

LIFE IN THE U.S.

ENGINEERING

Why nothing seems to work

By Rasa Gustaitis
Pacific News Service

San Francisco commuters are still complaining that their space-age, multi-million dollar BART (Bay Area Rapid Transit) is a malfunctioning boondoggle, if not downright dangerous.

And pedestrians in downtown Boston still look apprehensively skyward when passing the towering John Hancock Building, for fear those popping windows will one day hit a target.

Why is it that so many of our most sophisticated technological achievements continue to be plagued by near disasters? Why doesn't anything work anymore?

Eugene S. Ferguson, curator of the Hagley Museum in Greenville, Del., believes he has the answer. The problem, he says, is that the engineers who design today's technological behemoths no longer conceive them visually. The computer has been substituted for human vision.

Ferguson predicts that the problem will only get worse. "The more complex the machinery, the more often it will be out of order," he says.

"Something that the man in the street knows but most of our technicians don't is that much of machinery is out of order much of the time. The assumption of the engineer is that it will work."

Failure to see whole picture.

In engineering schools visual design courses that cultivate perception are being squeezed out by scientific analysis and computer mathematics, Ferguson has observed. Consequently, engineers can calculate but often can't use their designs in relation to their context.

This failure to see whole pictures leads to fiascos such as those that have afflicted the highly automated BART system, which has malfunctioned in alarming ways. Doors have opened while trains were moving. Trains have zoomed past stations without stopping, carrying anxious commuters to the end of the line. Electronic monitors have failed to detect a train on a track, threatening rear-end collisions.

The management finally resorted to a very old-fashioned safety measure: phoning ahead, station to station, to warn of on-coming trains.

BART "is a classic result of systems engineering uninformed by minds that can visualize the mundane things that can go

wrong," Ferguson wrote in a recent issue of *Science* magazine. "Absurd random failures that have plagued automatic control systems are not merely trivial aberrations; they are reflections of the chaos that results when design is assumed to be primarily a problem in mathematics."

Much creative thought in design is visual. Its language is in pictures that cannot be translated into words or equations.

Without visual design skills, engineers can calculate but often can't place their design in relation to its real-life context.

"Pyramids, cathedrals and rockets exist not because of geometry, theory of structure or thermodynamics, but because they were first a picture—literally a vision—in the minds of those who built them," Ferguson argues.

Artists and engineers.

Many of the great technological designers in history have also been artists. Leonardo da Vinci may be the best known among them, but in his time he was not alone. In Renaissance engineering, art—not science—was the guiding discipline, according to Ferguson.

Even into the 19th century, some of the great technological designers were also artists. Benjamin Henry Latrobe, a prominent consulting engineer and architect, was an accomplished watercolorist. Robert Fulton, known for his steamboat, and Samuel Morse, inventor of the electric telegraph, turned from careers in art to technology.

Using their intuitive sense of rightness and fitness, designers created the suspension bridge, the clock, the motorcycle. The notion that scientific information alone shaped them is "a bit of modern folklore," says Ferguson.

Yet in recent decades, as the scientific component of technology has expanded, the trend has been away from non-verbal thinking and toward verbal and mathematical analysis. Nonverbal thought is now generally viewed as less rigorous

and useful than cognitive reasoning.

"There may still be engineering graphics courses in some schools," says Ferguson, "but they are going out as the new breed comes in and the old dies out."

Engineering students used to be assigned exercises that required them to think in ways that could not be reduced to mathematics: design a container for an egg that will let it drop three stories without breaking; design a wheelchair that will go up stairs. They used to work a lot with three-dimensional models.

Sense of "fitness."

Now, says Ferguson, engineers learn the computer approach to drafting and designing. This requires them to convert mathematical descriptions to pictures in their minds. In the process, they can easily lose sight of the whole amid the scattered parts.

Ferguson began to understand the problem, he says, one snowy day when he boarded the modern high-speed Metroliner in New York only to find that all trains that day were being pulled by slow 40-year-old engines. The new engines were out of service because the designers of the sophisticated control gear had failed to consider that, during a snowstorm, the fan that sucks in air would also suck in snow.

He realized that failure to consider such simple possibilities also lay behind many of the failures of BART. It also helped him understand why the John Hancock Building in Boston kept popping out windows until an expensive stabilizer was devised on top.

The current "systematic but intellectually impoverished engineering approach" to design is leading to a technology that is devoid of a "sense of fitness," says Ferguson. For instance, it is not fitting during this time of high unemployment, he argues, that automatic fare cards be used in transit systems instead of human ticket salespeople.

It also is not reasonable, he says, "that a man who earns \$6 an hour on an assembly line should be forced to have someone come in to replace a part on his washing machine. That machine could be designed simply so he could fix it himself by changing a washer, but to do so would be bad corporate policy."

