PROLOG

THE UNOFFICIAL MR. R

A drawerful of plaques…a scrapbook of newspaper clippings…snapshots of men clasping hands at a farewell banquet…

These are the pedestrian objects that surface on the tide of a man's life, inanimate stand-ins for a caring human being, traces of those ritual honorings that said "this man is somebody." We hold on to the flotsam and jetsam because it betokens a life rich with accomplishments, but the objects themselves hold little meaning. We look into and beyond them to conjure up the man himself.

…a brown marble desk set engraved "From Your Friends at Rex Manufacturing"…a Holy Bible presented by the brothers of Warren Lodge No. 15…a tiny gold-framed photo of a smiling couple dressed for a picnic…

A line of dust rolls along on the horizon of the Indiana countryside, trailing a badly dented late-model Chevy sedan. Behind the wheel sits a man in his early sixties. He is short and thick, gray haired, wearing thick glasses. He drives like a madman, heading for Indianapolis.

…life membership in the American Ordnance Association, dedicated to scientific and industrial preparedness for the common defense, June 1943…a Hebrew prayer book adorned with silver and turquoise…

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This man lives in a small town, in the house he bought thirty-two years ago when he married Myrtie Barnette of Franklin, Indiana. He smokes a cigar. He brags about his golf game. He goes to temple on high holy days. He carries a buckeye in his pocket for luck.

…a shiny long-handled shovel, used just once, a few spots of rust showing the passage of time…fifteen Steuben glass figurines, one for each year served as bank trustee, carefully tucked away in a cardboard box…the Partners in Progress award presented at Sears Tower, September 1976…

This man is Sam Regenstrief. He makes dishwashers for a living, more dishwashers than anyone else. He is a wealthy man, with a net worth of more than $50 million. His employees call him Sam, or Mr. R.

…silky bright colors, the honorific garb of universities never attended…portraits of a husband and wife hung in a lobby, she wearing the same peach dress in which she was buried…

Sam Regenstrief is a man of contrasts. A leading citizen in his community, he seems embarrassed and shy when in the limelight. A great talker, he leaves his listeners scratching their heads. Master of his company domain, he visits with workers on the picket line. He drives his managers to distraction, but wins their devotion. He'll spend only ten bucks on a pair of shoes, but he gives away a fortune so that ordinary people can have excellent health care.

…a Grand Sachem's framed invitation to attend caucuses, conclaves, powwows, and other affairs of state and conviviality among fellow Sagamores of the Wabash…the miniature helmet of a samurai warrior, gift of a company far away…

This is the story of a complex man. It is also the story of a family, a small Indiana town, a dishwasher company, a failing county hospital, a reason for philanthropy, an era of optimism, a construction project, a medical record system, an ending, a harvest, and a rich inheritance. Sam Regenstrief does not tell his own story—the man rarely writes anything down. He writes, instead, vivid memories in the minds of those who know him.

Memorable is one word for Sam—unique, charming, cantankerous, controlling, intuitive, generous, and humble are some of the others—and many who knew him remember him fondly. In the spirit of their words, this is Sam's story.

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SAM'S BABY

At the age of 48, in Connersville, Indiana, Samuel Nathan Regenstrief fathered a child. The October 31, 1958, *News-Examiner* carried the story:

> Connersville industrialist Sam N. Regenstrief announced today that he is forming a new company and has contracted to purchase…a large portion of the plant and equipment of the American Kitchens Division of the Avco Manufacturing Corp. The new company will be called Design and Manufacturing Corporation and will manufacture products involving plastics and metals. Its products will find a high potential market among manufacturers of household appliances, office furniture, building materials, and many other lines.

It was no surprise that Sam's baby made headlines. The hotshot management consultant who had turned around the town's failing Rex Manufacturing Company and had gone on to become a vice president of Philco Corporation was coming home to Connersville to stay. For Indiana's "City of Industry," that meant jobs.

A tranquil town nestled at the foot of a hill midway between Dayton, Cincinnati, and Indianapolis, Connersville had the distinction of having launched the nation's first high school band. But almost from the time that pioneer John Conner established a trading post along the banks of the west fork of the Whitewater River, the site had potential for manufacturing. Connersville became a vital stop along the original Whitewater Canal extending from the Ohio River to Hagerstown, Indiana. A Mr. John McFarlan started a buggy business there in the 1800s and converted a five-acre cornfield into the nation's first industrial park, which became home to makers of automobile bodies, axles, enclosures, engines, lamps, springs, and tops. Known to many car buffs as "Little Detroit," during the 1920s and 1930s Connersville manufactured some of the finest automobiles ever built—the Auburn, Cord, Lexington, and McFarlan, among others.

Sam Regenstrief was coming home to the simple life in a Connersville that he already knew and loved. A man of substance, worth several million, he had been traveling about the East Coast looking for a place to land, a place to invest his talent for squeezing pennies out of manufacturing processes and to use his solid experience in metal bending. At his age, and with his considerable wealth, Sam could have chosen an early and comfortable retirement. But retirement was out of the question for this energetic man who defined himself by hard work. Life had not been easy for the burly redhead with the green eyes and charming smile. He was born into a nation on the brink of war. His mother bedridden, he had raised a younger sister and sold newspapers to help support the family. This pattern of effort, established young, still served him well in his late forties. "I just like to work.... I'm driven to accomplishment," he once told a reporter. Retirement was not for Sam Regenstrief. After twenty years of helping others run their manufacturing operations,

this efficiency expert was ready to risk his fortune on a business venture he could call his own.

"Sam Regenstrief—yesterday an immigrant newsboy, today a millionaire businessman and philanthropist—is living testimony that the American Dream works."
Indianapolis News *editorial, January 31, 1972*

Sam's younger sister Helen Barrett is the only sibling of Sam's still living, so by default she has become the family historian. What Helen knows of their earliest years as a family comes from stories told to her by her four brothers—Sam, Morris, Nathan, and Sigmond—and her sister, Sara. All but Helen were born in Bucharest, Romania, although when asked where he came from, Sam usually said Vienna or Austria, perhaps because these names would be more familiar. In the family's transition from World War I Europe to the sleepy midwestern town of Indianapolis, some of the details of family history got lost. It is said that fire destroyed their family papers. Half the family spelled their name Regenstrief, the other half Regenstreif—Sam used to sign it both ways.

Of the siblings, only Helen could be sure of her exact date of birth. The Regenstrief children figured their ages according to the closest Jewish or Christian holiday. They would say, "Well, I remember when you were born—it was the month of [such-and-such holiday]." They kept track of their ages not in absolute terms but in relation to other members of the family. Helen always knew she was fourteen years younger than sister Sara and twelve years younger than brother Sam. Sam Regenstrief celebrated two birthdays because one person told him he was born in November and another said he was born in June. The family had to nail it down somehow when as a teen he applied for citizenship papers, for which he had to have a birth certificate. He didn't have one, so they created one for him. No one who wrote about Sam in later years could agree on a date either. Sam's own statement—a rare written document from a man who never wrote things down—says he was born in Austria in 1906 and came to this country about two years later. The

Connersville News-Examiner had him born November 22, 1910, in Vienna. *Fortune* magazine brought him to America at the age of four. An investor's report on Sam's company had his birth date as May 22, 1911, and so on.

Sketchy as the facts may be, the outlines of the story are clear. Sam's father Isig (Isaac) left his wife Fannie Widenfeld Regenstrief and children in Romania and crossed the Atlantic to establish a new life for them in America. Before he could bring the family to join him, World War I broke out. He started a bakery on the lower east side of New York City and sent money to the family while they were trapped in Europe. The family was eventually reunited in New York, but Isig soon decided that this big city was no place to raise children. They packed up and moved again, this time to Indianapolis.

The Regenstriefs' first home in Indianapolis was a flat above their Southside Bakery Co. at 507 South Illinois Street, not far from the downtown post office and old Manual High School. That's where Helen was born. Not long after, the family moved into their own home at 715 Union Street, just across the street from Indianapolis Public School #6. Sam's father continued to eke out a living in the bakery business. His sons would later found the Regen Baking Company at 826 South Meridian Street, dropping the "strief" from the family name for the name of the business.

Helen Barrett recalls that Sam was one of the most important people in her life. But she's not so sure that, when she was born, he and sister Sara were glad to have a new baby sister around the house. Their father had just started the bakery and was struggling to keep food on the table for his six children. Their mother was sickly, having first contracted influenza and then Parkinson's disease, which was little understood at the time. The doctors pulled all her teeth, though they were perfectly sound, thinking she was being poisoned by infection. With Fannie Regenstrief confined to bed much of the time, the responsibility for raising Helen fell on Sara and Sam. Sara was the disciplinarian—"you shouldn't do this,""you can't do that" is all Helen remembers about Sara from those days. If Helen wanted anything or needed help making a decision, she always turned to Sam. He would show her how to get what she wanted by work-

ing for it. "If I wanted a bicycle," she said, "Sam would say, 'Go over to the bakery and earn the money.' " He made her feel she could get something if she could just figure out how to go about it.

As a child, Sam occupied himself by taking his sister's toys apart and putting them back together, foreshadowing his later fascination with manufacturing. There were signs of his knack for making money too. Sam's first employees, while he was still in grade school, were two of his younger brothers, Sigmond—or Zish, as he was known—and Morris. He paid them to sell the *Indianapolis News* at his stands on the corner of Meridian and Washington streets and outside the Guaranty Building on Monument Circle. Sam was always the first *News* boy to grab the home-edition copies of the afternoon paper and run them up to University Park, where he knew that a goodly number of unemployed men would eagerly buy a paper to search the classified ads. Only after making these sales did he move on to his regular newsstands. He and his brothers had a pretty good monopoly on the afternoon newpaper business in the downtown area. They later took over the night stand at Illinois and Washington to sell the *Indianapolis Star* as well.

Sam Regenstrief, the green-eyed, red-headed baker's son who felt he could conquer the world

If Sam was profit motivated later in life, perhaps it was because, at an early age, he had to be. His father was busy surviving in his new business, and Sam's business acumen added up to extra money for the family. "Sam not only worked hard," said sister Sara, the late Mrs. Louis Cohn, "but each week he would turn over to his mother everything he made except ten cents. He would then spend five cents for ice cream and proceed to turn the remaining nickel into another dime. He was always putting his time to some good use."

Sara used to say that Sam was the type of guy who felt he could conquer the world. Sam was not big physically, but he was not afraid to test his mettle. One day he came home black and blue all over. His father asked what happened and

Sam finally broke down and told him that he had entered the Golden Gloves boxing tournament and lost. Sam got a worse beating from his father than from the guy who was in the ring with him, Sara recounts. Sam attended Emmerich Manual High School, where he participated on the track and field team and his brother Nathan (Nate) was a star basketball player.

Sam was just seventeen and little Helen only five years old when their mother died. Sam had adored his mother. As a youngster—back in Austria, Romania, or wherever—he had once been kicked in the ear by a horse, but he kept it quiet because he didn't want to upset her. (Photographs show that his ear hung a little funny ever afterward.) Isig Regenstrief soon remarried, so Sam, his two sisters, and three brothers now shared their home with a stepmother, "Bubbie" Alice, and her son Abie and daughter Lilly, who were close to Helen's age. The Regenstrief household had quite a few mouths to feed.

"How could a person like Sam not be successful? He had such a mind on him."
Helen Barrett, Sam's younger sister

Journalistic opinion is mixed as to whether Sam worked the night shift while finishing high school *(Fortune)* or dropped out of school to help earn money for the family *(Indianapolis Star)*. But there is general agreement that some time in 1929, on the eve of the stock market crash, Sam took a job at the Real Silk Hosiery Mills in Indianapolis. He was a timekeeper. Quite simply, he walked around with a stopwatch, timing production at each step of the hosiery-making process.

"Now, some timekeepers are destined to be nothing more than timekeepers," a colleague would comment years later at an award ceremony, "but young Sam's deep interest in people and his keen perception for efficiency quickly translated this rather menial job into time-and-motion studies, how to encourage workers to do more and better work in less time." Perhaps Sam's days with a stopwatch brought home

Frederick Winslow Taylor's notion that every single act of a workman can be reduced to a science. Taylor had made a splash in the industrial world with his principles of scientific management and spawned a new class of management consultant—the *efficiency expert*. At Bethlehem Steel, Taylor had shown that men could carry forty-seven tons of pig iron a day (the average at the time was twelve and a half tons) if they followed a precise regimen of periods of carrying interspersed with periods of rest. His colleague Frank B. Gilbreth had analyzed to the nth degree the motions involved in bricklaying and had succeeded in reducing the usual eighteen motions to five by placing equipment in precise positions and having the workman pick up a brick in his left hand while taking a trowelful of mortar with the right, effectively doubling his speed.

Sam continued his education on a part-time basis at Indiana University's old extension center in Indianapolis. After two years at IU he went to the Baum School of Engineering in Milwaukee, where he alternated six months of study with six months of working on an actual job, thus getting both management and engineering training. Sam was attending the school when Mr. Baum gave up his school and went to the Real Silk Hosiery Mills as a time-study engineer. Baum installed new labor-saving systems, and Sam assisted him there for about two years.

A budding expert on stockings and lingerie, Sam went to Chicago in 1930 as a consultant with the James L. McKinsey Co. and slipped immediately into a job at the Phoenix Hosiery Mills in Milwaukee. He was assigned to study and install production methods, labor-saving plans, and budgetary controls to reduce costs and increase operating efficiency. The Great Depression had set in, and, as management consultants tend to do rather well in hard times, Sam found his efficiency-expert skills in demand. "People needed more help than ever of the kind I was offering," Sam reminisced in a 1981 *Indiana Business* article. "I was lucky. There are times when things happen that make opportunities become realities."

In the fall of 1931 Sam Regenstrief presented himself at the certified public accounting firm of Spradlin, Carter, and Jordan, billing himself as just what they needed to help their

clients in efficiency methods—time and motion, cost and budgeting. Wells V. Bishop, an old friend and business associate, recalls the qualities that endeared the man to his clients. "Sam Regenstrief had so much ability that Spradlin, Carter, and Jordan set up a separate division, known as the Management Institute, to devote full efforts to management counseling. Even then, Sam demonstrated an intuitive sense of rightness, a quick, analytical mind, and a warm, outgoing relationship with people—all qualities that have been so obvious to those of us who have worked with him."

Bishop became Sam's partner in the Management Institute, as did Charlton Carter. "We undertook time studies and various surveys to reduce labor costs and overhead costs and improve manufacturing methods," Sam later reported. They made surveys for the dairy industry, the *Indianapolis News*, Lilly Varnish, and various furniture industries. Sam remained an industrial management consultant with Carter Bishop & Regenstrief through 1945.

"Someone's misfortune can become someone else's luck."
Sam Regenstrief, quoted in Indiana Business*, 1981*

Sam's reasons for leaving Carter Bishop & Regenstrief had everything to do with his wildly successful future as an appliance manufacturer. Here is how it happened.

In 1936, the firm received an inquiry from Rex Manufacturing Company. Rex had been in business a long time, and it was failing. Sam and Wells Bishop were assigned to the case. Rex Manufacturing was situated in Connersville, an hour and a half drive from Indianapolis, in the building that once housed the Indiana Lamp Company, which made lamps for the town's buggy and automobile businesses. The building had been there Lord knows how long. Like many industrial plants constructed early in the century, it was built three stories high with wood floors throughout and, by 1930s standards, was not particularly well laid out. Rex Manufacturing now made refrigerator cabinets there. For years they had made these out of wood—even the early electric refrigerators had wood cabinets, in order not to stray too far from

the familiar icebox. Owned by the Ansted family that ruled the town's automotive empire, Rex had also made "California" tops for automobiles, a kind of enclosed top in contrast to a canvas touring car top. But now Rex's main business was to supply steel refrigerator cabinets for Stewart Warner in Indianapolis and for the appliance maker, Philco Corporation.

Rex was in big financial trouble. Wells Bishop and Sam Regenstrief surveyed conditions at the plant, and the news was not good. In a report to management dated May 6, 1936, Sam recalled finding "a complete lack of control in costs, improper production flows, and no consideration…given to proper control of costs in relation to the production to insure a quantity return—in other words, EXTREME WASTE." [Sam's emphasis]

Signs of this lack of control abounded and were duly noted in Sam's report. The foreman in the metal shop had no record of how many people he required for a given production run. Workers were turning in their production count for pay purposes without any verification as to the number of pieces actually produced. Even when workers were honest, there were no checks to prevent them from running a large number of pieces just to collect their pay. Consequently there was no relation between the pieces on hand and the number of refrigerators that could be produced from those pieces.

For Rex's management, the consultants' report was a wake-up call. They commissioned Sam and Wells to develop a complete operating budget and cost control methods for the fiscal year ending August 31, 1937. For their part, the consultants assured Rex that, if their production controls were followed, Rex would achieve estimated sales of $5.5 million and a net income of $207,000 for that year.

Sales did indeed reach the $5.5 million mark that year, but net income was only $85,473.33—less than half of what it should have been. Production was still out of control. Rex retained the Management Institute through the next year to track all costs. Sam met monthly with the board of directors and made numerous suggestions "which were not carried out" per Sam, so that, although some progress was made, the company was still in difficulty.

Rex had been trying since 1937 to bail itself out with a loan from the Reconstruction Finance Corp. The agency balked, fearing that the trouble-ridden company would soon go under. The RFC had denied the loan initially, which is what drove Rex to seek out management consultant expertise. Regaining its confidence with the improvements Sam and Wells had instigated in budgeting and cost control, Rex again applied for the loan in the spring of 1938. Apparently RFC people in Indianapolis knew and admired Sam Regenstrief. This time the RFC promised the money if Rex could make assurances that recent improvements in the financial structure would continue. It was a sign that Sam had already developed quite a reputation.

Steps were promptly taken. Rex's seventy-one-year-old president, C. C. Hull, eager to develop a management structure that would preserve the business for his family, stepped aside and handed Sam Regenstrief full responsibility for running the business. If Sam had any misgivings about assuming Rex's burdens, they were quickly overcome by the recognition that the downturn of the business cycle could be quite an opportunity to grab hold of something. "If I can be a good consultant," Sam asked himself, "then why can't I do the actual operating?"

The young efficiency expert got his start as a timekeeper in a hosiery mill

So, at the age of twenty-nine, Sam Regenstrief became de facto president of Rex Manufacturing. Sam's colleague Edgar Myers took over refrigerator cabinet sales, and Sam took over management of the plant, where he could continue his operations to cut costs and increase the productivity of labor. For Sam, this was a chance to continue solving the efficiency puzzles that brought out his talents as a consultant. The principal difference was that he was now free to put into effect any changes he viewed as necessary.

Sam wasted no time. He took over in spring 1939 and by late the same year had made major changes. First he completely rearranged the plant to reduce the cost of handling

materials. Next he changed the assembly line from a push-type line to power conveyors. On the push-type line, the workers had to push the jobs along by hand. The newly installed power conveyors carried the jobs along mechanically, and workers had their hands free to work on the assembly. Thus the speed of the line depended upon regulating the motor speed, not on the pace of individual workers.

Rex was continuing to give its steel cabinets two prime coats and a finish coat. Sam discovered that the rest of the industry had abandoned the intermediate coat, so he immediately cut the intermediate coat from Rex's production. This not only saved in material and labor costs but gained considerable factory space because Rex was able to tear down the intermediate spray booths and bake ovens. It also cut by a third the time required for painting.

Sam also installed material-handling conveyors, eliminating the need to truck these materials by hand from various locations. Conveyors were synchronized with the assembly lines to control the feeding of materials.

Rex had eighty-five operating departments, many quite small and wholly independent of other departments in their operations. Sam cut the number of departments to twenty and consolidated the rest into a single operating unit.

What did all this mean to Rex Manufacturing? Before Sam arrived, Rex had been supplying only refrigerator boxes to their customers. Those customers had to look elsewhere for a refrigerator unit, and yet somewhere else to get the unit installed in the box before the refrigerator could be sold to the consumer. This resulted in numerous handling and overhead charges. By rearranging the plant and eliminating some operations, Sam gained enough space to be able to lengthen the assembly line so that refrigeration units could be installed right at the plant, thus enabling Rex to sell complete refrigerators. This landed Rex several new customers, plus a very favorable contract with Philco, which accounted for the major portion of Rex's sales.

Refrigerator production soon came to a screeching halt, however. World War II broke out, and sheet metal firms everywhere were pressed into service to support the war effort. "At that time anybody with a decent stamping plant could come out smelling like a rose, because the war effort needed

metal stampings, and lots of them," recalls Sam's longtime chief engineer Tom Duncan. Rex turned its stamping equipment to making rifle grenades and airtight metal canisters that stored rayon bags of powder to fuel the big naval guns. Sam Regenstrief's innovations had given Rex Manufacturing a big boost, but a little help from his Uncle Sam certainly didn't hurt.

Although it was Sam's skill as a consultant that had landed him at Rex, already he was developing the unique persona that people who knew and loved him would remember fondly in "Sam stories" years later. For example, Sam Regenstrief's lateness was legendary. He was late for everything. He would sometimes be an hour late for a meeting, and it would infuriate people. And he would apologize over and over, but not mend his ways. The story is told of one such encounter during the war years. It goes like this.

It was World War II, and Rex Manufacturing was busy turning out rifle grenades and canisters. Everybody knew Sam was an organizational genius who was doing great things for the war effort, so he was appointed to one of the nation's many war boards and became a key player. This particular board, chaired by an Army general, was scheduled to meet on a certain day at 3:00 P.M. in Washington, D.C. Familiar with Sam's perpetual tardiness, the general called him the day before and said, "God dammit, Sam, I want you here on time." Sam said okay, no problem, he would be there on time.

So the meeting day comes, it's 3:00 P.M., and there's no Sam. By 3:15, the general is steaming. By 3:30, he's apoplectic. He says to his staff, "You get Regenstrief on the phone." They can't find him anyplace. Finally at 4:15 Sam calls in. "General, I'm sorry I'm late." The general says, "God dammit, Sam, I told you to be here." "I know, I know, General. Don't you worry, I'm going to be there. It's just a few more minutes." "Sam, where the hell are you?" "General, I'm on my way—just be patient, I'll be there shortly. I'm telling you." "Sam, God dammit, where are you?" "General, I'm in Cleveland, but I'm awfully close."

In 1941, when she was seventeen, Sam's sister Helen had an emergency appendectomy. When it was time to leave the hospital, Sam told her, "I want you to come home with

me." As far as she and the family knew, Sam was residing at the Grand Hotel on West 5th Street in Connersville, where he could be close to Rex Manufacturing. No matter how gracious the Grand's service, a hotel room was not Helen's idea of a restful recuperation site. "I'm not going to stay in a hotel!" the teenager exclaimed feistily.

Helen knew Sam had been seeing somebody, because a good friend of hers was a dentist and that certain somebody was his patient. The dentist had asked Helen, "Did you know your brother is dating Myrtie Barnette?" "Ahh, you're crazy," Helen had said. Now Sam's offer to oversee Helen's recovery came with a further clarification. "I want to take care of you, and I've got somebody who can. I'm living in a house now." This is how Sam finally admitted that, not long before, he had gotten married.

Myrtie Barnette of Franklin, Indiana, captured Sam's heart

It all came about because Sam Regenstrief loved basketball. At Manual High School he had gained quite a reputation as a basketball official. Later he had coached the all-women basketball team at Real Silk Hosiery. Many years hence, he would still revel in the game, watching his grandnephew's team coached by his own nephew, Allan Cohn, sister Sara's boy. Over dinner afterward, Sam would tell Allan, "You got killed tonight," and Allan would respond, "You're damn right. They were just that much better than we were."

There was one basketball game that Sam would not soon forget. It was played at Butler University's Hinkle Fieldhouse, which was hosting the Indianapolis high school sectionals, and Sam was attending with his pal Joe Burris. After the game, as the two men were walking down one of the fieldhouse's many ramps, Burris spied a friend in the crowd—a willowy blonde. He introduced Sam to his fiancee's roommate, Miss Myrtie Barnette of Franklin, Indiana.

