in the short run. Management had considerable discretion to either broaden the exceptions processing job or leave the previous job design intact. Some banks have kept jobs in exceptions processing specialized by function, even after introducing check imaging. Not enough time has elapsed to judge whether the different ways of organizing work in exceptions processing reflect equally productive ways of organizing the tasks, or whether competition will reveal that one way is more efficient than others. But we suspect that Cabot Bank’s choice effectively takes advantage of the interdependencies among exceptions-processing tasks and will be rewarded by the market in the long run.

**CONCLUSION**

So why did things at Cabot turn out one way downstairs and another way upstairs? Research by Professor Assar Lindbeck of Stockholm University and Dennis Snower of the University of London suggests that managers combine tasks into broader jobs when the tasks are complementary and create single-task jobs that take advantage of specialization when they are not—for example, in Adam Smith’s pin factory. It seems likely that the reason new technology resulted in narrower job definitions in the Deposit Processing Department downstairs at Cabot Bank is that there was little complementarity among the tasks. Once imaging reduced the cost of moving check information from one worker to another, it made sense to exploit economies of specialization. On the other hand, complementarity among tasks in the Exceptions Processing Department upstairs made task integration attractive.

This appears not to have been the only consideration, however. Upstairs managers also seemed to have the explicit goals of making jobs more interesting and involving the workers in the redesign. MIT Professor Paul Osterman has pointed out that where managers care about the quality of customer service and the well-being of employees, we tend to see integrated job designs. ✷

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**Business is kabooming**

*By Jane Harrigan*

Begin with a glittering silver chrysanthemum, 1,000 feet wide, exploding over the Washington Monument on the Fourth of July. Proceed to Boston, where, with each cymbal crash of the “American Symphony,” the pistils of giant red flowers strobe 1,000 feet above the Charles River. Take your pick of 700 other fireworks displays from Miami to Minnesota to Montreal. If you could follow a string of colored stars from all these productions back to their source, the trail would end at a tan, brick, and metal building on a rural road in southwestern New Hampshire. Here, behind a door guarded by jade lions, the 22 employees of Atlas PyroVision Productions choreograph the displays that illuminate the nation.

Here in Jaffrey, population 5,500, handmade shells designed to Atlas’s specifications arrive from Spain and Japan and China and accumulate in three concrete-walled magazines holding 60,000 pounds of explosives each. Here, the latest computer equipment calibrates the precision firing of a crude product that has changed little since the Chinese invented gunpowder over 1,000 years ago. Here, Stephen Pelkey,
A hometown boy makes good with a bang by setting fireworks to music
the hometown boy who made good with a bang, surveys a decade of 800 percent growth and distills a simple lesson: In life, as in fireworks, timing is everything.

When Pelkey took over the fireworks company from his father-in-law in 1986, it was a typical mom-and-pop operation. Pelkey does not pretend to have foreseen the combination of circumstances that took Atlas from the $500,000 business to the nearly $5 million in annual sales it does today. He didn’t predict them, but he’s happy to list them: Computer technology took off. The economy boomed. Corporations started sponsoring municipal displays as advertising. First Night celebrations and ski resort shows extended the fireworks season year-round; concerts, ice shows, and sports events brought pyrotechnics indoors. All Atlas had to do, Pelkey says, was hire people with imagination and take advantage of the technology.

In its early days, Atlas manufactured shells and sold them to volunteer fire departments that shot small-town displays. Pelkey and his wife, Dee, immediately began dreaming of something more. They drove to Montreal for the international fireworks competition, taking notes on technology and artistry as the icons of the pyrotechnic world fired off displays set to music. The couple made the trip eight times, but it had taken only one night for Pelkey to read the writing in the sky: “After seeing that first show, I knew this was exactly what I wanted to do.” He invested in a basic computer firing system and began to practice coordinating fireworks with music.

More than 400 companies in the United States shoot fireworks, but only about a dozen can put together the equivalent of a Pyrotechnic Symphony, a name Atlas has trademarked. By feeding individual pieces of music and reams of statistics about all kinds of shells into a complex computer database, the choreographer of a display can ensure, for example, that a five-inch shell with a lift time (time to achieve altitude) of 3.75 seconds will be shot into the air exactly 3.75 seconds before the moment at which it must burst to complement the music. The shells don’t just explode in time to the beat, Pelkey says. They illustrate the music, rising and falling in intensity or tracing piano key strokes across the sky.

Achieving that level of sophistication took practice. “If you’re proposing a full-scale production for D.C. or Boston or Disney, they ask, ‘Have you done this before?’” Pelkey
Although timing is important, quantity counts, too. In the display over the Washington Mall, Atlas sets off 6,500 separate ignitions. The typical town display uses only about 1,200.

The Chinese invented gunpowder.