Rasa Gustaitis, is an associate editor for Pacific News Service.

(off the record)

By Sidney Blumenthal
and Danny Schechter

Informed Sources

Even before Carl Bernstein's story was published in *Rolling Stone* about how 400 American journalists worked in one capacity or another for the CIA newspaper editors were issuing flat denials.

It seems doubtful whether the public will ever know the full extent of CIA-media collusion. This latest revelation received scant interest in the dailies and was consistently downplayed, relegated to back pages. When the Senate Intelligence Committee was looking into these charges over a year ago the papers also dealt with the story skittishly.

The *New York Times* reported on the Bernstein story: "Much of the information in the article about purported relationships between reporters and the Agency... has been reported previously by the *Times* and other publications." The *Times*, however, dropped its investigation after the CIA assured it that none of its reporters were on the Agency payroll.

Actually, Bernstein does present new

facts. A dismissive attitude on the part of the *Times* and other publications will not make them evaporate. One of the incidental consequences of Bernstein's story is that the *Times* has renewed its request to the CIA for names of its reporters who might also have served the Agency. Does this sound like the *Times* is taking Bernstein seriously? Perhaps its attempts to publicly diminish the significance of his report shows that it does.

The importance of the inquiry is not necessarily to expose the names of CIA-sponsored journalists, but rather to detail the nature of the CIA-media relationship. Names are important, but the name of the game is even more illuminating. The intelligence community is deeply involved in monitoring and influencing the news received by unwary readers. Stories in *Time* and *Newsweek* citing "Western intelligence sources" as the only sources in foreign reports indicates a glimmering of what this relationship is about.

Part of this shrouded CIA-media alliance is rooted in shared perspectives, social worlds and even expensive lunches. Many top media executives float in and

out of high governmental posts—John Chancellor of NBC was chief of the Voice of America, for instance—helping to create a seamless point of view.

Controlling the flow of foreign news is not difficult since it comes to the American audience from a narrow number of sources. "Approximately 75 percent of the news most Americans read [and hear] is provided by Associated Press and United Press International," the *Los Angeles Times* reports. Both UPI and AP are listed by Carl Bernstein as being CIA-tainted. Only the hierarchies of these operations and others need be penetrated or influenced in order for the Agency game-plan to be effective.

Outside direction is probably superfluous since almost all media are already supportive of the essential multinational corporate strategies for dealing with and reporting the world. The *Christian Science Monitor*, in a recent stark example, editorialized in favor of capitalism. "The honorable fruits of capitalism are the best defense of what is still the soundest economic system the world has devised," the paper baldly stated.

Jane Melnick



A bird lies stunned after crashing into McCormick Place in Chicago. The designers of McCormick Place made the largest entertainment center in the world, but neglected to consider the fates of thousands of birds that crash into the dark glass every year.

Coors strike

Continued from page 5.

Criswell's experience with the Coors empire, which encompasses a construction company, a can and bottle plant and a paper company in Boulder, Colo., goes back to 1973 when he was given a temporary job as a bricklayer in their construction division. Within a year he was a victim of a mid-winter layoff, so when the company offered him and 20 others a job in the brewery he jumped at the chance.

For the next two years he moved from department to department—from the brew house to the filtering department to the water storage plant to the fermenting department, where he became a

Coors called the workers together and told them how he was going to do everything in his power to make Colorado a right to work state and defeat all unions.

"yeast pitcher." By July 1976 he was so sick of the whole thing that he applied for management training "in the hopes of getting a job on the outside and traveling."

After a month-long training period, he was made coordinator of "Operation Control," a new branch that "handles anything that has a negative effect on the sales or distribution or production of the beer. It also deals with security. I had authority to shut down the plant for a given reason," he explains.

Coors had definite ideas, however, about what was sufficiently dangerous to warrant a shutdown of the whole facility. "We were in charge of anything that would happen in regards to bomb threats," he says. "I was instructed to clear only that immediate area where anything would be. So if the next department might not be affected, I was not to let them know anything about it."

"What they really didn't want was to slow up production and I didn't feel like that was a just cause. If you're dealing with something like bombs, it's far safer to have everyone out of the area completely."

Sought out information.

Increasingly disgusted with Coors' "philosophy and attitude," Criswell began using his position to obtain information on Coors' operations. When he and his secretary began checking the names and addresses of company employees, they discovered a "huge amount of people that were interrelated—all Caucasian. We could not come up with anybody who had a supervisors job for more than a year who was a Chicano, a woman or had a common Jewish last name," he says.

"We also concluded that no women were working in the production departments prior to 1971 and that about 90 percent of the minorities were paid very close to minimum wage. An awful lot of the lower jobs were filled by minorities."

"There are Chicano supervisors who work there now," Criswell adds, "but it's tokenism."