Apparently the chemistry was right. Sam and Myrtie were married on October 5, 1940, in Brookville, Indiana, by

Alfred P. Wise, Justice of the Peace, with Joseph and Katheryn Burris as witnesses. (Sam had served as best man at Joe's wedding.) Though Sam was the last of the older Regenstrief siblings to get married, the couple kept their happy secret from the family. Sam was sure his father would be angry because the Regenstriefs were Jewish and Myrtie was not.

It was Helen who had to go home and tell the family that Sam was married. Helen said, "You should see Myrtie. She's just wonderful, and you've got to accept her, [etc., etc.]" At length Myrtie came to Indianapolis and was introduced around. As it turned out, Sam's father dearly loved her. "Everybody loved Myrtie," says Helen, "because she was so good. She was a sweet person, and willing to give." By all accounts, Myrtie was a fine woman and a lot of fun to be with. She and Helen became good friends, closer than sisters, and went shopping together whenever Myrtie came up to Indianapolis. Myrtie never did convert to Judaism, but she went to temple—in fact she loved to go because of the cantor—and she learned to make all the Jewish dishes. She loved cooking.

Those early years held some important financial changes for the couple. They bought a modest but solid home in the Dutch Colonial style at the corner of Eighth and Oak, not far from Rex Manufacturing Company. With Rex's finances in a rather unsteady state, the company sometimes couldn't afford to pay Sam, so he struck a deal—he would keep working if Rex agreed to pay him in company stock. This says two things about Sam: One, he had supreme confidence in what he could do. Two, he was willing to gamble for high stakes. Risking his livelihood, he gambled that he could turn the failing company around and make its stock worth something.

And that's exactly what happened. Sam turned Rex around and did it so surely that Philco, one of Rex's early customers, took a fresh interest in the rejuvenated refrigerator company. Ultimately Philco merged with Rex in 1944 and made it a subsidiary, with Sam as its president. Overnight, all the Rex stock that Sam had accumulated through the years—as much stock as some members of the founding Ansted family—became Philco stock. Sam now held a tremendous amount of Philco stock. He was a wealthy man.

Sam stayed on in Connersville to run the Philco plant

and was soon named vice president of Philco's refrigeration division. He built a new Philco plant on Indiana Route 1 at the north end of town, the first building of the huge Ford plant that now occupies the site. The new plant made steel cabinets, while the old plant made refrigeration units and trucked them up to the new plant to be put together with the cabinets. Sam rose quickly through Philco's ranks to become a senior vice president in charge of all of Philco's appliance manufacturing, which meant working in Philadelphia at Philco headquarters, coming home only on weekends to play golf and have dinners at the Connersville Country Club.

Golf was probably on the menu at Sam and Myrtie's tenth anniversary celebration

As Sam's star continued to rise, helpmate Myrtie seemed content to let Sam be the center of attention. Behind the scenes, though, she ruled the roost and helped Sam a great deal. Not many wives would have put up with the kind of schedule Sam kept as executive of a major appliance company. Within five years of their marriage, business opportunities had drawn Sam away from Connersville, and for lengthy periods over the next thirteen years he was seldom at home. His trips to Philco headquarters in Philadelphia left Myrtie alone five days out of the week. Sam would leave on Sunday or Monday morning and not return until Friday night. Myrtie occupied herself with good deeds for Connersville. She volunteered more than five hundred hours as a nurses' aide in the Fayette Memorial Hospital, served on the Red Cross board, and was active in the town's Girl Scout program. Myrtie also spent some time perfecting her golf game at the Connersville Country Club. She became a very good golfer—better than Sam.

"Sam was just a very, very caring person."
Allan Cohn, sister Sara's boy

When Sam was at home with Myrtie, there was always time for family. Sister Helen called Sam "Shot," short for Big Shot. The big brother who firmly taught her to work for what she wanted as a youngster had remained a caring presence—"a father image, really"—through Helen's young adulthood, as he would throughout her life. When Helen married Art Barrett, Sam furnished their entire home as a wedding present. As a consultant, he had taken Adams Furniture Company out of bankruptcy, so they gave him a deep discount. Helen and Art got bedroom, dining room, and living room sets. Myrtie insisted on including a liquor cabinet—she and Sam had to have their cocktails before dinner. The day that Helen's oldest son was born, Art went into the military. Not long after, Sam insisted that Helen and little Ivan come and stay in Connersville with them, which they did until Ivan was nine months old. Then Sam helped Helen sell the house and pack up to join Art where he was stationed in South Carolina. She did it all herself, she says, but with Sam's guidance. Later he cosigned a bank loan to help Helen and Art set up a cleaning supply business.

Sam helped his brothers Sigmond, Nate, and Morris, too, when they joined their father in the bakery business, although his drive to control everything made him less than popular. Sam basically tried to run the business, not in a hands-on manner, but by coming in and asking for reports, checking to see whether the bakery was making money. He wanted to put in his own accountant, but the brothers rebelled.

Sam especially took pride in his nieces and nephews. The doting uncle indulged them with excursions to New York City. He would sell them his old beat-up cars—the price was always fifty dollars. Sam never believed in giving something for nothing, especially where family was concerned. He didn't think it was good for the family to rely on his fortune for financial support. But when the nieces and nephews were ready to purchase their first homes, Sam gave each of them the option to go through him for their first mortgage, at no interest.

Sara's children Phyllis and Allan have many happy memories of summers spent in Connersville with Sam and Myrtie. Sam loved to hear Phyllis play the piano and would make her play the "Firedance" for his friends. She would go

to the movies while Sam and Allan played golf. "He was fun to play golf with," Allan says, "because he would tell you things...." Off the course, Sam would tell of wonderful low scores, but on the course, watching him play, it was hard to imagine him getting anything but high scores. Allan and Sam had many a laugh over that.

Digging further back in time, Allan remembers being an eight-year-old kid and getting the latest Victrola from his Uncle Sam. When Philco came out with its television, which cost about five hundred dollars back then, he thought, "Gee, we'll never have a television. Who is ever going to spend that kind of money?" The next thing he knew, Sam had sent over a twelve-inch Philco television set that Allan's father Louis Cohn had bought from him—first in a long series of appliances that the extended family purchased from Sam, usually at a cost of thirty-five dollars—and the Cohn family was first in their neighborhood to have a TV.

Phyllis Cohn in particular had an opportunity to experience the avuncular Sam. One summer, at the age of eighteen, Phyllis accompanied Sam and Myrtie on an automobile trip through Canada. She remembers motoring through the mountains near Banff—Sam at the wheel, driving like a maniac, and Myrtie in the middle of the back seat extending her arms in both directions to hold herself steady, afraid she would fall out the side. Then, on a sightseeing stop, bears approached the car. Myrtie was terrified until Sam got them down off of that mountain. Later Sam and Phyllis went off canoeing, and when it got dark Myrtie had to send the mounties out to find them.

Sam was very protective, like a father to Phyllis. A young ski instructor at Banff had his eye on her, and Sam drove him off. Apropos dating a young man whose father was someone important, Sam cautioned Phyllis not to be looking at what the father did—the son had to be the one to have ambition.

Phyllis eventually married a promising young doctor, IU Medical School graduate Harvey Feigenbaum; Sam visited the couple several times in Philadelphia, where Harvey was interning at General Hospital. Phyllis remembers Sam being upset at the shabby apartment they lived in, which was all the newlyweds could afford. She was especially grateful—and Sam won Harvey's heart—when Sam flew to

Metal bending was Sam's game, and refrigerators his first love

Chicago to attend the funeral of Harvey's father. Sam had met the father only three or four times, but he did this out of respect for his niece's husband.

Although Sam was not inclined to talk business with the family, Allan Cohn thinks Sam was successful in appliance manufacturing because he wasn't afraid of change or of taking a chance on an innovation. Too many people of his era were afraid of risking anything after having suffered through the depression. One of Sam's rare business mistakes, an *Indianapolis Star* reporter got him to admit much later, came in the 1950s, when he decided to plunge Philco into the infant computer market. "When you lay an egg," Sam said, "you better get off it quick." He got off.

Sam was with Philco for thirteen years and seemed destined for the number one spot in the company, but he was passed up for the presidency. This may have been one of Sam's toughest setbacks, and one of the only times in his life that he experienced anti-Semitism. Allan thinks Sam was hurt that he didn't get the position, although he went on to become even more successful as a result of going in a different direction. When Philco announced plans to merge with Ford Motor Company, Sam figured it was time to leave. He took a year off to explore other options. It is said he even interviewed in New York with honchos at NBC-TV. Then came an opportunity Sam Regenstrief couldn't refuse.

"We know you will agree with us
that the American Central spirit is no idle rumor
but a genuine and deeply rooted ideal
which constantly challenges all of us
in the development and production
of finer equipment for the American Way Of Life."
Eric O. Johnson, general manager, American Central
Division, Avco Manufacturing Corporation

The war had ended, and the terrific demand for war products that had kept Connersville factories working night and day had subsided. Local industries were reconverting to civilian products, some returning to the manufacture of their prewar consumer goods, others introducing new products and developing new markets, which could take months and even years. Connersville found itself with an excess of industrial capacity and a surplus of skilled labor and engineering talent. For one plant in particular at 2000 Illinois Avenue, the future was uncertain. Connersville citizens and business leaders were concerned, hoping a solution would present itself.

The old plant had quite a history. At the turn of the century when the automobile was still a curiosity, the Indiana Lamp Company began making automobile headlamps and taillamps in the building that was familiar to Sam from the Rex Manufacturing days. Business was so good for Indiana Lamp that in 1916 it moved across the street to new headquarters at 2000 Illinois. In April 1931, at the start of the Great Depression, it merged with Corcoran-Brown Lamp Company, and the following year all of its machinery and equipment were moved to the parent firm in Cincinnati, leaving the Connersville building dark and empty. But not for long. In 1933 the vacant factory sprouted production lines for refrigerator parts, steel sinks, and kitchen cabinets when it was purchased by Steel Kitchens Corporation of Waukegan, Illinois. Soon they were making parts for navy planes and for M-4 army tanks under the newly formed SKC Aircraft Division. After the war, the firm did not return to civilian production but was purchased by American Central Manufacturing Company. The twelve-acre plant soon merged with American Central's main plant at 800 West 18th Street, which was engaged in manufacturing steel kitchen equipment.

American Central had its own lengthy history, beginning in 1889 when W. W. Ansted incorporated his wagon and buggy works and called it the Central Manufacturing Company. From 1904 on, Central made auto bodies for many of the best-known motor companies—Packard, Cadillac, Studebaker, and others. It too became involved in war production and was able to brag that its conversion from peace to war production antedated Pearl Harbor by a full nine

months. "The first jeep body, one of several hundred thousand turned out as the principal wartime activity, was produced and in a box car only 41 days after the design was begun on the drawing board," its brochure proclaimed. Incorporating in 1942 as American Central Manufacturing Corporation, four years later the company became an operating division of Aviation Corporation, which after the war became known as the Avco Manufacturing Corporation, or Avco for short.

By 1948, while Sam Regenstrief was working on refrigerators up the street at Philco, the growing American Central plant was busy turning out peacetime jeep bodies for the Willys-Overland Corporation. It was also turning out refrigerator cabinets for the Admiral Corporation as well as domestic kitchen equipment that it marketed through 81 wholesale distributors and more than 5,000 retailers nationwide. The plant occupied 920,000 square feet of floor space covering 93 acres on the banks of the Whitewater Canal; it employed 2,500 workers.

Perhaps Sam Regenstrief, purveyor of Philco refrigerators, came across this 1948 brochure with its guided tour for visitors:"Welcome to American Central Division Avco Manufacturing Corporation, Home of American Kitchens, Styled in Steel." Perhaps Sam resonated to General Manager Eric O. Johnson's introductory words. "Too often people think of a manufacturing plant as a collection of bricks, steel, machinery, railroads, statistical departments, and so forth.... We here at American Central are very conscious that our plant is primarily dependent on the people who make it live." Surely Sam would have been familiar with the arcane scenes the brochure described. Perhaps they put a gleam in his eye. Let's join the tour.

> We start in building 28 with die storage—a veritable treasure house. These dies, many worth thousands of dollars, mold or shape the parts required by their various products. They are the acme of the machinist's art.
>
> Next stop is building 2, the steel storage warehouse. Here are great piles of sheet steel, tons of it, to meet the hungry demands of

the production lines. Steel is brought to the warehouse in trucks and railroad cars. A private railroad siding shunts the cars into the unloading area, where steel is removed in slings suspended from powerful overhead cranes.

In building 1 we encounter the press room. A thundering, clanking rumble echoes about this building as the big and little presses thump out a thousand different sheet metal parts used in the manufacturing process. This is a building of strong contrasts: A 500-ton capacity press that weighs 464,000 pounds and cost $169,204 sits close by a 5-ton capacity press that weighs 750 pounds and cost $450. A big hydraulic press requires ten men to operate it, while many small presses are controlled by a lone operator.

In the jeep body assembly department, we find steel banging on steel, welding arcs sputtering and sending forth dancing showers of sparks. We see hundreds of small parts joined into front and rear sections of the jeeps' steel bodies. As the bodies gradually assume recognizable shapes, they reach the joining tables, where they are welded into a complete body. Then it's on to the metal cleansing cabinets, the paint booths, the drying ovens, final inspection, and at last the loading docks.

When Sam Regenstrief surveyed the Avco facilities on New Year's Eve, 1958, jeeps were no doubt the last thing on his mind. Sam was thinking…dishwashers! Ready to take a chance on a whole new industry, the refrigerator man was coming home to Connersville to make a stand. Gone was the Philco stock that had made him a rich man at the age of forty-eight. He had cashed it in to buy this plant, home of dies and sheet steel and presses and assembly lines. Effective December 31, 1958, this collection of buildings belonged to

Sam Regenstrief and his new company, Design and Manufacturing Corporation—D&M for short.

By the time of Sam's purchase, Avco's American Central Division was already producing dishwashers along with other major appliances, sinks, cabinets, and prefabricated gasoline service stations. Like most major appliance makers, Avco had broadened its line of appliances after World War II. It started making dishwashers in the mid-1940s and had developed a competitive product. However, Avco was having trouble getting retail distribution due to heavy competition in the industry, not the least of which was Avco's own competing divisions that manufactured appliances under their own brand names. By 1958 Avco's appliance division was losing money—badly and consistently. *Fortune* magazine would later describe it as a "hopeless also-ran in the dishwasher industry." At a paltry 11 percent market share, Avco was far behind the industry leaders General Electric, Hotpoint, and Hobart. Its plant was also underused. It had the capacity to triple the forty thousand dishwashers it was making that year. What's more, Avco seemed in danger of losing its largest customer, Sears, Roebuck and Co. A favorite Sears supplier, Whirlpool Corporation, had announced plans to produce dishwashers and was making its pitch to the giant retailer. Avco decided to bail out.

When Sam Regenstrief offered $2.6 million in cash for the Avco plant, he was welcomed with open arms. "They sold pretty cheap," Sam recalled. Says a D&M executive, "The Avco division was precisely what Sam was looking for. Its book value was low because the plant was almost fully written off. It was also incurring heavy losses. Hence, Sam could afford to buy it, and Avco could afford to sell it." The division had a good production facility and a good dishwasher. What it lacked was a viable approach to the market—in simple terms, it lacked management. Sam Regenstrief had a hunch that he could turn it around.

Design and Manufacturing Corporation was formally incorporated under the laws of the state of Indiana on November 13, 1958. On December 31 the corporation issued fifty thousand shares of common stock for five hundred thousand dollars in cash and consummated a purchase agreement with Avco Corporation for the purchase of certain specified

fixed assets and inventories. Officers of the corporation were Sam N. Regenstrief, president; L. Lee Burke, vice president; Charles R. Bottorff, secretary-treasurer; and directors Merle H. Miller, Robert Feemster, Melvin H. Boldt, and R. H. McMurtie. Together the officers owned 98.16 percent of the common stock.

For $500,000 down, Sam Regenstrief had bought himself a company valued at $2,870,247.70. Actually Sam acquired three separate manufacturing plants—the Indiana Lamp Company plant, the Ansted Engineering Corporation, and the entire east side of the former Central Manufacturing Company—each of which had enjoyed long periods of production. Along with the three major buildings and the land, Sam had purchased steel, paint, porcelain, parts, and cartons valued at $443,293.92 and finished goods valued at $788,858.37. These were meager assets indeed, but not for a man of vision. Sam Regenstrief knew he was about to enter the big leagues. He would now compete with America's industrial giants like GE, General Motors (which owned Frigidaire), Westinghouse, and Whirlpool.

Luckily for Sam, the Avco appliance division had a core of good engineering and production talent in addition to the physical plant. With this as a base, he promptly got rid of everything but the dishwasher, sink, and cabinet business. The company was now going to manufacture and market dishwashers, porcelain enameled and stainless steel sinks, and steel undersink cabinets. The dishwashers would be sold to other manufacturers under their brand names. The sinks and undersink cabinets would be sold by D&M's own sales organization to distributors, dealers, and builders.

One day not long after D&M officially began operations, a self-described "skinny little redhead" walked into the D&M offices to apply for a clerk's job. As she sat waiting for someone to come interview her, a door opened and a man leaned into the room and said, "Hey, you. Hey, you." She looked up and the man said, "Can you type?" She said, "Yes." He said, "Come on, I've got something that needs to be typed." And that's how Marilyn Mitchell met Sam Regenstrief and came to be Sam's personal secretary, a post she would hold, through thick and thin, for the next thirty years.

ONE-ACT SHOW

It was January 1959, and Design and Manufacturing Corporation was officially open for business. In Sam Regenstrief's only known statement of a business plan for D&M, Sam wrote:

> We have tremendous facilities and "know how" to manufacture all types of complete appliances, metal fabricating and all types of finishings, job shop stampings, plastics and films on steel, and defense items requiring the fabrication of all types of metals.... [These] will be of importance a year or two from now. At present, we are manufacturing items that we are tooled for and can offer a top quality product at the lowest cost in the industry.

These products were automatic dishwashers, porcelain sink tops, and cabinet sinks.

Quoting figures from the National Electrical Manufacturers Association, Sam noted that the dishwasher business had more than doubled in the previous five years, from 148,520 industry shipments in 1953 to 361,036 in 1958. Avco had been getting about 11 percent of this business, and D&M was doing a little better than that in its first three months of operation. D&M would soon grab an even greater percentage, Sam was confident, because of a new portable dishwasher product they would be bringing out in 1960. "Conservatively forecasting," he wrote, "I feel that on the dishwasher business we can definitely be assured of getting somewhere in the neighborhood of 12% to 14% of the total market."

These were confident assertions indeed, coming from a man who had never before manufactured a dishwasher. Sam Regenstrief was a refrigerator man. Here he was, on the threshold of a whole new business. But then Sam had plenty of experience with metal bending from the Rex and Philco days—could making dishwashers be so different from making refrigerators?

Technologically, dishwashers were lumped into the so-called water-bearing home appliances—a category that included disposers, clothes washers, and some dryers—as distinct from appliances that cool or refrigerate and appliances that cook. Dishwashers were one of the most complicated of all home appliances to manufacture, involving a combination of electrical, mechanical, and hydraulic technology. Undaunted, Sam was more than ready to apply himself to learning all there was to know about dishwashers. All around him he saw an opportunity developing that was too good to pass up.

"Sam was committed to metal bending. He was extraordinarily intelligent. He was highly competitive. He had good insight into the industry. His business was his life. He had all the ingredients to make a success of manufacturing."
Jim Marcus, partner, Goldman Sachs

Much of what we know about Sam's take on the dishwasher business we owe to a Harvard research assistant, Michael S. Hunt, who in the early 1970s got the assignment to write about D&M as grist for the renowned business school's teaching mill. No doubt the young Mr. Hunt followed Sam about with clipboard and pencil, recording Mr. R's statements and making notes on how D&M was run. D&M was to become a case study on which many a Harvard fellow cut his B-school eyeteeth. The case study recounts that Sam Regenstrief came to three conclusions as he surveyed the dishwasher market of the late 1950s.

First, the dishwasher market clearly had a high growth potential. Almost every kitchen in America was equipped with a range and refrigerator, but fewer than 10 percent of homes had an automatic dishwasher. Because of the complexities of manufacture, models on the market at the time were quite expensive. If the cost could be brought down to a level that the ordinary person could afford, the dishwasher market would really take off because it would free the family from one of the least popular, messiest household chores and give housewives more free time. It was also "beneficial from a health standpoint, since very hot water could be used."

Second, the industry was dominated by GE, which sold a very high-priced dishwasher. Hobart and Frigidaire were tied for a distant second place. All three manufacturers were pursuing similar strategies of higher price and brand image and were unwilling to supply national retailers like Sears, whom they considered the competition. With his background as an efficiency expert, Sam was sure he could slash the costs of Avco's dishwasher operation and undercut the prices of the competition.

Third, no manufacturer existed with the capacity to supply the national retail brand companies and manufacturers of other appliances who needed dishwashers to expand their brand-name product lines. The national retailers such as Sears, J. C. Penney Company, Inc., and Montgomery Ward offered an especially attractive market. Originally, manufacturers created demand for specific brands of appliances—the Frigidaire refrigerator and the GE range, for example. But by now consumers had come in contact with a wide range of brands, and the appliances were growing more uniform in

quality, so demand was growing for dishwashers in general, not for specific brands. Value became key, and national retailers offered the most value for the consumer dollar.

It was the perfect business opportunity for a man of Sam Regenstrief's talents. Under his leadership, D&M could increase its volume to make the best dishwasher for the lowest cost in the business. The market had obvious growth potential. GE was supplying the high end of the market, but no one else was stepping up to supply the national retailers and manufacturers. By getting there first and securing the volume, D&M would have a natural advantage.

But there was another, more philosophical reason for Sam's interest in dishwashers. Like all the home appliances, dishwashers stood to improve the quality of people's lives. "I feel that the social problems that face this country arise from the great divergence in the quality of life," Sam told the Harvard research assistant. Dishwashers of the late 1950s were still too expensive to be purchased by any but the rich, and Sam saw this as widening the gap. In dishwashers, Sam saw a way to make a positive contribution to society by focusing on what a businessman does best—making a profit. He would intentionally mass produce dishwashers to sell not under his own brand name but under the names of the national retailers and other brand-name manufacturers. Under this scheme, the only way he could make a profit would be to keep lowering production costs. In time, dishwasher prices would fall, and these labor-saving appliances would become affordable to anyone who wanted one.

Sam's strategy was thus firmly in mind. For now, however, his first concern was to hang onto the Sears account. Avco's American Central Division had been making dishwashers for Sears since the early 1950s, and Sears had been its biggest customer. In fact, without the Sears business, Avco—and now D&M—would have been out of business.

Sears, the store that offered quality at low prices to middle-class home-owning America, had a special relationship with its suppliers. Sears' strategy was, through heavy advertising, to bring large numbers of people into its stores and offer appliances at various price points that gave customers the best buy at whatever level they could afford. For this strategy to be profitable, Sears had to buy enough vol-

ume from its suppliers that it could ship complete carloads of appliances by rail to regional warehouses and the larger Sears stores. This saved as much as 10 percent in freight costs. Thus it was Sears' policy to build close ties to just a few suppliers. For example, Whirlpool made all of Sears' washing machines and most of its air conditioners and refrigerators. Roper made its gas and electric ranges. Sears could buy in large enough quantities that these manufacturers could maximize efficiencies in the production process and get the unit costs way down. In several cases, Sears even put up the money for a supplier to tool up efficiently for a particular product. In exchange, Sears got an equity position in the company, which gave it another measure of control over that supplier.

