred for you when you changed gears from microbiology to chemical engineering? What advantages did you bring with you into your new role? Refer to this chart before any job interview.

In Closing

Uncertainty is everywhere, including my column this month. And because uncertainty is all around us, you'll need to learn to live with it. You must keep your eyes and ears open and look for opportunities to ride this wave of uncertainty into exciting new fields, new endeavors, and new rewards.

Yogi Berra was right about prediction. He was also known to give good advice: "If you come to a fork in the road," he offered, "take it."

Reference:

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www.ianmorrison.com/books.html

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