Criswell's explorations also turned up some income tax procedures, going back four to five months, that had to be changed to conform with federal regulations. But his department head refused to take any action. When he mentioned it to another boss, "it came down that we were to bury that information and destroy the records. We said we wouldn't do it. And since we stuck to our opinion, it was decided that it would be best to transfer us out," he says.

"After these experiences and the whole bizarre atmosphere, I felt it was best to

try and go back to the calm and quiet of the union side."

Anti-union campaign.

It was only "calm and quiet," however, until Hurricane Bill Coors swept into action. In December 1976 he held his annual meeting with employees—affectionately called the "Christmas meeting"—and "announced that he was going to take on the unions and that the Teamsters, especially, were not going to have any authority whatsoever. He told how he was going to do all he possibly could to make Colorado a right-to-work state and defeat all the unions in the areas where he sells beer. He would not have the company out of the hands of his family and would not be told how to run his business."

When their contract expired in January, Criswell's local had to comply with Coors-sponsored state legislation that requires a union to gain the approval of 75 percent of those it represents in order to remain certified. "They held the voting in a construction area where there was no lighting, no wall structures up or anything else. Since it was new, people were not really aware of where it was. Even the ballot was worded in such a way that it confused those without PhDs," Criswell says.

Coors contact.

Nonetheless, the union received 92 percent of the vote. Bill Coors was reportedly enraged and reacted by trying to install his own contract.

"Not the contract the union had been bargaining, nor the contract he said he wanted. It was brand new," says Criswell. The contract provided for lie detector tests for employees, departmental seniority (which employers routinely use to get rid of unwanted workers), physical examinations upon request and a change in shift differential payments (*ITT*, May 3).

When members of Local 366 walked out, Coors replaced them with office personnel who had been trained for the last year and a half to fill key production positions. Vacations were cancelled and new employees worked 12-hour days, seven days a week.

"As a result, they've destroyed about \$2 million worth of beer. Recently one guy opened the caustic valve and they had to dump out \$80,000 worth of beer. We really don't have to level the plant—his people are going to do it inside," Criswell says.

To build the boycott the union gained the support of the AFL-CIO and contacted Chicano groups, which have been fighting Coors for years to force them to begin hiring minorities for higher company positions. "That's why we thought a boycott could be successful—the Chicanos and blacks are still being discriminated against. The lie detector tests and psychological evaluation tests are tools they use to keep minorities out," Criswell says.

Attack on right.

Criswell now travels across the country, on \$25 per week, organizing support for the boycott. He and other organizers view it both as battle for the human rights of Coors' workers and as a blow against Coors growing network of right-wing organizations. Coors is a major source of funds for the American right, says Criswell, and is connected to Anita Bryant's Save Our Children in Florida, Ronald Reagan's campaign efforts, the John Birch Society, and the Committee for the Survival of a Free Congress. (In 1971 Joe Coors quit the National Association of Manufacturers because it was too liberal; he rejoined in 1973 when a Coors man was installed as senior vice president.)

"We have got to organize people to stop the flow of his beer," Criswell says. "If the boycott works, we are not only defeating Coors, we're defeating the right-wing Republicans and we're showing them that they can't just go in with dollar bills and take over every state they touch and make them right-to-work states. Please go home and get the beer off the shelves."

THRILLS, CHILLS AND SPILLS AT THE U.S. GRAND PRIX

Continued from page 24.

at least several miles long, demands precision work by mechanics and near-perfect concentration by drivers.

Near-perfect luck is required too. Englishman Tom Pryce died in this year's South African Grand Prix after his car struck an anxious race official who had run into his path. The official, who was carrying a fire extinguisher to a wrecked car burning alongside the track, was killed on impact. Pryce apparently died an instant later when the fire extinguisher struck his head. His car sped on, colliding with another before being demolished as it reeled off the track at a sharp turn.

For their participation in so risky a business, Grand Prix drivers often are seen as fatalists. Almost unanimously, they disagree, asserting that—bad luck aside—they are in control on the track.

Conservatives.

Jackie Stewart, the all-time most successful Grand Prix driver and the author of a highly revealing autobiography, *Faster!* (Farrar, Straus and Giroux, 1972), has said he has never known a driver to suffer an emotional breakdown. Most drivers, he maintains, take few uncalculated risks—on the track or off. They are business-minded and politically conservative.

"To drive a racing car, you must be conservative. You cannot be a radical, someone who's given to spontaneity or enthusiasms," Stewart says.

A charming and articulate Scotsman, Stewart was a guest of royalty and the leading capitalists of Europe during a nine-year career that ended with his retirement at age 34 in 1973. Largely through product endorsements and television appearances, he made nearly \$1 million per year at his peak.