At the point when Sam Regenstrief stepped in to resuscitate the money-losing Avco dishwasher operation, two customers for whom Avco had been producing dishwashers—Whirlpool and Westinghouse—had just flown the coop. Avco had been making both undercounter and portable dishwashers for Whirlpool and portables for Westinghouse. But with the company's future uncertain, during 1958 Whirlpool and Westinghouse had tooled up to manufacture dishwashers at their own plants and were just out on the market with their own complete dishwashers. Worse yet, Whirlpool Corporation, already a favorite supplier of other Sears appliances and in which Sears held a major interest, was now courting Sears to also supply its dishwashers. If Whirlpool succeeded, D&M would lose one of its potentially most lucrative clients, and, because of Sears' supplier strategy, D&M would be losing not just some of the Sears business, but all of it.

Sam had to do some fast talking. He banked on making money talk, too, and he put together a very attractive package for Sears. Sam's ace in the hole was a scheme for a new front-loading portable dishwasher that was a departure from industry tradition. Front-loading built-in machines were already commonplace, but portables—the kind that rolled over to the sink, got water from the faucet through a rubber hose, then drained back into the sink through a second hose—up until this time had to be loaded from the top. To retrieve clean dishes from the bottom rack, you had to remove the top rack and lean into the tub. A front-loading portable seemed the ideal solution, but the industry was skep-

tical that such a machine could be made watertight. "Everybody thought we'd be a dead duck," Sam later recalled. "But you just can't be a me-too and succeed in business." Sam approached Sears with this concept of a new line of portable dishwashers. Sears examined a working prototype of the front-loader and liked what it saw. It placed a large order, and before long the front-loading portable design would become the industry standard.

And so it was that Sears remained at the top of the list of D&M's customers, leading quite a pack of brand-name manufacturers including Admiral Corporation, Kelvinator (Division of American Motors), Hotpoint Company, Frigidaire (Division of General Motors), Chambers Built-Ins, Preway, Inc., and Philco Corporation. Sam's pride was evident as he penned these words describing his new operation. "We are manufacturing undercounter and portable dishwashers exclusively for brand names. They are our own design and 100 percent engineered by us. Our customers depend on us to give them the dishwashers with which they can gain their fair percentage of the market. We are recognized as having some outstanding patents on dishwashers. [A]lthough at present 100 percent of our distribution is on a contract basis, all in all, the dishwasher is a product that is our own."

"Sam is without a doubt the most creative, energetic, dynamic person I have ever known. He built D&M and runs it with superb skill."
Bud Kaufman, vice president, operations

More than anyone, Sam Regenstrief hated red tape. Not that he was jumpy, or careless, but he wanted an organization where there weren't any empires, an organization that was lean and could make changes as required, without needing stamps of approval from fifteen different departments. He hired many kindred spirits at D&M.

As president of the fledgling company, Sam brought onto D&M's board of directors some of his closest associates and advisors. Charles R. Bottorff, a CPA and major in the U.S. Air Force during World War II, who had been Philco's division

controller for the previous ten years, came on the board as secretary-treasurer of D&M. Among the directors were Merle H. Miller, senior partner in the law firm of Ice Miller Donadio & Ryan, and R. H. McMurtie, former president of Huntingburg Furniture Co. Other key directors in the early years were Frank McKinney, Sr., who served as chairman and CEO of American Fletcher National Bank, and Logan T. Johnson, president and CEO of Armco Steel, which was a major supplier to D&M.

L. Lee Burke was a key executive that Sam brought in right away as board vice president and chief of engineering. A graduate of University of Cincinnati's School of Engineering with a degree in aeronautical engineering, Burke had headed up Avco's engineering department for defense products since 1939, and later he oversaw engineering on consumer products in the American Kitchens division. Sam needed Lee Burke to get the company going because Lee knew the tooling at the plant. Burly, and well over six feet tall, this "teddy bear of a guy," as one acquaintance described him, must have towered over Sam, but he was not one to press this advantage with the sometimes obstinate Mr. R. Lee was a solid, cautious, experienced man with sound judgment and a good handle on how to run a shop and an assembly line. Before long he advanced to executive vice president of operations.

Within a couple of years, Sam had added two other key people—engineer Tom Duncan, a refrigerator man like himself, and operations man Glenn "Bud" Kaufman.

Tom Duncan recalls first meeting Sam in passing. Tom was among a group of Seeger Refrigeration Corp. engineers who stopped by at the Rex Manufacturing plant on the way to a refrigeration engineering conference in Dayton. Seeger supplied refrigerators to Sears and was soon to be merged with Sears' original laundry appliance maker into the Whirlpool Corporation. Sam had an office near the front of the old Rex building, long since torn down, and refrigerators could be heard moving on tracks across the wooden floor above his head. The engineers joked that this was how Sam kept track of production.

Sam and Tom got to know each other when Tom helped set up a compressor plant for Philco in Bedford, Indiana. The

Bedford plant supplied compressors to the Connersville operation and Sam was in charge of both. Sam made a point of telling Tom that he was exactly ten years older than Tom. Considering that Sam couldn't pin down his real birth date, this seemed a little odd. In any case, they went back a long way. And ironically, they both turned in their resignation to Philco—Sam from Philadelphia, Tom from Connersville—on the same day. Eventually Tom joined D&M as chief engineer, taking Lee Burke's position as Lee moved up into management. It was a small engineering department, Tom says, "but we sure as hell were busy." Within three or four years he became vice president of engineering and sat on the D&M board of directors.

Where product engineers were concerned, Sam had hired the best. A graduate of the University of Evansville in chemistry, Tom Duncan had directed a laboratory at Republic Aviation Corp., developed products for Seeger Refrigeration Corp., and served as chief inspector at Philco chief engineer at Curtis Automotive. Joining D&M in 1961, he recognized right away that the way Avco had designed its dishwasher made it needlessly expensive to produce because it required too many parts to get it to run. Tom Duncan was uncanny at designing products to minimize production cost, and he contributed greatly to D&M's success. Dick Goodemote, a Sears executive who became a D&M director, recounts an example of Tom's genius. Small motors were one of the first reasonably complex products to be automated in manufacture. GE, which supplied small motor parts to D&M, had set up a manufacturing operation for small motors and was proud that the operation was running itself without human intervention—"Look, ma, no hands!" GE was convinced that they could take no further cost out of the production because all the direct labor cost was gone. But Tom took a look and found a way to take a sizable chunk out of the cost by redesigning the motors for easier production. GE couldn't believe it. They debated it, Tom showed them how they could do it, they did it, and it worked!

Tom Duncan and Sam Regenstrief had their disagreements. Sam was a good industrial engineer, Tom recalls, but product engineering was not his forte. Still, he would argue like the very dickens that something could be done. The

engineers would say, "Sam, you can't do that. It won't work. It's against the laws of physics. God dammit, you can't do it." This would go on and on. Arguments got pretty heated and were liberally sprinkled with profanities. Then ten minutes after the argument, no problem, no hard feelings. "I told him to go to hell more than once," says Tom, "and later apologized for it if it was necessary." Most of the time there was no apology because that was just part of the game. In all the years of their association, Tom knows of no instance where Sam ever fired anybody. Sam didn't hold a grudge. Arguing was just his way of getting his people to try something to get the result he wanted. "He would get you so mad, you would do something even if it was wrong." Tom saw this happen many times. Or an engineer would stomp off muttering, "I'll show him," and would take a different approach that managed to arrive at close to the same result. With Sam and his engineers, it was a curious love-hate relationship. "We used to get mad enough to kill at some of the stuff Sam would do," says Tom, ". . .but overall he was a very likable guy."

Bud Kaufman remembers exactly when he went to work for Sam Regenstrief—it was June 15, 1948. He was twenty-three and had been in the army. He attended Earlham College for a couple of years but ran out of funds and dropped out. He presented himself at Philco in Connersville, was interviewed by the department head, and landed a job doing time-motion studies.

One evening a few months later, Bud found himself at a drawing board, noodling over some thoughts he had about a debate that day concerning the loading/unloading dock for the railroad spur that came into the plant. Nobody had asked him to do it, but he started sketching an elevation of the building showing the floor and the cross section of the two rails with the boxcar, trying to understand for himself whether what his coworkers were saying was true or just hot air.

Lo and behold, he recalls, this redheaded guy comes barreling up the stairs about 5:30 P.M. and says, "Where's Ben?" Ben Kavanaugh, Bud's boss, is gone for the day. So Sam comes into the department and sits down at Bud's side and starts in—"What are you doing?" Bud has never spoken with Sam before and addresses him as Mr. Regenstrief. He explains that he's trying to sell himself

on the feasibility of the unloading dock that these guys are all banging their heads over. Bud's drawing has really caught Sam's attention—he thinks it's the greatest thing since sliced bread. And Bud's thinking it's a miracle that Mr. Regenstrief is even looking at his drawing! They shoot the breeze for about an hour. Then Sam, probably tired of being called Mr. Regenstrief, gets up to leave. He claps Bud on the shoulder and says, "Call me Sam. Don't call me Mr. Regenstrief."

A couple of days later Ben Kavanaugh asks Bud, "What the hell you do to Regenstrief?" "What are you talking about?" asks Bud. "He walked in here a while ago and didn't want anybody on the drawing board but you," responds Ben. "Said you were the only one with any goddam sense."

That was how Bud met Sam Regenstrief, who would be his boss and good friend for life. At Sam's insistence, Bud was put in charge of locating machinery and setting up operations at Philco. When Sam left Philco and started organizing D&M, Bud had just learned that he had been passed over for a promotion and said he was leaving Philco in two weeks. He didn't know where he was going, but he wasn't going to put up with this crap.

Somehow Sam got wind of Bud's decision and called and said, "Hey, Bud, come down here and start work Monday morning." Bud said, "Sam, how about a week's vacation? I've been hitting this pretty hard." "Nah, you don't need a vacation, you're too damn young for a vacation," came the response. Bud insisted he wanted to go rabbit hunting. "Leave them rabbits alone and get over here" were Sam's orders. Bud Kaufman still laughs uproariously remembering that "little fart" ordering him to come on down. Bud was made general superintendent in 1965 and vice president in charge of D&M production in 1970.

Volume up, costs down—that was Sam's strategy with D&M. This was duly noted by the Harvard case study researcher as he pursued the energetic Mr. R through his busy day. Sam wanted to supply as many companies as possible, but only if they could order the volume he needed to keep

the costs low. With his thirteen customers, he set the unit price based on what D&M could produce a dishwasher for and/or what it would take to keep them in business. In other words, he had to consider D&M's volume as well as their marketing and distribution costs. Any custom designing that the customer wanted had to be justified by high volume or the costs might go sky high. Sam would occasionally give a new company more leeway than their volume deserved, just to get them established in the market. But if the volume didn't come, he wouldn't carry them.

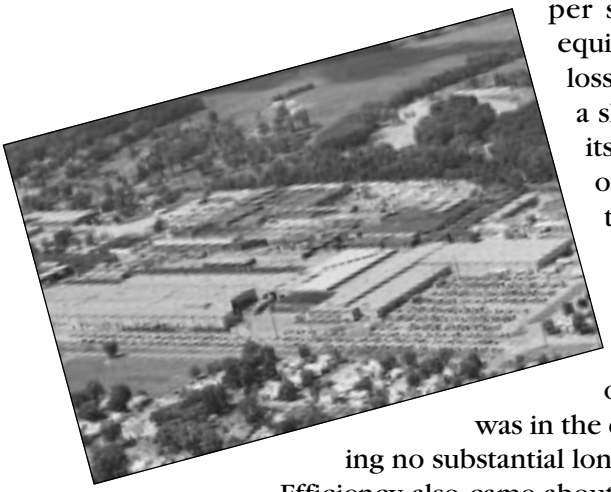
Sam, who handled sales himself, delivered the volume orders. Then he rode herd on his engineering and production team to deliver the low costs. He had to have the most efficient production facility possible. Our trusty research assistant must have followed Tom Duncan and Bud Kaufman around, too, to record D&M's approach to efficient production. This could be summarized in two words: Simplicity and standardization. It was up to Tom Duncan's engineers to keep product designs simple—a simple product was cheaper to make, less likely to break down, and easier to service if it did. And by standardizing parts, D&M could have longer production runs which lowered costs, even though they might be producing several different models for thirteen different customers.

D&M's quality control was rigid and directly related to keeping costs down. Detailed product inspections were routine through the production operation. A daily "customer acceptance" check assured that the day's production met rigid quality standards. Labor costs were rising rapidly, and repair work was highly labor intensive. It made dollar sense to handle as much of the problem as possible in the factory.

Bud Kaufman ran the production operation with a firm hand. He controlled costs basically by controlling the number of workers who came in the front gate. Supervisors would ask for more workers, and Bud would say, "No, that's your number of people—if you can't make it, I'll find somebody who can, but we will make our costs, and we will make our schedule." "Throughout the company," the young case study writer observed, "there is a strong concern with daily volume and cost in relation to schedule. Meeting or bettering the schedule is the prime concern of almost everyone at

D&M. To get cost down and volume up, people use whatever means are necessary, and cutting across functional lines appears to be the rule, not the exception." Running production numbers in the required time was D&M's secret of success, Bud told him. D&M believed in schedules—they had thirteen customers who depended on product being delivered at a given time.

Better tools and automated equipment were an important way that Sam Regenstrief ensured D&M's efficient operation. Sam was early in recognizing how to "get the labor out of the product" by automating the production line. To put this in perspective, today's dishwashers embody barely one-half hour of labor cost per unit. Sam often scrapped a piece of machinery a year or two after he bought it if he could replace it with a better machine. This was made easier because D&M was privately held. With 98 percent of the stock owned by company employees (the vast majority by Sam himself), Sam need not concern himself with earnings per share. He could replace equipment and take a capital loss without worrying about a short-term impact on profits and a disgruntled group of shareholders. In fact, throughout the 1960s, plant and equipment costs for D&M's rapid expansion in production were financed almost entirely out of current profits. D&M was in the enviable position of carrying no substantial long-term debt.



Sam's baby: Design and Manufacturing Corporation, Richmond, Indiana

Efficiency also came about through ingenuity—case in point, D&M's three separate buildings. Someone realized they could speed up the flow if they had all these operations in one building. But they couldn't afford a new plant with all new equipment, nor could they stop production to move the existing equipment to a new location. Sam and an architect figured out the solution—build the new plant over the existing buildings and then tear the old buildings out. D&M got the plant it needed without slowing production.

But it was Sam's great attention to process detail that largely accounted for his success in cutting costs. "Continuous process improvement" was his meat and potatoes long before the concept became popular. Sam Regenstrief could walk through a plant and make a quick judgment as to how efficient that plant was. Counting people was one technique—he would count the number of people engaged in a particular operation. Dick Goodemote remembers Sam walking into a refrigerator plant in California and laughing the minute he saw it. "They have thirteen employees on that door line—no way can that work!" He knew that a properly designed line with proper tools could make refrigerator doors using only two or three people. When he saw that crowd of thirteen, he saw dollar signs and cost in product.

The original hands-on manager, Sam had no compunction whatsoever about getting down into the details, and he personally controlled every detail of the D&M operation. Sam was constantly reorganizing assembly lines and working on the manufacturing process. According to Len Betley, who before long would play a big part in this story, it was not because Sam liked hands-on work better than managing. "He just got a kick out of the whole thing. He got a kick out of getting a good contract for steel. He got a kick out of making a good deal with Sears. He got a kick out of saving a penny a unit on the wiring. He just loved it all."

Len used to see Sam's cost accounting sheets. They'd be very, very detailed and would go on for pages and pages and pages. They'd compare costs this month to last month and to the month before that. Sam would pore over those things and say, "Look here. Look here. On this motor, the attachment, we're down two cents per unit." And that would be great, to save two cents on this little part. Well, when you're manufacturing a million dishwashers a year, two cents times a million is a lot of money, especially if you can come up with pennies saved in twenty different places. Sam got into that level of detail. More than anything else, that was probably the reason for the success of his manufacturing.

Bud Kaufman also testifies to Sam's attention to detail. He fondly recalls many a lunch hour spent with Sam poring over layouts. Always on the go, Sam would call Bud at 10:30 A.M. and say, "Bud, let's go over that print over lunch hour. I'll

bring a sandwich." So they'd go from noon to 1:00 or so. Maybe Bud would be preparing to move an entire assembly line or a conveyor on the following weekend, and they'd be looking at the final layouts. Bud soon learned to make Sam use the back end of his pencil to point things out so that he couldn't make marks on the vellum drawings. Sam would get to eating a hamburger, drinking a soda, chomping the ice, and trying to talk over the vellum all at the same time, and eventually the layout would look like a disaster area. Not to mention the cigars that Sam would chew or smoke, getting ashes all over everything. After a couple of sessions like this, Bud switched to running photocopies of the layouts and putting them, not the vellums, on the table. So one day Sam says to Bud, "Why do we always get the paper? Why don't you put out the vellum?" "Hell no," says Bud, "you'd destroy three a week if I did," which got Sam to laughing.

Sam liked to stroll out on the shop floor and get involved in what was going on. He was brilliant in many ways, Tom Duncan recalls, but not particularly gifted mechanically. Nevertheless, Sam was always poking around in the lab when the test models were being run. He liked to get out there and see exactly what that machine was doing as near as he could. Of course, it's hard to tell what a dishwasher is doing once it's all closed up. Sam thought it was the funniest thing in the world if he could pop open the door and get somebody wet. He just loved to do that.

"Sam Regenstrief, you've got a phone call on six," intones the voice over the loudspeaker. Sam, strolling through the plant with a visiting engineer, surrounded by a chorus of banging machines, picks up a phone. "Hello, this is Sam...yes...yes...well, I don't know, I'll check on it." He hangs up and calls his secretary Marilyn Mitchell. "Get Bill [So and so] on the line." The first call has clearly come from somewhere else in the country, and Sam is standing there waiting, machines banging away around him. The phone rings again and it's "Hello Bill, you got steel at [such-and-such a price]? Okay, now I want to buy [this much] of it and I want it shipped to [this place]. You got that?" Sam hangs

up the phone and says to the visitor, "Gee, I just made fifty thousand dollars."

Steve Sample, the visitor who witnessed this incident, took it as an example of Sam's instinctive feel for money. "Sam had an incredible feel for how numbers flow in complex equations. That's what made him such a great businessman." Somebody had called him from God-knows-where and needed rolled steel and thought maybe Sam had some. Sam didn't, but he knew someone who he figured had it, and he bought it and sold it for a much higher price, leaving all parties happy. He was doing what a merchant ought to do—bringing a willing buyer and willing seller together with a price differential for himself.

Where the profits from his dishwasher business were concerned, Sam saw profit as serving several purposes. To his customers, it was a service charge for determining their needs and wants, as well as for making and holding quantities of those things that D&M was skillful at fashioning and that others could not make so easily or so well. For his company, profit was both a reward for superior ability and expert knowledge of the factors involved and an incentive to give customers the latest and best in design and workmanship. "You have saved, they have gained" was the formula for business success, with a dose of risk thrown in—"betting on vision" was how Sam put it.

Sam Regenstrief had started his company in January 1959 with a hundred employees manufacturing sixty thousand units. By January 1972 his refurbished Connersville plant was employing more than fifteen hundred workers. D&M was now the world's largest manufacturer of dishwashing machines. They were selling at Sears under the Lady Kenmore name, but were also sold under names like Kelvinator, Modern Maid, Magic Chef, Admiral, and Norge. Way beyond Sam's modest aspirations in 1959, D&M held a full 25-percent share of the U.S. dishwasher market.

Sam's strategy was working—he was mass producing for the leading national retailer and twelve manufacturers while steadily bringing down production costs. As he had hoped, in his quest for a better quality of life for the average citizen, he had helped dishwasher prices to fall over the past twelve years. And he was making money. His margin of profit

had decreased a little, but the total profits were very, very big. Even competitors recognized that D&M's financial and growth performance was exceptional for this or any other industry.

Childless, Sam had devoted himself to his Connersville baby, D&M, but his ties to the family in Indianapolis remained strong, as they had through all his years at Rex and Philco. Sam rarely missed celebrating the Jewish high holy days with his brothers and sisters. Mother's Day and Father's Day were customary celebrations, with Sam doing a lot of cooking on the grill. Thanksgiving was always at Sam and Myrtie's in Connersville, and Myrtie prepared special dishes that were everybody's favorites. At Hannukah time, when the whole family would assemble, Sam was like a Pied Piper with the children—the center of attention, and enjoying every minute. Helen's nickname for Sam—Shot—was particularly apt, as Helen's daughter Lesley pointed out years later while watching a video of the family exchanging gifts at one of these Hannukah parties. "Look at Uncle Sam!" she said. "He's so stately. You can just see the power behind him."

Sam gave money to the Jewish Community Center for a swimming pool in memory of Nate, the athlete, the only one of his brothers to attend college and the first of his brothers to die. Nate's daughter Lynn married Marvin Silbermann, a bright young University of Chicago MBA. Sam gave Marvin a job at D&M, where he learned the business from the ground up.

Sam and Myrtie vacationed two weeks a year in Boca Raton, Florida, and director Dick Goodemote remembers taking his wife to visit them there. Nieces Phyllis Feigenbaum and Lynn Silbermann were there too, and Sam had the best time with those girls. They'd kid him and say, "Sam, bring your wallet and we'll do some shopping," and they would come home with things like really loud sportcoats. "Sam didn't care. He'd buy anything they told him to. He just loved those girls," Dick recalls.

Sam once tried to talk his nephew Allan Cohn into working for him in engineering. Allan, newly married, said, "Sam, I don't know anything about engineering. I didn't go to school for engineering." He remembers Sam saying "Hell, you sit with those guys for one session and you know as

much as they know." Allan declined. Disagreements were bound to arise in any business venture, and he didn't want to be a yes man but also didn't want to get into a confrontation with Sam. He valued the relationship with his uncle more than the opportunity he was passing up. As it was, their only real disagreement came during that contentious time in the 1960s when beards were just coming back into fashion—Allan had secretly wondered what color of beard a redhead like himself would grow. Sam said he wouldn't hire anybody who had a beard. Allan asked Sam, "What does a beard have to do with a man's intelligence?" Sam said, "I don't know what it has to do with his intelligence, but he doesn't need a beard. I don't think they can do as good of a job as somebody without a beard." The conversation continued with a good deal of laughing back and forth, but it revealed Sam's stubborn streak.

If Sam thought his nephew could learn engineering simply by watching, it was because Sam had perfected the technique. Having no formal engineering training himself, he had a knack for picking up technical knowledge by observing closely and giving advice, which was his way of asking questions. He especially admired anybody who had imagination and would get caught up in what they were doing. He spent long hours with an engineer friend named Ralph Roper at Wallace Expanding Machines, Inc., an Indianapolis firm that supplied machine tools for D&M. Ralph Roper was a genius at shaping metal, and Sam was a quick study. Sam would pore over the machines with Ralph; then he'd offer Ralph some advice, and Ralph would say, "No, it wouldn't work that way." Sam would absorb that and, the next time he came to visit, it would be clear that he understood how the process worked. This capacity to pick things up quickly extended to every sort of arena.

Imagination was an especially necessary ingredient for the D&M engineers charged with developing new products and refining existing ones. Although the chief thrust of D&M's product development was defensive, having a good defense resulted in occasional innovations. Already Sam's engineer-

ing group was credited with redesigning and marketing the first practical front-loading portable dishwasher, to resounding accolades from the consuming public. And it was the ingenuity of D&M's engineering department, rather than demand of its customers, that was principally responsible for developments in such areas as electrical circuitry governing the dishwasher cycle and the types of raw materials used. As a result, D&M came to hold a number of rather lucrative patents on dishwasher designs and components.

Sam's philosophy on new products and features was to maintain D&M's position in the industry by helping its customers maintain theirs. Sears needed to have all the successful features that its competitors had, plus unique features to distinguish its own models. Brand-name manufacturers, for whom dishwashers broadened product lines, especially needed special features so they could play in the highly competitive builder market. With the postwar housing boom continuing, building contractors were buying great quantities of under-the-counter dishwashers to install in their fully equipped dream kitchens.

As head of product engineering, Tom Duncan lived in constant fear of being scooped by someone else's engineering department. But on more than one occasion, his innovations set the competition on its ear. In particular, Tom came up with the macerator. Housed in the pump system, this device had twelve blades that spun around at 3,450 revolutions per minute (rpm). Anything that got into the upper pump had to go through the macerator, and the macerator chopped up food like it had never been chopped before.

The macerator was impressive, but the real innovation was the self-contained pump system that held it. In the earlier dishwashers, water emanated from an impeller at the bottom of the unit. The impeller looked like a boat propeller, and it spun around spraying water on the dishes, which had to be loaded in a circular pattern at just the proper angle to catch the sudsy liquid. Besides offering no flexibility in how a consumer could load the dishes, this impeller had to be protected because the Bakelite plastic of which it was made could easily chip. If a leading edge of the impeller got chipped, it wouldn't pump worth a hoot. Everyone in the business had been working on this problem, and Kitchenaid and

Hobart had developed a new spray arm system that overcame the loading inconveniences and made possible the rack system that people are familiar with today. Tom's coup was the self-contained pump that would not only drive a spray arm but also house the redoubtable macerator.

D&M's field sales manager had a favorite demonstration. He would put a D&M model side by side with a Kitchenaid and fill both of them with twelve sets of plates, cups, glasses, and silverware. Then, before the astonished crowd, he would pour cans of Dinty Moore beef stew over everything in the two machines and start them running. Et voila, his model would remove all traces of the Dinty Moore, and the Kitchenaid wouldn't. As the final coup de grace, he would insert the stew-flecked lower rack of the Kitchenaid into the D&M machine and let it clean up the mess. His audiences were impressed.

D&M's feature designers worked out of the Connersville plant, but to be sure his product had the right washability and convenience, Sam would make a trip up to Lafayette, Indiana, every so often and talk to the home economics people at Purdue University. He wanted to know what they considered a good wash job and how they would measure that.

While at Purdue, he would also stop in at his special engineering facility in Lafayette, because here he had a cadre of consultants working for him on special technical problems. The facility was ideally situated in Lafayette—the operation could draw on the talents of part-timers from Purdue. One of these professor consultants was Dr. Harold DeGroff, a graduate of Rensselaer Polytechnic Institute and California Institute of Technology with BSAE, MSAE, and PhD degrees, who had been teaching at Purdue since 1951. He joined D&M in 1969 and soon was named vice president for product development.

At the Lafayette facility, Sam had designers working on ways to make the product quieter and safer, anticipating that in coming years the environmental standards for dishwashers might be tightened. They also worked on new processes just to avoid the possibility of competitors being the first to develop a whole new technology for cleaning dishes—ultrasonics, for example—and putting D&M out of business. In

particular, Sam was interested in a new development embodying the use of plastic and steel, for which he saw great possibilities in the manufacture of kitchen cabinets, office equipment, and building panels. The Purdue connection served as an insurance policy, too. It demonstrated to Sears and Sam's other customers that, through research, D&M was making an effort to stay at the leading edge of dishwasher technology.

One technical problem that had bugged Sam for years was dishwasher controls. Early dishwashers had crude manual controls to control the cycles—rinse, wash, rinse, dry—and Sam was looking for new ways to control the cycles that would be more user friendly. He looked to Purdue to find the talent that could help accomplish this.

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The head of the engineering department stopped the young assistant professor in the hall and said, "Would you be interested in consulting for a dishwasher firm?" Steve Sample had just joined the Purdue faculty in the fall. The consulting would pay twenty dollars an hour, which in January 1967 was an enormous sum of money.

"What kind of consulting?" Steve asked. The department head said he thought it might have something to do with switches. Being an electrohydrodynamics man, Steve knew nothing about switches. "Why me, and not one of the more senior faculty?" Steve asked. The answer came back that, quite frankly, most of them wouldn't want to consult for a dishwasher company. And what the company really wanted was, well, sort of "window dressing"—something to satisfy one of their major customers that they were engaged in research.

Steve thought about it and decided he would give it a whirl, as long as the company understood he was an expert not in switches, but in the interaction of electric fields with fluids. "Well, you might look at liquid switches," the department head suggested. "They have some problems with the contacts welding together on their timers."

Thus did Steve Sample come to know of Sam Regenstrief and his company in Connersville. Their face-to-face meeting didn't come until much later, though. Steve dealt with Bill

Yake, one of Sam's lieutenants and an engineer with D&M. Steve signed up for the twenty dollars an hour, giving up all financial rights to any inventions he might come up with, and commenced to cogitate on liquid switches. After a week or two he dismissed the liquid switch idea, but he got this crazy idea for a digital electronic control system for a dishwasher. ("Pedestrian now," says Steve, "but in 1967 that was radical stuff.") Unfortunately, Steve knew next to nothing about digital electronics. He suggested to Bill Yake that other faculty in the department would be better suited for this kind of work. But he also told Bill that he thought digital integrated circuits were going to come into their own and become inexpensive. Bill talked to Sam and came back and said they wanted Steve Sample to do it. Steve said, "Yeah, but it's going to cost you twenty dollars an hour for me to read sophomore textbooks on digital electronics."

A good investment indeed, considering that young Dr. Sample came up with an innovation that really scooped the competition—the first solid-state timer. There had been some tinkering with solid-state items before, but nobody had ever come out with a fully solid-state machine. D&M did, although it was only a partial success; nevertheless, the electronic controls caused more than a little excitement in the industry.

Sam tried to entice Steve Sample onto his D&M management team, but Steve had academia in his blood. He went on to become a university administrator, first at Purdue and then at University of Nebraska and State University of New York (SUNY), Buffalo, all major research entities. Today he is president of the University of Southern California. The electronic controls that Steve Sample dreamed up while reading textbooks at twenty dollars an hour were patented and made a fortune for D&M. The last patent expired in April 1994.

Although Sam's earliest business plan spoke of D&M's potential to manufacture other major appliances—automatic laundry equipment, refrigerators, ranges, and air conditioners—and even the intention to take on defense contracts, by the mid-1960s the focus was clearly shifting to a single product. The steel sink and cabinet business that Sam inherited from Avco was still intact and provided a small income stream that helped to cover D&M's overhead costs. But builders were

increasingly turning to wood cabinets, and other cabinet sink manufacturers resisted Sam's overtures to supply their sinks, considering D&M's American Kitchens line to be a competitor. Finally in 1967, D&M dropped the sink and cabinet business, leaving Sam free to concentrate on making the best-quality dishwasher for the lowest production cost in the industry.

Ironically, Steve Sample's control designs were grabbed up by the fledgling microwave oven business, and most of the patent royalties over the years came from microwave manufacturing. Sam Regenstrief never pursued microwaves. His was a one-act show, and it featured dishwashers.

TO BUILD A FOUNDATION

Leonard J. Betley was a young lawyer at Ice Miller Donadio & Ryan when he first met Sam Regenstrief. The firm had headquarters in the aluminum-fronted Fidelity Building on Monument Circle in Indianapolis, and Len's office was close to that of senior tax partner Merle Miller, who handled, among other things, D&M's legal affairs. Merle had a nice office overlooking the Circle. Often, as Len walked past Merle's office, he would see Merle and Sam in there talking about the problems of D&M along with the problems of the state of Indiana, society, and the world. It was the Kennedy-Johnson era in the 1960s, a time of great change in the nation, so the two had plenty to discuss.

Merle Miller had been on the D&M board of directors from day one and had in fact been Sam's chief personal and business financial advisor since about 1950. The connection to Ice Miller was made years earlier when Sam's father approached the firm, then called Ross McCord Ice & Miller,

looking for an attorney to help sort out problems with his partners in the bakery.

A tax lawyer by profession, handling tax cases at the state and federal level, Merle Miller was a most unusual tax man. He was not at all concerned about details. "He was a big-picture kind of guy," his junior partner recalls, "the kind of person who in a half hour would have five brilliant ideas, three of which were absurd and did not make any sense at all, one of which somebody else had thought of a long time ago, and one of which was truly innovative."

An extremely bright man with the distinguished carriage of a statesman, Merle Miller liked the bold stroke. He wanted to change society, change the company, change whatever he was working on—not in small increments, but in one sudden, sweeping movement. In the conservative 1950s, Merle's classic New Deal Democrat proclivities foreshadowed the liberal optimism that was to come in the next decade. He took part in the Indiana Civil Liberties Union at a time when the McCarthy era made that a dangerous thing to do and was featured on the Edward R. Murrow show "See It Now" on CBS in 1953 for leading the fight to admit the ICLU into the American Legion Building in Indianapolis. He lost clients because of his involvement in liberal causes. Undaunted, and a card-carrying Democrat, he managed Birch Bayh's successful campaign for the Indiana senate in 1962.

Gradually, Len Betley began to be included in Merle's meetings with Sam. Len had been told that Sam Regenstrief was a very successful businessman, and he was impressed and duly respectful. Len would sit quietly and listen to the two of them—Merle seated, tapping a pencil on his big semicircular desk, talking broad generalities and grand visions, Sam standing at the window framed by the dramatic Monument Circle view, skipping from idea to idea, his mind moving way ahead of his mouth. Len frequently didn't have the foggiest notion what either one of them was talking about. In fact he doubted if either one understood what the other was saying! Nevertheless it was Len's job to sort out the kinds of things they were talking about, see whether some of these ideas could be implemented, and take charge of implementing them.

Len Betley finds it intriguing that Sam Regenstrief

showed interest in a man like Merle Miller. Merle was very different from the D&M people, key suppliers, customers, and other business professionals that Sam usually associated with. Most people regarded Sam as a hard-nosed businessman who watched like a hawk every detail of an operation and every penny spent. But there was a part of Sam that found Merle Miller's traits very appealing. The bold stroke. The social good. Sam and Merle shared a certain optimism about society, a sense that things could be made better and that one person could have an impact. That shared optimism cemented their relationship, and Merle was Sam's closest personal business advisor for at least twenty years. Sam would also consult with Harry Ice, Merle's law partner, who had the same Eagle Scout optimism.

Obviously Sam Regenstrief was his own man and made his own decisions, but Len feels that Merle did have some influence on the direction that Sam's natural instincts took. And Merle Miller was deeply involved in the thinking and structuring of a new enterprise on the Indiana University Purdue University at Indianapolis (IUPUI) campus that would play counterpoint to Sam's rising success in the dishwasher business.

Over the Jewish holidays in 1967, Sam began talking with his nephew-in-law Harvey Feigenbaum about what he could do with his money. Sam Regenstrief was 57 at the time and had amassed quite a fortune.

It was Sam's custom to drive up to Indianapolis for high holy days—Rosh Hashanah and Yom Kippur and the Passover Seder. For the two-day Jewish new year festivities, he often stayed overnight with sister Helen and her husband, Art Barrett, but, because Helen attended a different synagogue, Harvey would pick Sam up and take him with him to temple. Afterwards they would spend the afternoon together. Thus, over the course of several years Harvey and Sam had a lot of time to just be together and talk.

Because Harvey was a physician, their conversations frequently touched on medical matters. As president and chairman of the board of Fayette County Memorial Hospital

and as a financial contributor as well, Sam was especially concerned about the difficulty of getting quality medical care in Connersville. Indeed, Sam often arranged for his workers and friends to get their care at IU Medical Center, with Harvey as the liaison. Harvey also ran an annual physical examination program in Indianapolis for key employees of D&M. Sam knew how to get good care through the University Hospital, but he didn't think the other people in Connersville did.

On this occasion in 1967, however, the subject was money—specifically a tax problem. "They're saying I gotta have a foundation of some sort," Sam told Harvey. He needed to give some money away to reduce his taxable income. He thought he might fund some kind of university research, he said. Maybe it should be a foundation connected with the engineering school at Purdue—he had already worked with several consultants from Purdue in the course of his dishwasher business—or maybe a foundation connected with Indiana University School of Medicine where Harvey was employed. He mentioned a yearly budget of a million dollars.

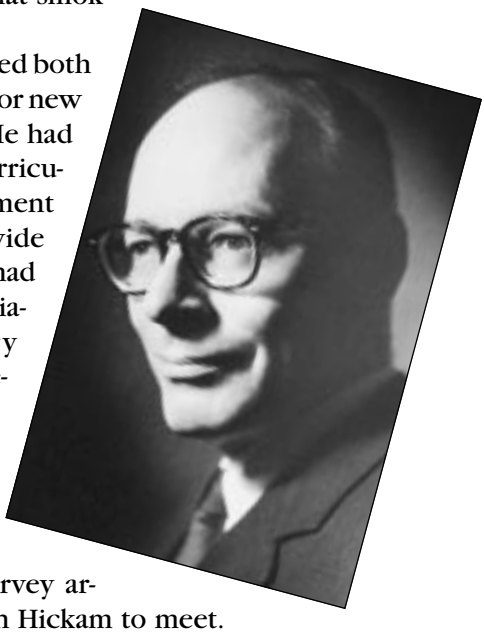
No doubt Harvey's eyes widened as he considered the possibilities. He quickly decided it might be a good idea to nudge Sam in the direction of medicine rather than engineering. And he knew just the man who could handle that sum of a million dollars a year. It was Dr. John B. Hickam.

John Bamber Hickam, professor and chairman of the Department of Medicine at IU School of Medicine, was from an old Indiana family and quite a character. Born in Manila, the son of Col. Horace M. Hickam, a pioneer in military aviation for whom Hickam Air Force Base in Hawaii was named, John graduated from Harvard University School of Medicine. He served as captain in the Army Air Corps Laboratory at Wright Field in Dayton and then taught at Emory University School of Medicine and at Duke University before joining the faculty at the Indianapolis medical school.

As head of the medical school's Heart Research Center, opened with a multimillion dollar federal grant, John Hickam was respected as a researcher. He was widely known for his original research in pulmonary function in heart and lung disease and had made a special contribution to knowledge of circulatory diseases through his study and photography

of blood vessels in the retina of the eye. He had also studied the effects of space flight on the human body and sat on the panel that established statistically that smoking is a hazard to health.

John Hickam was also recognized both locally and nationally as an advocate for new approaches to medical education. He had developed an innovative medical curriculum and was credited with development of the Indiana Program for Statewide Medical Education. It was John who had talked Harvey into returning to Indianapolis when Harvey had every intention of remaining at the now-defunct Philadelphia General Hospital. Harvey knew him to be a man truly concerned about people and says John Hickam influenced his life as much as did his own parents.



Respected medical researcher John Hickam helped shape Sam's vision for a foundation

Playing the role of "yenta," Harvey arranged for Sam Regenstrief and John Hickam to meet. Perhaps because they were both successful men—they didn't have to prove anything to each other—the two hit it off immediately. They started to talk about possibilities. Harvey stuck around to act as Sam's interpreter since, true to form, Sam never finished a sentence. Their discussion crystallized around a concept that not many people were talking about in those days—health care delivery. It was out of a series of these conversations that the Regenstrief Foundation and the Regenstrief Institute were born.

"I can't help feeling that medicine could have avoided…the traumatic changes that are going on now, if we had been able to listen to people like Sam who knew that medicine was a business, and that efficiency and cost effectiveness were essential components."
Harvey Feigenbaum, IU School of Medicine

That Sam Regenstrief should be interested in health care delivery came as no surprise to those who knew him. A "Sam story" that Joanne Fox often tells to Regenstrief Institute recruits brings the issue into relief.

Sam joined the board of American Fletcher National Bank, and it was AFNB's policy that all new board members had to undergo a physical. So he presented himself at Marion County General Hospital—known today as Wishard Memorial Hospital—to submit to the necessary chore. Joanne Fox remembers the huge outpatient waiting room on West 10th Street from her childhood. It was like a train station, with wooden pews all lined up like in a church. "You would wait most of the day at one end to see a clinic doctor," she recalls. "Then, if the doctor ordered some medicine for your condition, you would wait the rest of the day at the other end for the pharmacy to fill your prescription." People used to make a social event of it, bringing their lunches for a day-long encampment.

Into this scene walks Sam Regenstrief, efficiency expert. He takes a seat and hunkers down to watch and wait with the rest of the crowd. Time passes. Then, while he's still sitting there watching and waiting, he has a gallbladder attack. They put him on a guerney and wheel him over to the side—and leave him there because they are so busy. Sam is reputed to have said as he recalled this experience, "I can go anywhere in the world to get health care. I can pay and get the best there is. But these people have no choice. They have to sit here and wait all day. Surely to God there is something we can do about this!"

Sam's sister Helen confirms this story but thinks the reason for Sam's physical was to set an example for his executives who weren't crazy about coming to Indianapolis for their physicals—they had to get examined so that Sam could insure them. And she thinks it was a kidney stone that Sam was left alone to pass. In any case, we can imagine what Sam must have thought as he encountered that clinic at Marion County General.

Sam Regenstrief was certainly no stranger to illness. His sickly, bedridden mother was only the beginning—the family seemed plagued with medical problems. Sister Sara contracted rheumatic fever in childhood and then rheumatic heart disease. In later years, she underwent evaluation at the

Mayo Clinic and was told she should not have any more children because of her heart condition. Brother Zish had a heart attack just about the time that Sam was starting D&M, and Harvey cared for him through a stormy course of rhythm problems, bacteremic shock, and cardiac arrests. Brother Nate had a devastating stroke at quite a young age. He was undergoing rehabilitation in Chicago and was making a good recovery when they discovered he had colon cancer, which soon took his life. Brother Morris was overweight and developed high blood pressure and diabetes and then suffered a series of strokes.

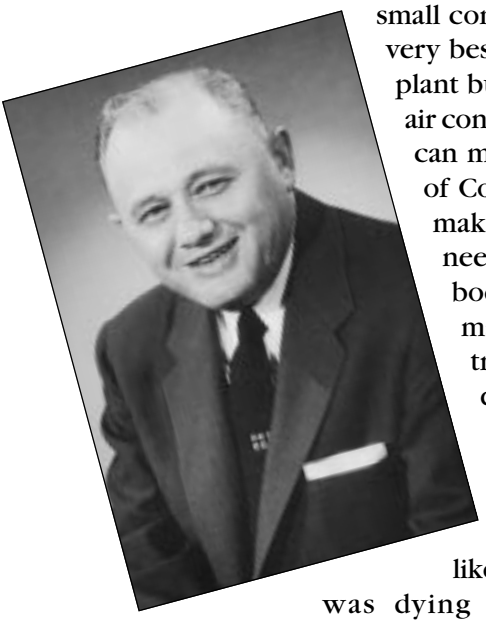
For Sam's part, his only major health problem for many years—other than the famous gallbladder attack—was his failing eyesight. He had a cataract removed at Johns Hopkins in the early 1960s. By this time he already had wealth. He wanted the best and was told that Johns Hopkins had the best eye clinic in the world. He never did get great vision out of that eye, but he developed the conviction that everybody ought to have the best medical care, not just the wealthy. A second cataract operation at IU went somewhat better, but, from then on, Sam always wore thick glasses.

It's true that there were important tax reasons for Sam Regenstrief to start a foundation. For every dollar that Sam gave to a foundation, he would reduce his federal income tax bill by about fifty cents. Plus, if the bulk of his estate were turned over to a foundation at his death, all that money would go to charity and not be taxed. Sam and Myrtie had decided it would be bad for the family to give substantial amounts of money to the young nieces and nephews—both his and hers—and they had no children of their own to inherit the Regenstrief estate. Besides, if the estate went to family, half of the money would go right back to the federal government in taxes.

But these reasons did not take center stage in the series of meetings that laid the groundwork for the Regenstrief Foundation. John Hickam and Sam Regenstrief, as interpreted by Harvey Feigenbaum, chatted about many concerns that Sam had about medical care in general and what he could

contribute from his experiences in Connersville. Gradually the idea for research into health care delivery began to take shape.

Sam was struck by how variable the quality of health care was. "Why can't we have expert medical help in small communities?" Sam was often heard to say. "Connersville is a small community and we have experts—the very best in manufacturing—not just in my plant but at the Ford plant too. They make air conditioners for Ford products, and they can make an air conditioner in this town of Connersville just as good as they can make one in Detroit." If Ford or D&M needed expert advice, they called somebody on the phone and got it. It didn't make sense to Sam that the town had trouble getting access to an equivalent quality of medical care.



Successful in dishwasher manufacture, Sam thought medical care ought to run more like a good factory

John Hickam could relate to what Sam was saying. He had on his hands a troubled county hospital—Marion County General—which, like county hospitals all over the nation, was dying a slow death due to chronic underfunding. It didn't make sense to John that a prosperous community like Indianapolis could not maintain its county hospital at a standard of care that was the same as the community at large. Access to decent health care for ordinary citizens was very much on John Hickam's mind, and maybe there was a way a foundation might shore up Marion County General....

Sam was also dumbfounded by the delays in medical care. He would have an appointment for 9:00 A.M. and not get in to see the doctor until 10:30 A.M. Medical care was downright inefficient. Why couldn't it be run more like a good factory? His dishwasher business was bringing down costs every year and making a better product faster and easier. Why was health care, despite new drugs, therapies, and surgical techniques being invented all the time, only getting slower and more expensive? It was because the health care process did not operate like a fine-tuned factory. It was er-

ratic, chancy, uncontrolled, and poorly managed. In short, it didn't work like a system. "Health care is not competitive," Sam would say, at a time when the rest of the world was hardly concerned about health care delivery and everything seemed to be going along fine. "We have to get it more like industry."

John Hickam must have resonated to this characterization, all too familiar from his tribulations at Marion County General Hospital. Because of the indigent population it served, as well as the lackluster support it received from the county, he had trouble luring the kind of talent that was needed to dig the hospital out of its morass. If Sam's foundation could entice some of the best minds in medicine to apply themselves to making the hospital run efficiently....

Sam's years in manufacturing had taught him how to maximize the utility of people and equipment. He was convinced that the medical profession had a lot to learn, not just from a medical novice like himself, but from manufacturing techniques in general. "I don't know beans about medicine—in fact, I'm scared to death of it—but I felt the layperson could help the specialist just as the specialist aids the layperson," Sam said in an interview years later. "The idea is to use new industry technology to build up cost containment and productivity of people. That is what counts in whatever you are doing."

In particular, Sam saw in medical practice and in manufacturing the same basic necessity—to get the labor out of the product. The medical industry should not have its most highly trained people doing menial tasks, he thought. They won't do them well and they'll make mistakes. Research in industry had borne this out; if you put a highly intelligent individual on the job of quality control, the person's mind wanders instead of concentrating on whether this piece is done right or wrong. These expensive people—the medical professionals—were doing too much work that could be done by others. Why would a doctor ever have to calibrate an instrument? Why would a doctor have to spend time making detailed expense reports? Why would they waste that person's time?

Again, John Hickam's ears must have pricked up, because a revered medical educator whose star pupil John had

once been was just retiring from Duke University. He had been pioneering a program there to train skilled laypeople to assist physicians in routine tasks. Maybe Eugene Stead could be enticed to become involved in Sam's foundation....

And so it was that on April 7, 1967, on the advice of Drs. John Hickam and Harvey Feigenbaum of IU Medical School's Department of Medicine, and with the blessing of Dean Glenn W. Irwin, Jr., Sam and Myrtie Regenstrief created the Regenstrief Foundation, Inc. The avowed purpose was "to bring to the practice of medicine the most modern scientific advances from engineering, business, and the social sciences, and to foster the rapid dissemination into medical practice of the new knowledge created by research."