Stewart's 27 lifetime victories established a record that may not be equalled. Only one currently active driver, 28-year-old Niki Lauda of Austria, seems to have much chance of catching him.

Return from the dead.

Lauda, with 15 triumphs, was named the top driver of 1975 and appeared on his way to a similar honor in 1976. Then last August in Nurburgring, Germany, he nearly became the tenth driver to die on an unusually lengthy (14-mile) course, long regarded as the most treacherous on the Grand Prix schedule.

In a fiery three-car crash, his lungs were scorched by the heat of flames that horribly disfigured his face. He was not expected to live. A priest administered last rites over him.

Lauda says he heard the priest, understood him and decided he liked the challenge of trying to stay alive. Astonishingly, he was back in competition within six weeks.

Lauda's face advertises racing's perils. The fire left him missing part of an ear and some of his hair. Much of his once pale, boyish facial skin has been replaced by withered scar tissue.

Lauda's driving ability, on the other hand, seems unchanged: he arrived at Watkins Glen, the fifteenth of 17 Grand Prix races this season, needing just a sixth-place finish to clinch another driving title.

Corporate backers.

In a prerace poll of drivers Mario Andretti (one of three Americans among the 26 entrants) was picked as most likely to win because his fast, but oft-troubled car was in unusually good shape.

Andretti's machine is bankrolled by a cigaret manufacturer. Others have financial backing from the suppliers of wine, travelers checks, magazines and an assortment of automotive goods. In exchange, the cars bear the insignia of their patrons. Thus, each time a car is shown on film or

in a photograph, its sponsor gets exposure too.

Raymond D. Saunders, general manager of Kendall Oil, proclaims his company's decades of racing sponsorships have "given [us] a million lines of publicity in the car books, the daily press and national magazines."

But perhaps no one puts more money into racing than the sport's customers. Admission to the 1,100-acre Watkins Glen complex costs up to \$23 per person. An additional \$50 is required for a seat at the start/finish line.

But while the prices are far greater than at most other athletic events, so, too, are the diversions. In addition to the Grand Prix, there are vintage car parades, celebrity races (with George Plimpton demonstrating he has failed to master still another sport), film festivals, rock bands, skydivers and Penthouse Pets.

The Bog

And there is the Bog, a barren plot where violence is the main attraction.

Unwary motorists who venture near the Bog on Grand Prix eve, when some 2,000 celebrants spend at least part of their evening there, are likely to find themselves surrounded by rock and bottle throwing 18 to 21-year-olds who delight in smashing windshields and frightening passengers.

Unlocked cars are stolen from their parking places, pushed to the Bog and burned. No less than a half-dozen cars, including a 1977 Capri and a 1976 Plymouth, were destroyed there this year; once a bus was burned.

The \$2 Grand Prix official program, published by the local nonprofit corporation that sponsors the race, contains advertising for T-shirts exhorting "The Bog Wants You." And the Bog's violence occurs with little interference from Watkins Glen security personnel. Security team members were on hand at the Bog on Grand Prix morning—in time to guard the charred remains of cars destroyed the night before.

"Those goons in the riot squad can't do shit to us," asserted Jerry, a 21-year-old Rochester resident who wore a Notre Dame sweatshirt and said he was unemployed. "Man, the Bog belongs to the people. You come to the Bog, you ought to know what to expect. You can't get mad just because you get a little roughed up or your car gets a little dented."

Never seen the race.

As he spoke, Jerry was helping his two companions load the pickup truck in which the three had arrived. The mid-afternoon race was nearly five hours away, but they and other were preparing to leave long before its start. "Watch the race, you kidding?" Jerry asked. "I've been coming here for three years and haven't seen one yet."

"Think we ought to take this home?" One of his friends held a hand-lettered sign inscribed "Show Us Your Tits." It was hardly original. Similar signs dotted the complex, where males probably outnumber females by at least 4-1 and unaccompanied young women are frequently taunted and sometimes molested.

Drunken rowdiness was nearly nonexistent by the time the first of 59 Grand Prix laps around the 3.4-mile course got underway. James Hunt was second to Hans Struck in the early going, then took the lead for keeps on the fifteenth lap when Struck was sidelined by mechanical woes.

Only a frantic late surge by runnerup Andretti kept the race from being a runaway.

Lauda, meanwhile, finished fourth to complete his successful title quest. No drivers were injured nor any cars badly damaged.

Out of their vehicles and relaxing for the first time all afternoon, Hunt, an Englishman, laughed when the Penthouse Pet of the Year called him an "All-American." Andretti, visibly disappointed at losing, explained he had "had to try" although one of his front tires was about to blow out on the final lap. And Lauda, whose mere presence perhaps symbolized a greater achievement than any of his racing victories, smiles patiently as he was praised.

All three look tired.

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