Sam Regenstrief wrote only sketchy notes about what he wanted the Foundation to do, but Len Betley is certain that improving health care delivery was only part of it. Sam and Myrtie were pointing toward the future and the good stewardship of their fortune. An idea was taking shape in Sam's mind. It was that the Foundation could be a means to develop continuity of ownership for Design and Manufacturing Corporation after his death. By arranging to place a controlling interest in D&M in the hands of a not-for-profit foundation board made up of Sam's family and key associates, he might ensure that D&M would continue to operate. D&M would continue to employ the people of Connersville and at the same time create a stream of income for the Foundation. Thus the Foundation was to ensure bright prospects for Connersville, and for Sam's baby.

Sam and Mytie must have slept soundly on that April night, having in some measure secured the future for the benefit of their hometown and their foundation. John Hickam, however, probably lost a little sleep thinking about the exciting prospect of lining up a roster of innovative minds to resurrect Marion County General Hospital.

Two weeks later—April 24—Sam and Myrtie Regenstrief drove to Indianapolis from Connersville for the first meeting of the board of directors of the Regenstrief Foundation. They were joined by fellow board members Merle Miller and Logan T. Johnson at the offices of Ice Miller Donadio & Ryan at 2:00 P.M. Frank McKinney was also on the board, but absent due to his wife's illness.

The first order of business was to consider which physicians and consultants should be invited to sit on the board in the capacity of advisors. The purpose of advisors, of course, was to help the Foundation spend its money. Sam introduced Drs. John Hickam and George Lukemeyer of the Department of Medicine at IU School of Medicine, and John Hickam was officially chosen director of the Foundation. John presented a list of advisory members and consultants, with brief biographical sketches.

The board met again in June to see to opening a bank account at American Fletcher National Bank (Sam was on the bank's board as well) and to approve a small budget for office furniture and travel expenses for consultants. They were pleased to hear that the Internal Revenue Service had officially granted the Regenstrief Foundation tax exempt status as a charitable organization and that contributions to it would be deductible for federal income, estate, and gift tax purposes. They agreed to meet bimonthly on the first Monday of the month.

By August 1967, the Regenstrief Foundation was giving out its first grants. With the advice of a select group of physician advisors, according to a news report, the Foundation awarded "a limited number of grants to research investigators in this community and elsewhere," reserving most of its resources for the development and support of health care research at IU Medical Center.

The reality was that John Hickam, Harvey Feigenbaum, and the rest of the advisors and consultants were scrambling about trying to figure out projects that Sam would want to fund. Later this would be known unofficially as the "ad hoc period" of the Foundation's history. As the newest grant-making entity on the block, the Regenstrief Foundation was flying by the seat of its pants. But this was not a bad thing, simply an indication of its start-up mode. The Foundation needed time to pull its act together.

The times certainly provided rich fodder for an entity seeking to define a mission and vision. Great optimism pervaded the medical community during the late 1960s. John F. Kennedy's "high apple pie in the sky hopes" had metamorphosed under President Lyndon B. Johnson into "a chicken in every pot." In his 1966 inaugural address, LBJ declared that

the United States was "mighty enough—its society healthy enough—its people strong enough—to pursue our goals in the rest of the world (i.e., the Vietnam War) while building a Great Society at home." As the Regenstrief Foundation handed out its first grants, major civil rights legislation was being enacted and a war on poverty and urban blight was being waged. Head Start, the Teacher Corps, vocational education, family planning assistance, food stamps, rent supplements, and model cities programs were readily supported in both houses of Congress.

LBJ had just launched the regional health program, and the consensus was that medicine had all the tools, diagnostic techniques, and therapies to take care of people. It was now just a question of getting them access to health care. Everywhere people were talking about the shortage of doctors. New medical schools were cropping up like mushrooms, and existing schools like Indiana University's med school were opening their doors to swelling classes of 250–300 would-be physicians at a time. Health maintenance organizations (HMOs) were just getting started. Medicare was coming in, and there was going to be more money available to take care of poor people. Everyone had hopes of making a change and making health care more accessible, especially to the poor in rural areas and big cities.

Harvey Feigenbaum was caught up in the enthusiasm by virtue of running a health clinic at Flanner House in the impoverished neighborhood adjacent to the IU Medical Center and he and Sam would touch on this in their discussions now and again. Harvey was excited about a development that promised far-reaching consequences for health care—a new technology for automating blood chemistry tests. By analyzing a single blood sample, the new chemical analyzers could report on a whole array of substances in the blood. Thus they could be used to quickly screen for a variety of disorders, not just the specific problem that brought the patient to the clinic. Harvey wanted to implement *multiphasic* screenings at Flanner House, taking advantage of this equipment, and Duke University was pilot testing a similar screening clinic in North Carolina. Grants from the Regenstrief Foundation soon funded both of these efforts.

If Sam held a deep concern for and a desire to help the indigent of the world, he did not express it aloud—Sam was not one to talk about his philosophy, his values, or his politics. His chief motivation was to straighten out things that he saw as inefficient, but perhaps also the sights, sounds, and smells he encountered on the occasion of his gallbladder attack at the West 10th Street clinic left a lasting impression.

Marion County General Hospital's charge was to heal the pain and suffering of the city's disadvantaged citizens and to care for sick prisoners. A ward of the Marion County Health and Hospital Corporation (HHC) since 1951, the county hospital had been informally allied with IU Medical Center since 1925, a relationship stemming from their close proximity on the IUPUI campus. When they became formally associated in 1963, the medical school became more deeply involved. Marion County General and IU School of Medicine had just completed negotiations providing for the medical school to assume responsibility for patient care and teaching at the county hospital, which is why John Hickam, as chief of medicine, found himself responsible. John deftly focused Sam's attention on the troubled county hospital, appealing to Sam's irresistible urge to fix things that he saw as broken, and Sam Regenstrief became a willing collaborator.

John Hickam had a vision of the deus ex machina that would swoop down and save the hospital—an institute. He would pull together a group of world-class consultants and resource people to use the hospital as a research laboratory to try out better ways of delivering health care. There was no resource in the state—in the entire Midwest, for that matter—where people could turn for assistance with the many new ideas and technologies that had the potential to improve health care delivery. Good research could shed needed light on many areas—medical information systems, multiphasic screening, the use of technology, start-up of new physician practices, financial counseling, training for laypersons to assist physicians, and health systems engineering, to name a few. An institute bringing together talented researchers from many disciplines would be that resource—the Regenstrief Institute, funded by the Regenstrief Foundation.

INNOVATIVE MINDS

When it came to recruiting world-class minds to apply themselves to bettering health care, John Hickam knew of no one better suited to the task than his mentor and former boss, Dr. Eugene A. Stead, Jr. John had been his chief resident and star pupil at Emory University, and he had followed him to Duke University when Gene became chairman of medicine there. Described by a colleague as a kind of "father of most things that are going on in medical care these days," Eugene Stead had trained more chairs of medicine than anyone else in the history of medicine. At one point ten or twelve of his former students simultaneously held chairs at major medical schools around the country—impressive, considering there are only about a hundred medical schools in the country.

Just as Harvey Feigenbaum had turned to his mentor John Hickam for advice about how to help Sam Regenstrief start a foundation, John now turned to his mentor Gene Stead

to help him people an institute. Gene had a grand view of how to upgrade health in America by curing the many ills of society at the same time—housing, education, transportation, nutrition, and pollution—and was pioneering innovative medical education programs at Duke. "He was always thinking beyond the envelope compared to most people," a researcher would later recall. Eugene Stead was appointed chief consultant to the Regenstrief Foundation and came to Indianapolis two or three days a month to talk with John, Sam, and others at the medical center.

If Gene Stead had a knack for developing medical talent, John Hickam was no slouch in that department either. "Hickam was a wondrous man," says his former resident Charles Clark, Jr., "a very warm, personable individual who somehow was able to spot talent in a simply amazing way. He made you feel like he was your friend and confidant, and somehow he got the best out of people." With Gene Stead looking over his shoulder, John Hickam developed his vision of the Regenstrief Institute, and together they began the searching and screening that would give birth to the Institute's leadership.

John Hickam had in mind to involve a certain young man who had distinguished himself as chief resident at IU Medical Center. But there was a slight problem. This young man was in Afghanistan with the Peace Corps, helping put together a medical school in Jalalabad, only the second such school in the country. As the new school's only internal medicine faculty member, he was knee deep in training an entire medical staff from the ground up, for which he received the corps' standard $150-a-month stipend and a bicycle for transportation.

Peace Corps associate Joseph J. Mamlin soon received a letter from John Hickam. John wrote about Sam Regenstrief and about a notion he had of putting together a research organization called the Regenstrief Institute. This institute would do something called "health services research"—Joe had never heard this term before—and wouldn't Joe like to come back to Indianapolis and get involved? John Hickam was sure he would strike a responsive chord with this project, knowing that his former chief resident was especially interested in linking academic medical centers with populations

that had poor access to health care. Joe packed his bags. "The fact that it was going to touch Marion County General was attractive," Joe Mamlin recalls, "because I was interested in medical education in the third world and medical education as it affected urban underserved populations." Besides, Joe says, he didn't know what else to do after his Peace Corps stint was up. He had thought about going into cardiology at Duke, and in fact John Hickam had arranged for Joe to go to Duke to talk with Gene Stead, but Joe opted instead to pursue the adventure in the third world, which he now considers to have been "a wise choice."

John Hickam foresaw that no research program concerned with the practice of medicine should be divorced from operational responsibilities. The only way to keep it grounded in the real needs of medical practice was to get down to the nitty gritty of caring for patients. Accordingly, he planned that the Regenstrief Institute would be actively involved with medical care at Marion County General Hospital. To provide this close relationship, he would integrate the Institute's first research programs into the outpatient operation of the county hospital—the general internal medicine clinic. It was understood that these programs would extend soon into the other clinical departments and later into medical practice settings elsewhere in Indiana.

When Joe Mamlin arrived at John Hickam's doorstep in 1968, things were not really organized yet. It seemed to Joe that John didn't quite know what to do with him. So for a year Joe did some cardiology research with Dr. Raymond H. Murray of the medical school while the Institute was being pondered and structured. Structuring the Regenstrief Institute was no easy matter, considering the parties involved. The Institute was to be a joint project between the Regenstrief Foundation and two major entities that had not been particularly good at collaborating in the past—Indiana University School of Medicine and a municipal corporation called the Health and Hospital Corporation (HHC) of Marion County. As chair of the Department of Medicine at the medical school, John Hickam was familiar with the politics of the situation and knew there would be many details to be worked out. He laid the groundwork carefully, and Sam Regenstrief's attorney and advisor Merle Miller

deftly orchestrated an agreement that made the collaboration possible.

On October 14, 1968, John Hickam sent Merle Miller a copy of the charter of the Krannert Institute of Cardiology, executed just six years earlier by Herman C. and Ellnora D. Krannert, as an example of the kind of arrangement he proposed the Regenstrief Foundation might establish with Marion County General Hospital. He had served on the Krannert Institute committee with Dr. Glenn W. Irwin, dean of IU School of Medicine, and Dr. Arvin G. Popplewell, director of hospitals of the HHC.

John's letter sketched out the Foundation's proposed mission to establish and operate a "laboratory" in health care research at the Marion County General Hospital. This was to be an arrangement that would satisfy the needs of all parties involved—the county hospital's need for improved patient care, the medical school's mandate to develop a program of education and research in health care, and the Foundation's need to develop instruments to accomplish its purposes. John pointed out how suitable the county hospital was for such an enterprise. "This hospital is physically close to the medical school, has long been one of the major teaching hospitals of the school, and has available a large patient population with plenty of problems in health, some peculiar to an urban low-income population and some of more general application."

But, John concluded, "if we are to conduct an operation which will take full advantage of the opportunities at the General Hospital, we will need a new space of our own." Accordingly it was proposed that the Foundation construct a special building to house its research: about ten thousand square feet, to be maintained by the General Hospital. A prefab structure might cost about two hundred and fifty thousand dollars, he thought, with basic equipment approximately a hundred thousand dollars and salaries and supplies about two hundred thousand dollars per year, to be supplemented by grants and other financing as soon as they "had something to show." The Institute would be expected to

gradually obtain more and more of its own funding, leaving the Foundation free to move on to other projects after a few years. They would call it the Regenstrief Institute for Health Care and set it up along the lines of the Krannert Institute.

When the Regenstrief Foundation's board of directors assembled October 28, 1968, Sam Regenstrief announced that this was to be an important meeting. He sought the board's approval to authorize John Hickam to negotiate with the Marion County General Hospital and with IU Medical School to create the Regenstrief Institute for Health Care as a laboratory for research in conjunction with the county hospital's outpatient services. A tentative floor plan was presented, proposed projects were outlined, and Dr. Mort Bogdonoff, a colleague that Eugene Stead was recruiting from Duke University to become full-time director, spoke about the practical matters of running the Institute. The board unanimously approved a resolution authorizing John Hickam to proceed.

There followed a flurry of correspondence perfecting the wording of the new charter. Should it be the Regenstrief Institute *on* or *for* Health Care? Various definitions of an institute were cited from *Webster's Third New International Dictionary*. Should the medical school be included in the first paragraph as one of the parties to the agreement? Should the document be signed by the dean of the medical school, or its board of trustees, or both? Could it be specified that the Institute would have a hand in designing its own space? Shouldn't the Institute be subject to the same regulations pertaining to research activities as the IU faculty? Should the charter spell out the medical school's obligation to grant Institute personnel access to its facilities? And so on and so forth....

Merle Miller wrote to Mr. Bernard Landman, Jr., his counterpart at Bamberger and Feibleman representing the HHC, and he sent two copies of the draft charter "looking to an early execution and moving forward with concrete action after this delay of words." Return mail from Mr. Landman requested that the wording pertaining to the Institute's desire to build "a two or three story building" be made more flexible because the HHC might want to make it one story higher.

Then there was the issue of whether the Institute would pay for utilities and maintenance costs for the space it would

use in the county hospital. John Hickam held out for the "same deal" that the Krannert Institute got, which included free maintenance plus a contribution to staff salaries in exchange for the considerable support provided to the hospital's outpatient services by Institute professional staff.

The big nut to crack was the question of whose employees the Regenstrief Institute researchers would actually be and who would pay their salaries. Mr. Landman asserted that Section 4, Article II, should read, "All employees of the Institute, including the professional staff, shall be employees of the Hospital…subject to the approval of the Board of Trustees." John Hickam countered that it should state, "All employees of the Institute shall be employees of the Hospital.… All members of the professional staff of the Institute shall be of a caliber eligible for academic appointment at Indiana University."

The issue of who employed the professional staff was important, John wrote to Merle, because "first-rate academic people" would not happily come to work at the Institute as employees of a county hospital, which offered neither the prestige nor the security of a university appointment. Describing an arrangement that had proved satisfactory to the Krannert Institute, Hickam wrote, "In the first place, as full-time University faculty they either have university tenure or are working toward it, and because of this the University is obligated to maintain their employment, whatever happens to the Krannert Institute. This not only implies job security but also a definite job prestige in their minds, and we have found that this is an exceedingly important consideration to them. In the second place, as full-time employees of the University they are entitled to retirement benefits under a nationwide university teacher's retirement program." The county hospital had tried repeatedly but unsuccessfully to become eligible for this program.

"I expect to pay most of the Regenstrief professional staff through the University by depositing Regenstrief Foundation funds in a University account," John continued. "In addition, I certainly want to be able to place people paid from other University funds in the [Institute] space to work and teach there. To a great extent the Regenstrief Institute work will also be University work, as we have said many

times. To require that they all be paid through the [hospital] would greatly limit our operation because the funds would not be available to pay them, even if we could recruit them."

It was in the context of structuring the Regenstrief Institute that a formal agreement was hammered out between IU School of Medicine and the HHC for the care and nurture of Marion County General Hospital. Again the diplomatic and persuasive Merle Miller was integral to working out the details.

> The best medical treatment and hospital care are invariably provided in an environment where the spirit of inquiry and investigation exists in combination with a genuine interest in both teaching and learning. The best medical education is provided in an environment where exemplary clinical care is practiced. To assure themselves of such an environment and such clinical care the Health and Hospital Corporation and the Indiana University School of Medicine strongly support a broad policy of cooperation and professional interchange.

So began the draft agreement that Merle sent to Sam Regenstrief on February 18, 1969. The document laid out a plan for interlocking appointments and responsibilities that firmly wed the two interests, "the purposes of both parties being unselfish, and there being no conflict of objectives."

Specific responsibilities were assigned. The county hospital would be responsible for patient care, the medical school for physician education. The hospital would supply full-time chiefs of services in general medicine and surgery, and these would also be chairs of those respective departments in the medical school. The HHC would operate and administer the hospital under a hospital director who would have a joint appointment in the medical school as assistant dean for the Marion County General Hospital.

In its role of physician education, the medical school would furnish qualified graduates to the county hospital as resident physicians, and it would furnish part-time attending

physicians and consultants to supervise the residents' education. This was considered a good alternative to a wholly full-time medical service in that it would provide the citizens of Marion County a much higher standard of medical care than they had been getting. Plus it would "attract and retain qualified professional, technical, and administrative staff by providing them the opportunity to keep abreast of the latest techniques and developments in their fields by liberal interchange with the teaching program of an affiliated university medical school," and it would provide a "vital link between medical research and medical practice, using all appropriate channels of communication and endeavor."

In the end, the Regenstrief Institute charter was executed between the Regenstrief Foundation, Inc., the HHC of Marion County, and IU School of Medicine—an apparently happy marriage between a willing donor, a hospital "presenting in both number and variety of clinical problems the best environment in the community for health care research," and a school of medicine "desirous of promoting and conducting education in health care and its optimum delivery."

Signed June 6, 1969, the charter defined the Regenstrief Institute for Health Care as a department of the HHC, with a principal office address at 960 Locke Street, Indianapolis, Indiana. Its avowed purposes:

1. To gather, analyze, and make available information on health care needs
2. To conduct research and demonstrations in the application of medical knowledge to health care
3. To devise new diagnostic methods for the detection of disease
4. To make the results of medical research more available to medical practitioners and to the public through appropriate educational programs

Ten people were to sit on the Regenstrief Institute Committee—the Institute's governing body—whose composition was identified as persons holding specific positions at the Institute, med school, and HHC for the duration of their terms of office. The charter called for three donor representatives (in June 1969, these were Sam, Myrtie, and Merle), one direc-

tor of hospitals of the HHC (Dr. Arvin G. Popplewell), one director of the Institute (Dr. Raymond H. Murray), one dean of IU School of Medicine (Dr. Glenn W. Irwin), one director of the Regenstrief Foundation, Inc. (Dr. John B. Hickam), and one medical consultant (Dr. Eugene A. Stead). It was contemplated that the Institute's director, appointed by the director of hospitals of the HHC, would also serve as director of the medical school's about-to-be-formed Department of Community Health Sciences.

The debate over who would employ the Institute's professional staff was neatly resolved with the vague wording, "All employees of the Institute shall be subject to the personnel policies of the Corporation [HHC]. All members of the professional staff of the Institute shall be of a caliber eligible for academic appointment at Indiana University."

The charter obliged the HHC to erect a building of about thirty thousand square feet, to be constructed with a foundation that would allow other stories to be added as needed. The Regenstrief Institute was to have the top floor for its research center, and the Regenstrief Institute Committee would have approval of the design. In addition, the HHC would provide hot and cold water, gas, heat, air conditioning, power lines and power for equipment, lights, telephone service, and daily janitorial and maintenance service without charge. The new building would be named the Regenstrief Health Center.

"We share with Sam Regenstrief the confidence that the innovative minds that have made America the world's greatest industrial power can also contribute significantly toward improving the health care delivery systems for tomorrow."
Glenn W. Irwin, dean, IU Medical School

The Regenstrief Institute charter was signed not a moment too soon, because John Hickam was poised and ready to unleash a team of able researchers to shape up Marion County General.

Drs. Duke H. Baker, Joseph J. Mamlin, and Raymond H. Murray—all members of the Department of Medicine at the medical school—joined John Hickam as members of the Institute in the summer of 1969, and Dr. Charles Kelley was named the first official Regenstrief Fellow in Health Care Research. Gene Stead had recruited Mort Bogdonoff, a prominent colleague from Duke, to head up the Institute and serve as the county hospital's chief of medicine, but Bogdonoff suddenly dropped out of the running for undisclosed reasons. The decision was made to tap Ray Murray as the Institute's director.

By agreement with the HHC, the medical school's Department of Medicine assumed responsibility for the county hospital's medicine clinics, which were disorganized, inefficient, and delivering care that was unsatisfactory to both patients and staff. The researchers made improving these clinics their first project. Treating medicine like the big industry that it was, they would take an industrial management approach and search for bottlenecks in the system. They would make of the clinics a model medical care system for study and innovation.

They began this venture that summer with a general survey of the operation of the medicine clinics, just trying to get a handle on what was going on. The county hospital had a general internal medicine clinic, which was the patients' point of entry into the system. In addition to this clinic, there were several specialty clinics to which patients could be referred for specific problems. For the first five months, the physician-researchers analyzed the operation of the clinics and prepared preliminary plans for improving them. But they soon realized their medical training could take them only so far with problems that cried out for expertise in management science, industrial engineering, and operations research. By September the Institute had contracted with the firm of Klainer and Murray and Copenhagen, consultants in health systems engineering. Over the next ten months, members of the Institute worked closely with these consultants to analyze in depth the dynamics of the general medicine clinic. All the researchers were instructed in industrial engineering techniques.

Various studies began to probe this and that aspect of

health care delivery. Simple time-and-motion and work-sampling studies measured how the clinic physicians, medical students, and patients spent their time. The researchers looked at what went on between doctors and patients, in test laboratories, and in X-ray facilities. Using systems analysis, they precisely described routines so that any changes they might implement—new office procedures, different arrangements of machines and personnel, elimination of wasteful techniques—could be evaluated. Then the researchers tinkered with the routines to see if changes would bring improvements. At the general medicine clinic, for example, they discovered that, by rescheduling some of the afternoon examination hours to the morning, they could create more time for treatment in the afternoon. People no longer got examined in the afternoon only to have to come back the next morning for treatment, which meant patients were happier.

Meanwhile, the Institute contracted with a cultural anthropologist, James Y. Greene from the University of North Carolina, to assess the attitudes of patients toward the hospital. Greene and five students asked 750 randomly chosen inner-city Indianapolis families about their experiences with Indianapolis's neighborhood health centers, especially Marion County General's outpatient clinic. The survey revealed that neighborhood health centers were not well known, although people who did use them liked them better than doctors, clinics, or hospitals. People thought medical care in hospitals was good, but they were irritated by transportation problems encountered in trying to get there, long waits for service, and occasional rudeness by some nonprofessional hospital personnel. Soon three Institute researchers became involved in developing and supporting the neighborhood health centers in the inner city, and two researchers worked with regional and statewide health planning agencies.

Following up on multiphasic screening studies that the Regenstrief Foundation had funded at Flanner House, Joe Mamlin and Charles Kelley launched a series of pilot screening studies at Marion County General. In January and February 1970, they selected 610 volunteers randomly from patient populations in the medicine clinics (general medicine, screen-

ing, diabetes, hematology, and eye clinics) and gave them all multiphasic examinations. The purpose was to find out which screening tests yielded the most useful information.

Multiphasic screenings were designed to uncover diseases whose symptoms were not disclosed during a doctor's visit. For example, patient Sally Forth might present herself at the clinic with a stomachache. Instead of following up on only her stomach ailment, the investigators would put Sally through a complete battery of tests—a fifteen-part blood test done on the hospital's automatic blood test machine, X rays, a thorough physical exam, and other diagnostics. The screening might turn up additional but unsuspected problems such as gout, glaucoma, or calcium deficiency. As a quality control check, the researchers would go back to Sally's chart to see the diagnosis of the doctor caring for her; they would compare this with what they had just learned from the tests to see how well the diagnoses matched. The tests that had the best diagnostic value would be the ones to keep.

The March 1970 *Red Cross Reporter* described the process, which took about two hours.

> Each patient is accompanied by a file which stays with him during each step in his progress through the clinic. In this file is his medical history of the past two years and a record of all that takes place during the clinical examination. The Red Cross health assistant's role is to accompany the patient throughout the clinic and to help relieve whatever tension and anxiety he may experience. [The assistant] takes and records height, weight, pulse, and blood pressure…assists the trained technician [with the pelvic exam and blood and breathing tests]…and escorts the patient through the final stages of the procedure, such as eye photography, concluding with the chest X ray and Eye Clinic.

The researchers wanted to see whether trained health assistants could be used to carry out most of the screening tests.

Would patients view them as competent? And would doctors accept them? If the researchers could define a battery of the best tests for evaluating the health of a patient, and if the health aides worked out well, they might incorporate such a screening unit into the clinic on a permanent basis.

Multiphasics performed on the 610 patients generated an enormous amount of data to collect, correlate, and analyze. But Drs. Mamlin and Kelley learned which screening tests were most valuable diagnostically. And the good news was that the project demonstrated the competence and acceptance of a nurse assistant in gynecology. This specially trained RN carried out over four hundred pelvic examinations and uncovered a large amount of gynecological disease. Its feasibility thus tested, in spring 1971, a new multiphasic screening unit became part of the general medicine clinic. And to continue in the research mode, Charles Kelley brought in a management scientist, Dr. Gene K. Groff of IU Graduate School of Business, to do a pilot cost analysis of the new unit.

Another area to come under close scrutiny was patient charting. Because the medical school's own hospital, IU Medical Center, shared many of the same physicians and students with Marion County General—they rotated through both hospitals—it seemed logical to make a uniform charting system for both. A Regenstrief Institute team headed by James Reber tackled the task. Crediting Dr. Robert Mouser at St. Vincent's Hospital with drawing attention to the possibilities of a "more constructive, simplified form for patient charts," James Reber explained that they "used a common-sense, analytical approach to make it easier for hospital personnel to locate quickly information on any of the forms in a patient's chart. Where possible, obsolete forms were discontinued and duplicate information was eliminated." Forms that used to carry up to twenty-six different sections were pared down to ten easily identifiable sections always found in the same place on all forms. A numbering system allowed for future forms to be developed that would fit neatly into the system.

One cost-saving innovation did away with the fourteen colored papers that coded each type of form. Instead, white paper was printed with bands of nine different colors at the bottom, each color designating a different chart section.

As a result, a pad of forms that used to cost $1.96 was now averaging 96 cents. Sam Regenstrief must have been proud. It took two years of work for James Reber's team, but IU Medical Center and Marion County General were able to agree on a standardized medical records form suitable for both hospital staffs.

About this time a new research tool—the computer—was making its debut in academic settings, and the Regenstrief Institute fellows and associates immediately sought out applications for it in health care delivery. Initial investigations took two directions. With the collaboration of the operations research consultants, Duke Baker "number crunched" the details of the entire system of medicine clinic care and developed a series of computer simulation models that proved extremely useful for predicting the course and effects of changes in clinic operation. Then, when Edward A. Patrick, PhD, associate professor of electrical engineering at Purdue, joined the Institute in a part-time collaboration, the Institute initiated a computer-based project that soon captured the interest of other members of the medical school faculty, as well as medical students and engineering graduate students. The result was a set of preliminary programs for computer-assisted diagnosis of selected conditions, such as hypertension and dermatological diseases.

While pursuing the bottlenecks in patient care at the county hospital, from time to time assistant professor Joe Mamlin crossed paths with Sam Regenstrief. Being a "young pup," Joe was not privy to the board meetings and the planning and visioning that Sam had driven up from Connersville to participate in. But what came across in their brief conversations was Sam's keen interest in what was going on at Marion County General. Joe found this both surprising and pleasing.

Their first meeting took place in John Hickam's office. John asked Joe to chat a little bit about what he was doing, mainly to show Sam that there were some young faculty members emerging who had some of the same interests Sam did. Joe remembers little of this encounter, except for Sam's sentence structures. Many conversations later, he would recall that speaking with Sam Regenstrief was "like listening to a symphony. You couldn't pin down whether that was a B-

flat or an E-sharp, or figure out what key it was in, but you felt the experience of the thing."

It was clear to Joe that Sam did not know a great deal about medicine but had been influenced by his own experiences. There was a distinct earnestness about his interest in having some influence on the ability of health care to make itself operationally more accountable, to be able to effect change in a reasonable way, and so forth. Joe found it remarkable that an industrialist like Sam Regenstrief was sold on an abstract idea like health services research. It was visionary. No one had heard of it then.

Sam was not interested in specific diseases, but rather in the workings of a health care system. Joe Mamlin thought this appealed to Sam as a systems person. "As an industrialist, he understood the interrelatedness of all the activities that created a product at the end of the day. He recognized that medicine was floundering in that context, and poorly prepared for change. He was able to make the transfer from his experience in industry to what he saw as a missing piece in medicine. That touched him, and he very much wanted to think that it would impact how care was delivered."

Joe admits that back in these early days he wasn't much of a researcher himself, though John Hickam had unofficially tapped him as the Institute's first research associate. Without a specific mentor shaping his activities, he was free to try to fix whatever he saw that needed fixing at the county hospital. He would write proposals and the Institute would fund them. Sometimes it would be a stretch to call the proposed projects "research," but he had the distinct impression that, when there was any doubt in the minds of the powers that be at the Institute, if Sam's interest was piqued, Sam would write a check out of pocket to fund the project anyway.

John Hickam's vision of innovative minds who would revamp health care at the county hospital was beginning to put down roots, but he would not live to see it bear fruit. The Regenstrief Institute was barely six months old when tragedy struck. On February 9, 1970, while attending a week-

end medical education conference in Chicago, John Hickam suffered a massive stroke and died. He was only fifty-five years old.

Pastor William H. Hudnut III—later to become mayor of Indianapolis—spoke at his funeral, citing, among a host of positive attributes, John Hickam's probing intellect, his unobtrusive quality of leadership, his companionability, sensitive understanding, and tremendously useful life. There was not a dry eye that morning in St. Luke's Catholic Church where the eulogy was delivered. John Hickam had been much loved. The next Regenstrief Foundation board meeting on May 21, 1970, honored him with a moment of silence. It was now up to others to carry forward the vision—and the recruiting.

The board appointed Eugene Stead to take over John Hickam's role as director of the Foundation. One of Gene's first acts was to march Joe Mamlin over to the office of Walter Daly, who had just assumed John Hickam's vacant chair at the medical school's Department of Medicine. The subject of discussion: Would Joe Mamlin be interested in taking on the role of chief of medicine at Marion County General Hospital? This was something Joe Mamlin had never dreamed of doing, considering that the county hospital had never had a paid chief of medicine but had always used volunteers. This paid position would be a first. Joe Mamlin said yes.

And so, starting in 1970 with only two or three physicians at Marion County General, Joe Mamlin would build a staff of thirty-five in the next six to eight years. By means of the Institute and the top-notch talent it attracted, he moved ever closer to John Hickam's original goal of establishing a senior physician presence at Marion County General. "Joe really made the hospital work," says Clem McDonald, another Institute associate who would soon enter the picture. "Joe got the resources and he got the funding. He started doing the billing right. He did a lot of things to make it all come together."

Perhaps Joe Mamlin's biggest challenge as chief of medicine was to get the county hospital to allow Regenstrief Institute researchers to participate in hospital activities. The Institute wanted to experiment in the "real guts" of the hospital. It was too easy to be wild eyed and crazy in dreaming

up better ways to run a health service. The enthusiasm had to be tempered with a dose of reality. As John Hickam had cautioned, the school of real life was the only way to make the research work.

From the county hospital's perspective, the researchers were just doing their own thing. They had no stake in the hospital and no right to be nosing around while the staff were trying to tend to patients. It fell to Joe Mamlin to take the heat and work the political angles to get the researchers accepted into the environment. If people today no longer sit for hours in the clinic waiting rooms and if patient care runs smoothly, no small measure of credit goes to Joe Mamlin for making it possible for the researchers to discover better ways to deliver health services.

Clement J. McDonald, MD, came to the Regenstrief Institute through an interesting set of twists. He was at Cook County Hospital in Chicago and planned to stay there all his life. He was finishing his residency in internal medicine, but he was not your ordinary doctor. During his senior year at the University of Illinois medical school in 1964, he had been introduced to the computer—starting a love affair that would last a lifetime. After interning at Boston City Hospital, he obtained a master's degree in bioengineering, which was mostly computer work. Then he went to the National Institutes of Health (NIH) for two years and managed a project to automate a laboratory. From then on he knew what he wanted to do with his life—automate medical records.

At Cook County Hospital, things were getting ugly. Chief of Medicine Rolf Gunner, a cardiologist, super teacher, and everyone's idol in medical school, was being pushed out by Chicago politics. Clem pulled up stakes and moved to the University of Wisconsin hospital, where he again settled in to stay his whole life. While at Wisconsin, he chanced to meet a Hoosier by the name of John Grist who told him, "Clem, you ought to go to Indiana because they have a county hospital down there and they have this institute that's interested in doing things with computers." Clem had always liked county hospitals, and computers were definitely on his

agenda, so he came for a visit. He toured Marion County General. He saw the computer at Purdue and met Ed Patrick, the young Purdue faculty member who was collaborating with the Institute on a computer-assisted diagnosis project. Clem didn't know much about the Regenstrief Institute, but he knew it spelled funding for the things he wanted to do.

Joe Mamlin did the recruiting, and he was very persuasive. Escorting Clem to the airport for the return flight to Wisconsin, Joe said, "Now Clem, what you should do is whatever is best for Clem. Whatever is best for Clem is the best for us." If the magic formula of county hospital plus computers plus funding hadn't clinched the deal, Joe's words helped tip the balance. Clem McDonald packed his bags for Indiana. "It was a very good decision," Clem says today.

"Sam Regenstrief was a really different, intense, and very hard-to-follow man. I thought of him as sort of a wizard, just popping out ideas and popping out successes."
Clement McDonald, director, Regenstrief Institute

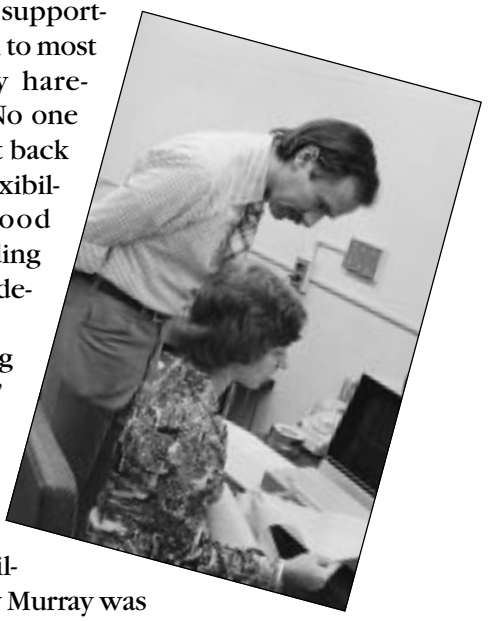
As a junior member of the Institute, Clem didn't have much interaction with Sam Regenstrief. When Sam and Myrtie drove up to Indianapolis for board meetings, he would occasionally come through the Institute to talk about things. "Sam's leaps in ideation were tough to keep up with," Clem remembers, "but the man was charming." Clem always felt buoyed by their interactions because Sam was so full of fire and energy and ideas. Sam soon became enamored of the computerized medical records idea.

It's hard to appreciate today how ambitious Clem's project was in those days. From the technological aspect, it seems nightmarish. The goal was to computerize the medical records for all of Marion County General Hospital. The vehicle was a PDP 1144 minicomputer at Purdue in Lafayette, Indiana, connected to the Institute by three telephone lines. Ed Patrick and his graduate students at Purdue were running the computer, mostly doing research projects, and the

computer would be on-line some days and down on others. Clem needed to have the system up and running every day so that doctors could use the electronic records in caring for their patients.

The Purdue folks were always trying to save money, which was fine with Clem, but the lengths they went to were sometimes humorous. In those days video monitors cost about twenty-five hundred dollars, about the price of a huge PC today, only you got just the monitor. So at Purdue they built their own video monitor out of a Zenith TV set. It cost them seven hundred dollars and consisted of five pieces that had to be carried around to wherever it was needed at the moment. One of the pieces was a transformer with bare wires sticking out that carried fifteen thousand volts—not really practical in an open environment like the hospital clinics.

Clem McDonald credits the Institute and Sam Regenstrief for taking a chance on supporting his medical record project, which to most people must have seemed pretty harebrained and futuristic at the time. No one else was funding this kind of project back then. The Institute offered Clem flexibility—his charge was to "do good work"—and it offered a steady funding stream that allowed his project to develop with some continuity.



Young Clem McDonald was determined to computerize medical records

Nor did they have to twist young industrial engineer Steve Roberts' arm too hard to get him to come to the Regenstrief Institute from a faculty position in Florida. Steve and his wife were both born and bred in Indiana, and they wanted their children to know their grandparents. Ray Murray was the one who wooed Steve Roberts back north to a joint appointment at his engineering alma mater, Purdue, and the Regenstrief Institute. Steve jumped at the chance to be involved in a brand-new organization that was devoted to one of his keen interests, health care delivery. He met Ray Murray, Gene Stead, and fellow newcomer Clem McDonald. "The people were all new and it was a chance to start into an

exciting venture. I didn't think there were any other kinds of institutes situated with quite the potential of the Regenstrief."

An especial selling point was the Institute's strong interest in combining medicine and technology, Steve Roberts recalls. Clem McDonald was talking about building a computer information system to support medical decision making. A lot of other places were doing biomedical-type research, but this was an opportunity to really focus on health care as a system. And the group was unique in that it was strongly associated with the medical community but willing to listen to expertise from outside the medical community.

By definition, industrial engineers help other people do the things they want to accomplish. Steve Roberts saw his role as one of helping Joe Mamlin and Charles Kelley deliver better outpatient care. He and a small group of other industrial engineers carried on the studies of examination rooms, waiting times, and what times services were available for withdrawing blood and taking X rays. They measured the amount of time patients spent at the facility, where they had to wait, and when they had to wait. They looked at medical records and how long it took to process laboratory tests. All this was to try to do a better job of scheduling patients into the clinic, staffing the various clinics, and organizing the flow of work. Their aim was to keep patients well cared for and costs down.

Steve remembers Sam Regenstrief as quite a presence in those early days. Perhaps because Sam was a self-made industrial engineer, he soon saw Steve as someone who could relate to him in terms he understood. They had lots of interesting conversations. Sam said he wanted to "bring the kind of progress that American industry had made into the delivery of health care." It was a phrase that came up often.

The early working conditions also made an impression on Steve. When he landed in Indianapolis, he arrived at a "virtual" Regenstrief Institute—a bunch of office spaces all around the outpatient wing on the fourth floor of the aging Marion County General Hospital. Steve remembers moving into a room isolated from everybody else's. Ambiance was not its strong suit. His office had an air conditioner hanging out of the window, which he couldn't see through because

it was so dirty. Pigeons lived atop the air conditioner—he could hear them making all kinds of noise, and pigeon feathers and dust were blowing in. It was clear to Steve why the Regenstrief Institute needed a home of its own.

But the people were good—just a lot of young folks with a lot of eagerness to do things. Down on the third floor at Outpatient West, Duke Baker, Charles Kelley, and Joe Mamlin were running the general medicine clinic, trying to make outpatient services more available and to deliver them more efficiently. Availability, accessibility, cost, efficiency—just the meat and potatoes for an industrial engineer to sink his teeth into. Only this time the subject was not nuts and bolts on an assembly line, but types of personnel, scheduling policies, location of facilities, and different programs to make the health care industry better serve its clients, and it was all happening in an inner-city public institution. What better subject to bring together the talents and expertise of this ambitious young research team?

NO EMPIRES HERE

"There isn't an employee at the plant who doesn't know Sam and feel free to call him by his first name. And there's no one who puts in a fuller workday."
Lee Burke, president, D&M

"Sam, is that you?" a voice called out of the darkness of the driving ice storm. There had been a wreck on the icy country road between Cincinnati and Connersville. A car was in the ditch. It was close to midnight, the freezing rain was still falling, and two weary travelers were cursing fate and wondering what to do. The owner of the voice, a farmer coming down the lane to see what all the noise was about, recognized one of the travelers and quickly sized up the situ-

ation. "Well, Sammy, you really did it this time. I'm going to have to get my tractor and haul you city boys out of a ditch."

Everybody in the Connersville area knew of Sam Regenstrief. He had saved the bacon of those men and women who stood to lose their jobs at the failing Avco plant back in 1958, and now he was the largest employer in town. Everybody at D&M—all fifteen hundred or so—addressed him as Sam. Some, like the Good Samaritan farmer who came to the rescue on that freezing night, called him Sammy. The farmer had worked at the D&M plant years before. "That farmer loved Sam. You could see it," recalls Steve Sample, Sam's companion on that ill-fated excursion.

It's now the early 1970s, and Sam Regenstrief is a leading citizen of Connersville. Chairman and president of the Fayette Memorial Hospital board. Brother of Warren Lodge No. 15 since 1948. Former ringer on the Rex bowling team. Respected member and frequent diner at the Connersville Country Club. Supporter of the Connersville Boys Club. Recipient of the Chamber of Commerce's much coveted Distinguished Citizen Award for 1971. Honorary plaques are liberally bestowed, testimonials eagerly given. Sam has attracted the attention of Indianapolis too, especially since he started his foundation and the Regenstrief Institute. One by one, newspapers are touting the success and philanthropy of the Dishwasher King. Both Butler University and Indiana University have granted Sam Regenstrief honorary degrees.

Sam was named Connersville's Distinguished Citizen of 1971

Our Harvard B-school research assistant has gone home to Cambridge to write his case study of Design and Manufacturing Corporation. Now another figure is lurking about the assembly lines, rummaging in the company books, surveying the lots and buildings, and making copious notes. He is an associate of Goldman Sachs, the world-renowned New York investment banking firm. He is sizing up D&M.

"We're just a little scraggly place out in the sticks.

Sam'd rather no one know we're even here," says Marilyn Mitchell in the umpteenth newspaper article written about Sam Regenstrief and his rags-to-riches success story. Goldman Sachs's report paints a detailed and much more alluring picture....

> D&M's plant, constructed of heavy-duty steel and concrete, occupies 38 acres in Connersville, Indiana. It includes 520,000 square feet of production facilities and approximately 400,000 square feet of warehouse space. Administration and engineering occupy an additional 30,000 square feet of office space. More than two-thirds of the facilities have been constructed or entirely rebuilt since 1966.The size of the company's plant provides an efficient single-level facility for straight-flow manufacturing and warehousing.The manufacturing process includes metalworking and component part manufacturing, porcelain enameling, finishing, and final assembly and testing.
>
> *...See Sam strolling about the plant, watching the tubs and doors and motors rolling down the assembly lines. By his expression you can tell he gets a kick out of this. He sits down to share a sandwich with one of the guys on the line....*
>
> Virtually all dishwasher components are fabricated of steel, wire, and aluminum. Modern metalworking and fabricating facilities for various stamping, metal expanding, crimping, and finishing operations permit automatic or semiautomatic direct processing from coil and flat steel, stainless steel, and aluminum stock.The integrated porcelain plant consists of automatic pickling equipment, automatic flow coating, dual furnaces, mill rooms,

dryers, and a quality control laboratory. Finishing facilities include two integrated paint systems and facilities for decorative finishing, electropolishing, and aluminum anodizing and plating.

…See Sam in his office, talking on the phone, making deals, checking up on everything and everybody. The door is open. People wander in and out to pick up papers. A worker stops by to speak to Sam about a problem on the line….

The company operates three assembly lines, plus component assemblies for the pump system, electrical assemblies, and various other mechanisms. Estimated daily capacity for efficient manufacturing with existing component and assembly facilities is 3,600 units, running two eight-hour shifts. Yearly production capacity is estimated at 838,000 units. D&M manufactures forty-five models of portable and undercounter dishwashers which are sold to other appliance manufacturers and distributors for resale under their respective brand names. All products are manufactured to customers' specifications and, though highly engineered, are essentially the same in basic design, fabrication, and assembly. They have different control panels and timing mechanisms, and the portable models have different outer cabinet tops.

…See Sam in a staff meeting, holding forth to four of his engineers, explaining something he wants done. It's a hot afternoon, the air conditioner is out, and the windows are open. The tool engineer shakes his head. Then he shakes his head again. And again. Sam stops and says, "Steve, why do you keep

shaking your head no for?" "Sam, I wasn't shaking my head no. This damn fly is bothering me." Sam goes on talking….

For the last five years, D&M's largest customer has been Sears. Sears purchases all its dishwasher units—both portable and undercounter—from D&M. This single customer accounts for about 68 percent of D&M's dishwasher sales, which reflects 16–17 percent of total industry shipments. Sears sells the units under its Lady Kenmore and Kenmore brands. Other customers for which D&M is the sole supplier include Magic Chef Inc, including Gaffers & Satler; Tennessee Stove Co. for its Modern Maid Inc. line of dishwashers; Raytheon, for its Caloric line; White Consolidated Industries, Inc., for its Kelvinator and Gibson dishwashers; and Fedders Corporation for its Norge label. Together these customers comprised 32 percent of D&M's dishwasher sales in fiscal year 1971.

…See Sam, a living time-and-motion study. He chews gum incessantly and bounces from one office to another, checking personally on every aspect of D&M's operations….

Rather than long-term contracts, D&M has annual contracts with its customers. Shipments are made against monthly releases. Through its specialized experience, D&M maintains continuity and relationships that eliminate selling expenses. This, along with lower general and administrative expenses, affords them a distinct competitive advantage. Seven field service reps familiarize customers with D&M products and assist in training customers' service personnel. D&M's principal competitors are GE and Hotpoint,

Hobart, Westinghouse, Frigidaire, Whirlpool, Norris Industries, and Maytag.

…See Sam late in the day poring over detailed cost sheets. Sam likes to make money, though he doesn't spend it. He takes satisfaction in producing a product more cheaply than his competitors can and getting a lot of business.…

Goldman Sachs thinks the company could be a hot prospect for potential investors. In 1961, with 620,000 dishwashers shipped, D&M accounted for 12.8 percent of industry shipments. By 1970, it is shipping 2,115,000 units, and its market share has grown to 23.7 percent. By industry estimates, only 24 percent of wired American homes have dishwashers, compared to the 99 percent that have refrigerators and 91 percent that have clothes washers. There is still plenty of room for D&M to grow. Goldman Sachs quotes the prevailing sentiment: "The Company believes that its customer relationships provide a secure basis for an expanding participation in the expected growth of the dishwasher industry."

…See Sam at a D&M board meeting. He says a few words about the Regenstrief Institute and the Foundation that supports it. One of the officers moves that D&M make a gift of half a million dollars to the Regenstrief Foundation, and it passes unanimously. Misty eyed, Sam thanks everyone on the board.…

Dick Goodemote remembers well his first face-to-face meeting with Sam Regenstrief. It was May 4, 1970—the day

that nervous Ohio National Guardsmen fired on peacefully protesting students at Kent State University. Three young people were killed. Dick had heard about it on the radio and was the first one to tell Sam. Sam was shocked. "Is it coming to that?" he muttered. They were meeting in a little hotel in Connersville. Dick had just been appointed to the board of D&M, and this was his first official visit in that capacity.

Sam walked Dick Goodemote through the whole D&M plant that afternoon. It was a huge plant. Some buildings weren't being used at the time and were full of machinery that had come with the purchase of the plant. Sam knew every square inch of that plant, what it was doing, where it was going to go, and what the future held. It was his plant. He even knew where every machine came from. "We got these presses from Delco and I paid [this much] for them, and we don't use them, but I may be able to use them at Wallace," he would comment. Dick was impressed. Sam was obviously a very bright man.

The reason Dick Goodemote was joining the D&M board had everything to do with Sam's success as a dishwasher manufacturer. Sears' policy said that, if a company was supplying it with a significant quantity of product, they needed to protect their interest in some way. This was especially true for a wholly owned operation like D&M. Sam could suddenly decide not to make dishwashers anymore, and Sears might be left in the lurch for a couple of years until another supplier could tool up.

By this time Sam had almost a third of the dishwasher business in the United States. Sears managers were frankly nervous. They kept telling the buying department, "We've got to have some backup, some protection there. See if Sam will put some more people on the board." So the purchasing department gave Sam a list of Sears executives, saying they would like to see at least one of them placed on the D&M board. Sam picked Dick Goodemote because he was head of Sears' technical operation.

Dick remembers well that meeting with Sam, and not just because of the Kent State killings. Dick arrived in Connersville at close to noon, and Sam didn't stop talking until eight o'clock that night. It was Sam's manner of talking that really left an impression. "He was one of these

people who think so much faster than they can talk. He would start a sentence right in the middle with no antecedents, like he was starting on second base. You had to hang on with both hands to figure out what he was trying to tell you. And then as he was talking, his thoughts would jump to another point and he would go on about that." Early in their acquaintance, Sam became forgetful of names, too. Speaking of Len Betley, he would say, "Well, I talked to what's his name," and Dick would have to figure out who the hell what's his name was. He'd say, "Do you mean Len?" "Yeah, of course," Sam would say.

Although they had not met face-to-face until this day, Dick Goodemote had known of Sam for years, since before Sam had landed Sears as a customer. Dick was Sears' man in charge of evaluating products and suppliers, which put him at the interchange between people who were trying to develop products and marketers who were trying to sell them. A very practical man, Dick was trying to find products that would be marketable and profitable for Sears. He had an interest in what Sam was doing because it was his business to be interested in this relatively new product, the dishwasher. Over the years Dick and Sam became close friends. Later Dick would play a role in Sam's foundation as well, but now, as the newest member of D&M's board, he was seeing Sam for the first time in his element, center stage in his own company.

"I absolutely adore Sam….he's a lovable teddy bear of a man. He's just as common as an old shoe, and he has a sense of humility."
Marilyn Mitchell, after eighteen years as Sam's secretary

Sam's office at D&M was a humongous room that at once served as office, conference room, showroom, and working laboratory. His desk sat back in one corner. At the other end sat a huge table for conferences and board meetings. And lined up along the two big walls were

dishwashers—Sam's dishwashers and dishwashers someone else was making—refrigerators, appliances of various kinds, and tools. No fine leather furniture, no pristine desktop, no plush carpet, no paneled walls. A half-built dishwasher here, an electronic control device over there, a model for a press, and mockups of things helter-skelter all over the table.

In fact, the room seemed less like an executive office than a large working space. From the looks of Sam's office, you would think his business affairs were in chaos, but miraculously he knew where everything was. He had his own system for keeping track of production and for knowing what models they were building and when and on what schedule. He had that right at his fingertips in loose-leaf folders in his desk drawer. He knew exactly what was going on. The office did include one file cabinet over in the corner. This hardly seemed necessary, because leaving a paper trail was not high on Sam's list of priorities. When somebody wrote him a letter, Sam would often scribble a response right on the letter and hand it to Marilyn Mitchell to mail back.

Secretary Marilyn Mitchell kept Sam organized for thirty years

Marilyn Mitchell was in charge of Sam's schedule and kept him organized. She was cast in the classic mold of the secretary who seems to be running the company. If Sam said, "I talked to Merle about [x, y, z]—I think he sent me something," Marilyn would immediately be handing him a paper, saying, "Here it is." Any filing system Sam had was Marilyn's doing. She kept him organized as much as anyone could keep him organized. And that was no trivial matter, for Sam had an insatiable appetite for detail, all of which he kept in his head.

There in his office Sam would be, on the phone, day after day, keeping in tune with what was going on, making sure that what transpired was what needed to be done, never letting up. Sam Regenstrief was the classic workaholic. He'd think nothing of starting a meeting late in the afternoon and

going way into the night, or of calling a meeting on Sunday morning. The people out on the firing line, especially in manufacturing, engineering, and tooling, never got a moment to sit back and relax. They wanted to, but Sam wouldn't let them. That's what gave D&M the energy of success.

"For relaxation…are you kidding?
Sam relax? The word is anathema
to the man who 'sleeps in' until about 8 or 9 o'clock
Sunday mornings to 'recharge my battery.'
He drinks an occasional Scotch and water,
and once a year he and Myrtie
take a two-week vacation somewhere in the sun.
Sam will shoot a round of golf now and then."
Jeff Devens, Indianapolis Star *staff reporter*

"I do whatever I have to do—there's always time.
I feel that, if a person isn't busy, time doesn't pass."
Sam Regenstrief

Bud Kaufman's days started at 5:45 A.M. with setting production schedules for the day. As VP of operations, he put in twelve-hour days five days a week and worked most Saturdays and occasional Sundays too. He felt well rewarded, not just monetarily, but by the good feeling that he was doing the job right and knowing that a lot of employees and their families—not to mention Sam himself—were depending on him to do the job right. "It was really a nice feeling, well worth it," he muses. "My four sons grew up without a father," he adds. "I know I did miss something there."

The production day would end at 3:30 P.M., VP of engineering Tom Duncan recalls, and Sam would have a foreman's meeting at 4:00 P.M. By the time that was over, it would be 5:00 or 5:30 P.M. Then Sam would want to get together with Dave Miller, head of purchasing, and Sam, Tom, and Dave would hash over all kinds of things. What are you doing about

this or this? What can we do about so and so? Often the rehash sessions would go on until 7:30 or 8:00 P.M., interrupted only by Myrtie calling Sam to get home for dinner.

Sam wasn't asking Bud or Tom for any more than he himself was giving. D&M was Sam's avocation and his life, and he devoted himself fully to it. Anyone who didn't want to work as hard as he did wasn't there long. He was very demanding. Not that he wanted to make sure everyone had sixty hours a week on the books—he wasn't even keeping track of hours. It's just that he was totally immersed in the business. When Sam was excited about something, he was a ball of fire. He'd call Bud in and say, "I need [such-and-such information], and I want it yesterday." He was really serious. He would think of something at an odd hour and want to work on it right away, and he expected the people he was working with to be as immersed as he was. D&M wasn't a sweat shop—if you worked for Sam, it was just your life.

Sam never took any significant vacation. When Dick Goodemote and his wife described their plans for a motor trip through parts of England and Wales, Sam lit up like a kid and said, "Gee, that sounds interesting," and turned to Myrtie and said, "That's something I'd like to do." But he never did it. Sam didn't really believe in vacations. One time Bud Kaufman planned a vacation in July, and finally on December 22 Bud's wife and four boys were all packed and primed to leave for Florida for the Christmas holidays. Bud kept reminding Sam, "Sam, I'm leaving early Friday afternoon." Sam kept saying, "We'll see, we'll see." So it finally got to be Friday noon, and Bud said, "Hey, I told you for the last time, I'm leaving. I won't see you until after the first of the year." Sam said, "What the hell are you standing around here for? Why don't you go ahead and go?!" Bud had been reminding him for a week now, but Sam kept hanging on, thinking, "Maybe Bud ain't leaving. Maybe he'll stay." What kept Bud and others from resenting Sam? "Probably the love they had for him," says a colleague. "He was just an unbelievable individual."

"There are no empires here."
Sam Regenstrief

By choice, Sam ran an informal operation. If he saw that production costs were out of line for a given day, he didn't call in his production manager, Bud Kaufman. He called the foreman responsible and found out why. If the foreman's explanation didn't suit him, or if the problem happened again, only then would Sam talk to Bud. If a machine that was important to the process was inoperable, he'd be out there with a wrench working on the machine with the mechanic. And all the managers could go to hell. He wasn't worried about lines of command—he had to get that machine working.

Not that there wasn't an organization chart, with vice presidents in charge of production, engineering, new product development, and so on—it simply held no meaning for Sam. "When I or any of my executives see a problem, they deal with it," Sam observed. "We can't afford the time or the money to go through formal channels. Everyone knows that's the way things work around here and accepts it." The philosophy extended to workers too. If a worker ran out of parts, it was his responsibility to get them, not just to tell the foreman.

What this amounted to was a "bicycle wheel" style of management—fifteen hundred direct reports with Sam right in the middle. Sam knew all of his employees by their first names. He would sit down and break bread with workers on the assembly line. When their kids got sick, he would ask Marilyn Mitchell to phone Indianapolis and get them good care at IU Medical Center.

Sam's general approach was to keep corporate overhead as low as possible. He wanted the best possible managers, but as few of them as possible. The same was true of data collection. He wanted to know exactly what was going on in as few numbers as possible. "Red tape would kill this organization," said Sam. "It would raise our costs and slow us down. We have to be ready to turn on a dime, and this takes a lean, flexible organization, not a fat, rigid one."

If the organization was lean, the payoffs were rich. Sam rewarded his people with competitive wages and salaries, but once D&M got established in the marketplace he also offered bonuses based on corporate performance. In a good year, workers might earn a quarter of their salary in bonuses, and executives might easily double their salary. This was not

done out of a sense of altruism, but to guarantee that Sam got maximum effort out of everyone. "The first year that they paid a 27-percent bonus above salary," Bud Kaufman recalls, "most of the people there had never seen that much money. They thought they'd died and gone to heaven." Bud notes that this was before the union negotiated health insurance, which in later years amounted to a cost of five million dollars a year.

"However incoherent he might have been, however given to hyperbole and even sometimes confusing misrepresentations, everybody listened. You had to listen to Sam."
Steve Sample, president,
University of Southern California

Above all, the Dishwasher King was a talker. Jim Marcus, an investment banker with Goldman Sachs who joined the D&M board in later years, recalls what it was like to listen to the man. Sam Regenstrief was a lecturer, really, and a very difficult man to understand. He would pick up ideas in the middle and expect people to fill in the beginning and the end. His presentation was unshaped, absolutely amorphous, and not necessarily grammatical. He was like a satellite broadcasting, a lot of going on and on and on, and you had to pick out from it what was sensible.

People became accustomed to filtering through the hyperbole because it was Sam. He was not someone you would count on to get the details right, but you knew there was a larger message there worth listening to because it came from one of the most successful businessmen in the state of Indiana. In the appliance industry, he was probably the most successful businessman in history. Sam's gift for hyperbole worked out extremely well for the young Purdue professor who developed his patents for solid-state controls. When he was up for tenure and promotion, Sam put in a few good words for him—probably said he was the greatest technical

genius to come down the pike in a hundred years. The assistant professor got tenure *and* a promotion and later went on to a brilliant career in academic administration. That was Steve Sample, to this day a grateful fan of Sam Regenstrief.

Steve is convinced that Sam developed the uncanny ability to speak even less coherently than he was capable of. In essence, he turned a weakness into a strength and created an aura about himself of a man who spoke in convoluted, obscurely philosophical ways—sort of a Casey Stengel way of speaking that became his signature. Now the essence of Stengel-ese is not that a person speaks confusing English; it's that the person is so confusing that he controls the conversation. Sam had this technique perfected, as this story illustrates.

Steve Sample accompanied Sam to Long Island to negotiate a contract for some integrated circuits for his new electronic controllers. On the plane going out, Sam leaned over to Steve and said in the most straightforward way Steve had ever heard him speak, "Now listen, Steve, we're going to go out and meet with some guys who think we are really stupid—because they're from New York, and anybody from New York thinks anybody from Indiana is stupid. Now you're not capable of appearing stupid. So you be the bright boy, PhD, engineer, that's fine. Be as brilliant as you want. But leave the business part to me—no matter how confused it gets, leave the business part to me." Steve said, "Okay Sam, it's a deal."

They proceeded on to Hicksville, New York, to the integrated circuit company, and sure enough these guys were all New York City types and they all thought they were dealing with bumpkins. Sam did nothing to disabuse them of that theory. In fact Steve had never seen him act more bumpkinlike than during that day of negotiations.

And Sam knew how to negotiate. He negotiated by not negotiating. He could never quite understand what the New York boys were saying. They'd say, "Now Sam, this is the deal, right?" And Sam would say, "Right, that's the deal," and then he would repeat it and it would be all screwed up. So they'd say, "No, Sam, come on, this is the deal, right?" And Sam would say, "Right, I agree 100 percent, we're going to do [this, this, this, and this]," and it would be all screwed up again. The New Yorkers grew increasingly frustrated and appealed to Steve with their eyes. In response, Steve intimated that, if they thought they had problems, they should consider what

it was like to work with this guy all the time. But of course Sam was playing on the fact that they knew he was very wealthy and very successful, and that they wanted his money—lots of his money.

Meanwhile, twenty-eight-year-old Steve Sample was thinking, "This guy is really smart. I'm a teacher, so I know there are good teachers, not so good teachers, and a few great teachers. I'm with a great teacher here, so I'd better listen up, 'cause this is my chance to learn something that I wouldn't learn any place else." Suffice it to say, by the end of the day Sam and Steve had negotiated a very sweet deal.

Back at D&M, Sam had other memorable quirks and techniques that tended to infuriate his staff. For example, Sam found it very difficult to admit he didn't know something or that he had made a mistake. He would correct the mistake, but he just wouldn't admit he had made it. A typical scenario went like this.

In a meeting someone would question whether D&M was going to enter into a contract with a particular supplier. Sam would say, "Yeah, we're going to do that because of [such-and-such]." He was always very emphatic. It was never "maybe we should…" or "should we…?" or "what do you think?" This was how it was going to be.

Someone who could stand up to Sam—maybe Bud Kaufman—would say, "Now Sam, you've got to remember [such-and-such] is happening upstairs and, if we do this, it will cause [that problem]." Sam would get upset. "God dammit," he'd say. He didn't go much beyond "God dammit," but he'd use a lot of God dammits. "That's crazy, that's stupid, you can't do it that way," he'd say. By the end of the meeting, he'd be red in the face and saying, "By God, this is how we're going to do it."

At the next meeting Sam would say, "This deal over here to do the processing—that doesn't make any sense because…" and he'd give you the same reasons that Bud had given a week ago. "I don't know what you guys were thinking about—we can't do that!"

In other words, Sam was listening to his people, processing what they said, and taking their input into consideration in his final decision. It's just that they were always wrong and he was always right. It got to be funny among those who had worked with Sam for years. But woe betide any new kid on

the block. Sam could be pretty intimidating.

At corporate board meetings, it was the "I know all about it" technique.

Sam would say, "Now what's happening on this Smedley deal?" And one of his officers would start to give a report. "Well, Sam, you know, we offered them [this] and they offered us [that]." And Sam would interrupt with "I know all about it" and would repeat the Smedley story and get it all wrong. So the officer would say, "Well now, Sam, not quite. What I was trying to say was [this, this, and this]." And Sam would listen and he'd say, "I know all about it—it reminds me of this," and he'd tell this long story and get off into something else. Eventually Sam would come back to the Smedley deal. He'd say, "I knew all about this Smedley thing before you even started to tell me about it." And he'd lay out what he knew and it wouldn't be right.

The problem was, nobody knew exactly how much of this was controlled, how much was inherent, and how much was just for fun. One thing is sure—it kept Sam the total center of attention.

And there may have been a method in this madness. Getting his people to repeat things seven times led to a high level of frustration—they ***had*** to make Sam understand because he made all the decisions; he had all the chips. But it also forced them to sharpen their arguments. It revealed who was in favor of what and let them see the pitfalls in their plans. Besides being a form of sport, the technique quite nicely tested the limits of the rational approach.

For a man who appeared not to listen very well, it is curious that some of his fans describe him as a "hell of a listener." Sam had a great gift, Bud Kaufman reminisces. You could sit down and go over a problem, and Sam wouldn't know the direction you should go, but he would know the end result he wanted. Through his conversation and his digging, he would lead the group in the right direction, not knowing what the costs would be or anything else. "He just had so much energy, and everyone kinda picked up on it. He was a wonderful, wonderful person." Ed Mulick, who plays a role later in this story, chimes in. "People could bounce ideas off Sam and he would take them and expand on them and

truly make them bigger and better and still make you think it was your idea. He sort of fed off that kind of thing."

Some people were deathly afraid of confrontations with Sam, but not Bud Kaufman. He thinks that's why he and Sam got along so well—they both stuck to their beliefs.

> *One time they were arguing hot and heavy, and Sam says to Bud, "I don't want you in my office anymore." Bud says, "Good, you'll save me about fifteen hours a week in after-hours meetings," and he got up and left. Bud kept his distance for about ten months. Then the phone rings one evening and it's Sam. "Bud, will you come to my office?" Bud: "Are you asking me back?" Sam: "Yeah, I need you." So Bud walks into Sam's office and they pick up where they left off as though nothing had ever happened.*

Bud saw both the savvy and the softer side of Sam. Sam was very bright, he said, and, if he knew someone was trying to take advantage of him, he'd cut him up. But if Sam knew someone was asking a question out of a lack of understanding, he would do his best to explain his position and all the whys and wherefores.

D&M board meetings could also be the scene of histrionics. There would be some conflict and Sam would get mad. More than once Dick Goodemote heard Sam threaten to shut down an operation. He would cuss it out. He would say he could shut it down any time he wanted to. Later at home Myrtie would say, "Sam, what about the Foundation?" And Sam would sober up and start being rational again.

Sam was so obstinate about his schemes and kept up the pressure on his managers so relentlessly that one wonders why people stayed on at D&M. "Because they were a success. They could see it," explains Ed Mulick, who knew Sam during the latter days of D&M. Even through the fiercest arguments and the widest disagreements, deep down people could tell Sam was fueling their energy to keep improving the product and moving the company forward, which was absolutely the right thing to do. Sam had an almost cultlike hold on some of his people, built not from the financial rewards they stood to gain but from the high they felt with their sense of accomplishment. The more aggressive among them figured out that, even if he wanted to, Sam

couldn't be everywhere at all times, so they actually did have some latitude. Thus they would sort out what Sam would grudgingly let them do on their own. Despite the heated arguments, people felt lucky to know him. Tom Duncan says, "You had to know Sam and work with him, not just for a few days but a few years. If he felt like you were really trying to do a good job, he was on your side. At times it didn't seem like it, but he was."

As in control of events as Sam liked to be, he could be scatterbrained at times. Bud Kaufman recounts the time Sam took two cabs of D&M people to visit a company for which D&M did cabinet fabrications. Sam was in the lead car, and he told the driver, "Pull over—we want to get a sandwich." So the cabbie pulls over and the second cabbie follows suit. The seven travelers go into this little diner and all order sandwiches. Sam pulls out his billfold, and all he has are two one-dollar bills. Bud says, "Young man, it's a good thing someone's watching over you, because you sure as hell can't take care of anything!"

Bud had the sense that money didn't matter much to Sam. He never discussed or disclosed his wealth and never seemed impressed with the wealth or position of other people. By now, of course, he was quite wealthy, pulling down perhaps two million dollars a year, but he certainly was not acting like a rich man.

Sam showed little interest in investing. He bought a little stock in Armco because it was a big supplier of D&M, and on the advice of a close friend he once sank significant money into a savings and loan that went down the tubes, but he was a purely passive investor.

Nor did Sam's wealth drive him to fancy cars and fancy women. Sam came home every night to Myrtie. He went to extraordinary lengths to get back from his business trips around the country on the same day and not spend the night. He would have a private plane fly him to Chicago or Indianapolis at 4:00 or 5:00 A.M., take a commercial flight to where he was going, work all day, and still get back that night. That's how he and Steve Sample ended up in a ditch that wintry

night and had to be rescued by the Connersville farmer. Steve had joined Sam in Indianapolis to fly to New York for a day of negotiating. On the return trip, a big snowstorm diverted the flight from Indianapolis to the Cincinnati airport. What fell as snow in Indianapolis was falling as ice all over southern Indiana, but Sam was determined, so they rented a car and Steve took the wheel for the long slow creep to Connersville. They had almost made it when, one little turn, and the car landed in a culvert.

And Sam's personal vehicles were legendary for their shabbiness. Sam was a lousy driver even before he developed physical frailties, and his cars were always banged up, usually on both sides. One reason for this was the way his house was situated. Despite Sam's millions, he and Myrtie were still living in the same Dutch Colonial at 911 West Eighth Street that they had bought back in the Rex Manufacturing days. The garage was in the basement of this old house, which sat close to the crest of a hill. Dick Goodemote describes the obstacle course Sam negotiated daily when driving home from D&M. You'd come up the hill and cut a sharp left across oncoming traffic into the driveway, which was carved into the ground and lined with stone retaining walls. The car was always ricocheting off these stone walls. Then you'd get out of the car and there was a big post in the basement and you had to be careful not to hit that when you opened the car door.

Sam and Myrtie's first and only home in Connersville

The house itself Myrtie had nicely fixed up, but it was small and inconveniently laid out. They didn't even have a downstairs bathroom—they had one bathroom, upstairs. Though he didn't dare say it, Dick thought many times, "Sam, why the hell don't you get yourself a comfortable home, make yourself an office here—you live in this damn place!" But that was Sam. Worldly comforts didn't seem all that important.

Perhaps this lifestyle was Sam's way of keeping in touch with his humble beginnings as the son of an immigrant Indianapolis baker. His family remembers that Sam always thanked God for his luck. He "didn't have God by the beard," as he used to describe uppity people. Material things didn't impress Sam. In fact, it seems his own wealth sometimes embarrassed him. Sam bought Myrtie a Cadillac, and the story is told that, when she drove him around town, Sam would scrunch down in the seat when they passed the D&M plant so the workers wouldn't see him in it. When Myrtie bought an expensive antique, Sam carried on and on about the cost, and, when she yearned to own a mink coat, he said, "Nobody in Connersville wears a mink coat." The closest thing to luxury was Sam and Myrtie's condominium in Boca Raton, where they vacationed long before that was fashionable. Even this was leased, not owned. Sam paid fifteen to twenty thousand dollars a year to rent the condo, but he never would put money down to buy it.

Sam and Myrtie's social life revolved around the Connersville Country Club. Legend has it that, when Sam first came to Connersville, the club did not welcome him because he was a Jew. He could play golf there occasionally, but he certainly could not be a member. Then later the club fell on hard times. Some sort of financial transaction must have taken place involving Sam, because from then on the Connersville Country Club was open not only to Jews, but also to Sam's employees at D&M. You would see men and their wives playing golf there who were clearly of the working class—well behaved, clean, and neat—and their kids were in the pool. Sam the populist didn't come from money and privilege, and it appeared he had not forgotten his roots. Perhaps this is why he never considered moving to a grand home in Indianapolis. He preferred the simple life of Connersville.

Sam could be a real penny-pincher. Once when he was being honored at a black-tie event in Indianapolis, Myrtie forgot to pack his tuxedo shoes. Sister Helen suggested he wear his black shoes, but no, Sam had to have tux shoes. But he didn't want to spend a fortune on them either. Helen took him to Glendale Mall, and they headed straight for Kinney Shoes—forget Florsheim's. If the salesman brought him a pair costing more than ten dollars, he'd say, "I don't want them.

I'm just going to throw them away. I need them just for tonight." And why should he spend much on shoes anyway, since he had really small feet? He and Helen had a good laugh over that. But when it came to something important like the Foundation, Sam Regenstrief had no trouble at all spending money. Once a year, he and Myrtie would give about half a million dollars to the Regenstrief Foundation. And D&M would give another half million.

In a 1976 series on "Indiana's Bold Businessmen," *Indianapolis Star* staff reporter Jeff Devens described Sam Regenstrief as a "near-recluse." No wonder. The reporter was kept waiting outside Sam's office for more than an hour before Sam would submit to a brief interview. In the interview, Sam asked most of the questions: "Why do you want to interview me? I'll talk to you only if some good comes of it—only if it advances something." Luckily Devens managed to elicit some of the few quotable observations ever captured from this "shy, hard-working, diminutive bundle of energy named Samuel Nathan Regenstrief" as Devens lyrically described him. Sam refused to let himself be photographed for the story.

If Sam was such a recluse, why did he agree to be the center of attention at a swanky dinner attended by more than five hundred civic and business leaders, including the likes of IU chancellor Maynard Hine, American Fletcher Corporation's Frank McKinney, dean of IU School of Medicine Glenn Irwin, IU president John W. Ryan, former IU chancellor Herman B. Wells, Butler University president Alex Jones, and American United Life's Jack Reich? The answer is, he didn't.

With Myrtie's connivance, on January 27, 1972, Sam was lured to the Murat Shrine Club under the ruse of a business dinner. He was to meet with Glenn Irwin, Maynard Hine, and Frank McKinney at 5:30 P.M. to share a meal and discuss some plans for the Regenstrief Institute. The men dined quietly in a room immediately below the large banquet hall where hundreds of guests were assembling as a surprise. Sam

Regenstrief, age sixty-one, was about to take center stage as the honored guest of the Boys' Clubs of Indianapolis at their 1972 Horatio Alger Award Dinner.

As his quiet dinner was interrupted and a bewildered Sam was escorted from the room below onto the rostrum of the huge hall, master of ceremonies George H. Deck, Jr., an official of Sebco Industries Inc., explained to the multitude that this annual award ceremony had been started ten years earlier "as a means of recognizing a distinguished citizen whom we consider typical of the heroes of the old but still famous Horatio Alger books. But even more important, we feel these awards help to inspire the young boys who are members of the Indianapolis Boys' Clubs…to impress upon them the fact that hard work, courtesy, thrift, and driving ambition are still the only sure ways to success in life."

In the hall, besides all the dignitaries and friends, were youngsters representing the membership of the Boys' Clubs of Indianapolis. "Mr. Regenstrief…it is your life that we wish to portray to the young men in this audience," the master of ceremonies continued, "as a living testimony to the fact that anyone who has a strong enough desire, and who applies himself with all his ability, can literally pull himself up 'by his own bootstraps'…just exactly as did the heroes of the famous Horatio Alger stories."

A ruse lured Sam to this public tribute at the 1972 Horatio Alger Award Dinner

Following a script prepared by public relations man Howdy Wilcox, the master of ceremonies recounted the events of Sam's life…from Europe to Indianapolis at age nine…selling newspapers on the street corners…the night shift at Real Silk Hosiery…consulting at Rex…meeting Myrtie at Butler Fieldhouse…the birth of D&M…the aspirations of the Regenstrief Institute…and one by one, the voices of Sam's family, close friends, and business associates were heard speaking from an outer mike. Then the owners of the voices were ushered onto the speaker's platform and seated with

Sam and Myrtie—sister Sara Cohn, former partner Wells Bishop, "best man" Joe Burris, D&M executive Lee Burke, Dean Glenn Irwin.

"Mr. Regenstrief," the master of ceremonies concluded as Boys' Club president John W. Lauter approached bearing a large wooden plaque on which was mounted a brass scroll citing Sam's exemplary character, personal accomplishments, and contributions to the community,

> the Indianapolis Boys' Clubs salute you…because you exemplify those qualities which make it possible for anyone to succeed. We honor you also because you have always shared your success with those about you, your own family, your loyal employees, and now, millions of men and women whom you will never know but who are bound to benefit from the results of your great generosity. Your life, Sam Regenstrief, tells a story that we want to tell over and over again to the hundreds of boys who are members of the Indianapolis Boys' Clubs, boys who, like you, must rely upon self-determination, hard work, personal pride, and honesty to make something of themselves.

Sam, shy and embarrassed but all smiles, graciously received the Horatio Alger Award from Mr. Lauter, said a few words of thanks, and proceeded into the audience to shake hands with some of the boys. It was a night to feel proud, even if he had been tricked into coming.

With a last glance at the cluster of buildings at 2000 Illinois in Connersville, the Goldman Sachs associate puts down his clipboard, tucks his gold pen into his pocket, and arranges his notes in his fine leather briefcase and snaps it shut. It's time to go home to New York City to compile his report on D&M.

D&M is doing quite well, thank you, and, as 1972

stretches into 1973 and 1974, the years bring only more success. If anything, D&M is earning too much money. As Merle Miller's legal practice winds down, Len Betley has gradually started to handle more and more of Sam's affairs. Len and Sam place bets on whether the IRS is going to assess D&M a penalty for accumulating more cash than they're allowed to before paying out dividends. Sam wins—the IRS charges no penalty. Len hands over the nickel.

From time to time, Sam thinks about where he's going to go with all this. Perhaps somewhere in the back of Sam's mind is the realization that he has every egg in one basket, and that this is not the best thing to do....

Sam Regenstrief didn't sit around every night totaling up his net worth. He didn't care about his net worth as long as he was making money—he cared a lot about making money. By the mid-1970s, D&M was at the top of its game, and Sam still owned over 80 percent of his company's stock.

Perhaps someone suggested that he ought to think about taking some of his capital out of the business, for at one point Sam considered taking D&M public. If he wanted to cash in a portion of his stock, this would help, because there was no accurate way to determine the value of a share of D&M stock if it was all privately held. By offering a block of shares for sale to the general public, D&M could let the market determine a price. Sam and the other shareholders could then total up their net worth and have the market validate it.

Sam assigned Len Betley and his associates at Ice Miller the task of preparing the necessary paperwork to take D&M public. Sam also called on Jim Marcus, a partner at Goldman Sachs in New York. Jim had been at Goldman Sachs since before Sam bought D&M, handling the technical side of Sears' financial work, and that's how Sam Regenstrief came to know him. In considering options for D&M, Sam felt the need for the kind of advice this experienced investment banker could provide.

Goldman Sachs was eager to take D&M public. They thought it would be a really good stock issue—what the in-

dustry today calls an initial public offering (IPO). D&M was dominant in its industry, it had good profit margins, and the company certainly didn't need the money because it had no debt. Selling off some shares would be a breeze, and then Sam could get liquidity for some of his holdings. "Not that Sam needed capital, because he lived very simply," says Jim Marcus. "The man never spent two cents." Indeed Sam Regenstrief had no personal need for cash. He was taking a modest salary, plus the dividends from D&M and his other stock holdings. All this amounted to about two million dollars a year, of which he probably spent about one hundred thousand dollars on himself and his family. About five hundred thousand dollars went to the Foundation, and the rest was accumulating in U.S. Treasury notes and bonds.

The necessary paperwork for the public offering was made ready, but ultimately Sam backed off. Len Betley and Jim Marcus have no doubt that D&M could have been sold to the public. The feasibility was there, but the comfort level was simply too low. "I think Sam was right," says Jim in retrospect. "That was the right decision for him." Besides, Len says, as a CEO in a public company, Sam would have been a disaster. Operating the company for quarterly earnings to satisfy shareholders was not his style. Imagine Sam having to answer to a bunch of shareholders at an annual meeting. And Sam was hardly the kind of person who would have been happy talking with security analysts. He was too uncomfortable with procedural things.

Perhaps, too, being the shrewd risk taker that he was, Sam felt he needed the flexibility to change his mind when necessary. For example, some of his Purdue consultants had been working on a hot idea to build foam insulated steel panels that could be used like an erector set to build modular housing. Sam built a million-dollar facility in Lafayette to manufacture these panels under the name Araneida, Inc., but the concept was ahead of its time and too new to gain much acceptance. No one really knew where to go with it and how to market it. So one day Sam closed the door on the whole operation, just closed the door and locked it, cutting his losses. Many managers, faced with a decision they realized was wrong, would have tried to make it work or slipped out of it gradually over time instead of simply saying, as Sam

did, "That's a mistake, forget it." But in a public company, how would Sam have explained to stockholders that, after having just spent a million dollars, he decided to lock the doors?

There were no repercussions from not going public with D&M. The company was soundly capitalized and very profitable, and Sam had no need to borrow money, so there was no particular financial reason to go public. But at the time it was considered, D&M was at its zenith and was worth much more than in later years. Had Sam taken the company public then, there might have been more money for his beloved foundation. "Most people in Sam's position would have either sold off all or part of the business or brought in a management team that he could live with and let them run the business while he gently receded into the background," says Jim Marcus. "Maybe someone suggested that he ought to consider all of this, and he considered it, but he was unable to untie the Gordian knot."

The market had changed in the years since D&M was started. By the mid-1970s, GE, for example, was willing to slug it out on a cost basis with high volume. Sam was not unduly concerned about competition. Lots of companies were eager to take business away from D&M, but to do that they would need D&M's volume, and there was only one way they could get it—by introducing a significantly better product while matching D&M's low costs. Since D&M was continually improving its product, Sam doubted that anyone could do this. Sam boasted, "We have the volume and the efficiency now to play this game profitably. No one can match our production costs today." He had every reason to be proud of his company and hopeful of continuing success. He knew precisely what segment of the market he was going after. He hit it at exactly the right time. And he set up a tightly controlled organization to take full advantage of the opportunity. "The future looks good," Sam said in the pages of the 1972 Harvard case study. "Only 25% of US homes have dishwashers, so there is considerable growth potential for the product. If anything, the market share of national retailers will expand, because they offer the greatest value. I see no reason to expect our growth to slow."

And then, like a tiny cloud on the horizon, he added, "My biggest problem is to develop the management capabil-

ity of Design and Manufacturing Corporation so that we can continue to fashion a better product at a lower cost. Our success over the last twelve years has been based on accomplishing these two tasks, and I see no reason for any change in the future."

Sam's colleagues at D&M no doubt shared his pride and his confidence that no company could knock them out of their dominant position in the market. But they also shared a concern with management capability in much larger measure than Sam himself had verbalized. Amongst themselves they wondered: Who will carry on after Sam? Sam was not cashing in his shares and preparing to lounge on the beach in Boca Raton. He was happy continuing to take center stage at D&M. Basking in the glow of his baby's success, Sam Regenstrief seemed only vaguely aware of his own mortality and of the changes that lay ahead.

PRIMARY CARE TO THE PEOPLE

"The people need more health care and we've got to get it to them."
Sam Regenstrief

Early in 1970, special invitations went out to physicians, house staff, and medical students throughout the IUPUI medical complex to attend the first in a monthly series of technical seminars sponsored by the Regenstrief Institute and organized by its director, Dr. Ray Murray. Speaking was Dr. Eugene Stead of Duke University, renowned educator of chiefs of medicine. The Institute was taking the first step to fulfill an

important part of Sam Regenstrief's vision—communicating the findings of research to medical practitioners and the lay public. Practitioners would get to hear the celebrated Dr. Stead in person, and news would trickle down to the public via the media.

Gene Stead spoke on a subject dear to his heart—*universal entitlement*, or the belief that all people are entitled to adequate health care regardless of their circumstances. In this regard, and at this point in time, Gene Stead saw eye to eye with Sam Regenstrief. In time, however, the two men's visions would diverge, and eventually they would part company. But for now, Gene Stead was laying out themes that would characterize the Institute's work for the next several years.

The prevailing shortage of physicians and clinical assistants was a bottleneck to universal entitlement, Gene told the assembled staff and students, but developing efficient use of physicians through computerization and mechanization of health services was not the answer. "The medical profession is a human system," the press quoted Gene Stead. "Since physicians deal with the emotions of patients much more than with their intellect, it becomes important that human beings, not machines, deal with illness.... The emotional satisfaction of the patient is important in getting him well and keeping him well. A physician is not free to ignore a person's feelings." Paying for this personalized treatment could raise costs, the speaker acknowledged. It would demand new approaches to financing health care, since the third-party payor system provided no incentive to physician or patient to lessen costs. Universal entitlement also demanded "system engineering" of facilities to provide needed services. "We have to put the building, the people, and medical equipment in the right mix. We have to decide how much clustering in a central location is going to be done and what type of service is to be offered in outlying areas."

The 1960s had seen American cities embroiled in racial turmoil, riots, and looting. Detroit had been badly burned, and there was great unrest in Indianapolis too. The problems of the inner city loomed large against the backdrop of the general plight of the poor. While at IU Medical School, Dr. Ray Murray had an early introduction to the problems of

the inner city because of a very persistent African American nurse, Ann Bollen, who came to see him one day, saying she wanted to set up a neighborhood health center in a low-income, crime-ridden eastside community of Indianapolis. Ray Murray told her they were really loaded up and couldn't do this, but the young nurse would not take no for an answer. Ray began to work in a small neighborhood center in the Martindale area, which in 1969 was designated a "most in need" district in a federal Model Neighborhood rehabilitation program.

Eventually Ray Murray brought together three neighborhood health centers into the Metropolitan Health Council and got federal money to fund them. Although at the time federal money was flowing freely to programs targeting the city's poor, Ray knew that the funding spree would soon phase out, and he figured that, if they could fold some of Indianapolis's poor into the health care system that was evolving, the feds might give them money for health care just as they did for welfare. They did, and that was the beginning of the first HMO in Indianapolis; it was called Metro Health Plan.

While pondering the possibilities for the Regenstrief Institute, IU School of Medicine's chairman John Hickam took special notice of Ray Murray because he had expressed an interest in working with the city's underserved populations. John was aware of Ray's strong academic background and of his seven years of experience practicing medicine. Ray had also run an aerospace research laboratory for Indiana University at Wright Patterson Air Force Base, so he was familiar with research too. When the time came to choose a leader for the Institute, John Hickam thought the wedding of Ray's various experiences and interests could be quite useful in someone called to administer a program of medical research in a county hospital.

Ray Murray was well into directing the Regenstrief Institute when in February 1971, about a year and a half after becoming a party to the Regenstrief Institute charter, IU Medical School created its own entity to focus on health care delivery—a new department called the Department of Community Health Sciences (DCHS). The medical school had two goals—first, that the DCHS should become the focus of the medical school's involvement in primary health care projects

at the IU Medical Center and in communities around the state; second, that it should work with the Regenstrief Institute and others in developing a strong health care research program at the medical school. The DCHS was conceived as a companion to the Institute, and, although they were quite separate entities administratively, they were both centered in the same space and shared a director—Dr. Raymond Murray.

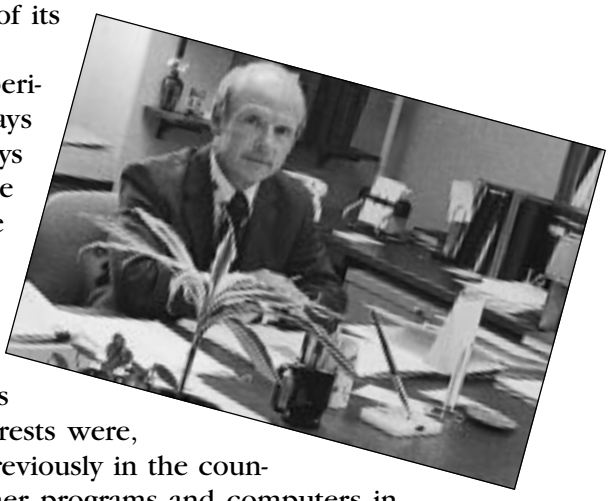
Thus bonded to the Institute, the DCHS set out to pursue an ambitious and quite similar set of objectives. These were

1. To promote the education and training of medical students and house staff in effective delivery of comprehensive health care, especially ambulatory care
2. To become involved in selected medical practice programs in Indianapolis and elsewhere to study, innovate, and evaluate various approaches to the delivery of care
3. To bring together from within the departments of the medical school and the other schools at the IU Medical Center those health professionals interested in health care delivery and health care research
4. To bring into the medical school, at faculty level, professionals from other schools and universities as well as certain nonacademic fields (including engineering, sociology, management science, computer science, anthropology, and economics), in order to broaden the base of medical education and research and use those theories and practices from each of these fields that might relate to health care
5. To lead the university's involvement in health care research, working closely with the Regenstrief Institute and others to foster collaborative programs among the clinical departments of the medical school
6. To participate with the medical school administration in selected extra-university programs that are concerned with community health

At about the same time, the medical school also initiated a program that would train doctors to practice medicine

in the context of the family—the old *general practice* was going to be replaced with *family practice*. Both the DCHS and this program were designed to broaden the sights and the training of medical students, taking them beyond the confines of IU Medical Center to hospitals, rural areas, suburban practices, and inner-city clinics. "We want the students out where the action is," Dean Glenn Irwin told a reporter.

The new clinical department began actively recruiting, and Ray Murray took up his additional directorial duties with gusto. Like his fellow researchers, Ray was caught up in the excitement of this fertile time for research. Medical schools all over the country were expanding research programs and launching new ones. Physician training programs were changing too, and this community-focused training program appeared to be the first of its kind in the country.



Ray Murray, first director of the Regenstrief Institute, saw the chance to make a difference in health care delivery

"None of us had experience in the field before," says Ray, recalling those early days of the Regenstrief Institute and the DCHS. "We were learning as we were doing. We didn't have a global vision. In some ways we were opportunistic. We would find out who was available, what their interests were, what had been started previously in the country—like nurse practitioner programs and computers in medicine—and exploit the opportunities that were available, or that we could make available when we had the resources. We saw the great chance to make a difference in those fields. It was a very exciting time."

The Indianapolis media picked up on the excitement with the beginnings of some publicity for the Regenstrief Institute. Ray Murray was often quoted. "We're looking to the time we will take new systems out to try elsewhere, in neighborhood health centers, in rural areas, and even in private practice," he told reporter Fred Cavinder of the *Indianapolis Star* in March 1970. He dreamed of sending out multiphasic screening wagons carrying sophisticated

technical equipment into rural areas to help doctors in remote regions give on-the-spot diagnostic tests. Ray Murray was attending the birth of a new concept—primary care—and he was going to help bring it to the people.

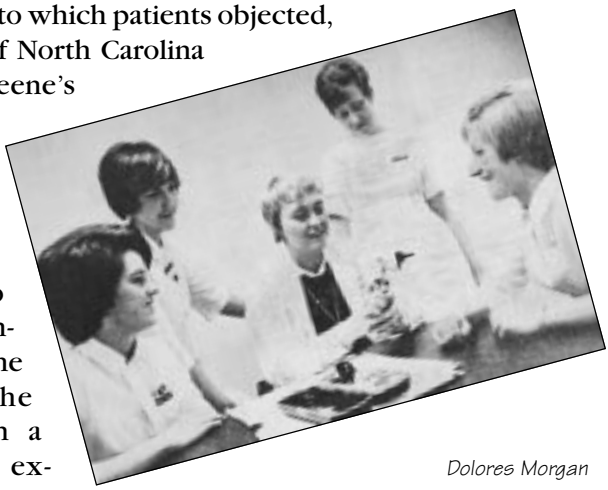
In a May 1970 article headlined "Indiana Making Progress In Health Care," *Indianapolis Star* columnist Leila Holmes noted that the nation had done little to bring the medical advances of the past twenty years to the patient and that the Regenstrief Institute was trying to change that. "In our time there never will be enough physicians to provide proper health care," Dr. Murray was quoted as saying. "So we must find better methods for using the ones we have." Indeed, finding better ways to use physicians became the focus of a whole series of training experiments conducted by the Institute. Sam Regenstrief may have recognized these as a variation on one of his favorite themes—getting the labor out of the product.

Eugene Stead had been working for some time on the idea of using trained assistants—they called them *physician extenders*—to take over some of the physician's more routine tasks. Giving an injection, taking a blood sample, doing a blood pressure reading, making routine laboratory tests—these were not difficult or complicated procedures, and an intelligent, conscientious layman could easily be trained to do them quite well. In a pioneering program at Duke University Medical School, Stead had demonstrated that ex-military corpsmen could be trained to assist family physicians and others involved in primary health care. Thus assisted, the physicians were free to apply to a greater number of patients the specialized diagnostic skills and therapeutic techniques for which their costly training had prepared them.

Regenstrief Institute researchers set out to discover through experimentation which jobs technicians might take over from nurses and which jobs nurses might take over from doctors. Again Institute spokesman Ray Murray was quoted in the press. "Our medical care system is very good," said Dr. Murray, "but we have to find ways to make it more

efficient so more patients can receive good health care. We must extend the doctor's reach and enable him to do a broader job." The county hospital's chief was also quoted in Fremont Power's column in *The News*. "There is no question," said Dr. Arvine G. Popplewell, "that [Marion County] General Hospital will be heavily involved in developing training programs to educate…personnel to become the extensions of doctors' eyes and ears in monitoring patient illnesses and making certain value judgments about changes that may occur." The article indicated that many physicians would probably concede that they were "overtrained" for some of the routine tasks they did.

In sorting out which jobs could be done more efficiently by whom, the Institute built on its early experiences with multiphasic screenings at the Martindale and Morgan health centers, where the Institute had trained aides to weigh patients, take blood pressure, help with routine lab work, and help doctors conduct exams. This was thought to relieve the physicians' job pressure and to reduce the mad pace and lack of personal attention to which patients objected, according to University of North Carolina anthropologist James Greene's survey. Greene was on hand again to monitor patient reactions as Marion County General Hospital began to use Red Cross volunteers to help with multiphasic screenings, and then again in the summer of 1970 as the county hospital began a special new physician extender program, this time involving nurses.



Dolores Morgan instructed the Institute's first four nurse clinician trainees

Dr. Dolores A. Morgan, a graduate registered nurse and physician, was recruited as director and developer of the new one-year *medical nurse clinician* program which would train a small number of nurses who held baccalaureate degrees. They would be equipped to take patients with stable, chronic diseases—diabetes, for instance—and over-

see their treatments for extended periods of time between doctor visits.

Four nurses were selected and, over a nine-month period beginning July 1970, they were trained to carry out a history and physical examination, initiate laboratory studies, and follow the course of patients with chronic medical diseases. Working alongside medical students, they learned the specialized techniques required to analyze medical problems by sight and touch. Then during the last three months of training, they worked with a local neighborhood health center and with three groups of internists elsewhere in Indiana.

Indianapolis Star reporter Donna Knight duly documented this innovation midway through its first year. Unlike the specialized nurse training being tried at other universities and hospitals, this program expanded the nurse's role to include the psychosocial aspects of the patient's life. Each patient diagnosed with chronic disease was assigned to one of the four nurse clinicians, who became that patient's personal health consultant. Visits took place at a neighborhood health center so the patient could avoid the hassle of obtaining transportation to the hospital clinic.

"Nurses are 'primary care' people," said Dolores Morgan. "They get to know the total person and evaluate the effectiveness of the treatment. No amount of medicine will cure a case of hypertension if the patient's home life is so bad that it is aggravating his condition. This is the sort of thing a nurse can determine by her close relationship with the patient. She can then relay her findings to the doctor for reassessment." In addition to testing nurses in the role of physician extenders, the medical nurse clinician program was testing a new way to care for the chronically ill on a continuing basis, one that might forestall the onset of serious complications and in turn cut medical costs.

This collaboration between the medical school's Department of Medicine and the county hospital's Department of Nursing Service appeared to be working out well, but no innovation of the Regenstrief Institute was going to be judged on anecdotal evidence alone. James Greene set about evaluating the acceptance of medical nurse clinicians by the patients they served, and a University of Wisconsin graduate student in social work, Beverly Flynn, RN, joined the Insti-

tute part-time to measure the value of this project as a basis for her doctoral dissertation.

The program proved successful. Nurse clinicians performed responsibly and well and were well accepted by physicians, nurses, and patients. Three of them stayed on at the county hospital to work in the general medicine clinic, one went to a neighborhood health center nearby, and director Dolores Morgan left to resume her family practice residency. The research had concluded that, yes, nurses could and should be trained to assist physicians in the delivery of health care. They could and should play a more responsible role in the general medicine clinic at the county hospital, which in turn would let the researchers assess their potential value in private practices as well.

With this success under its belt, the Regenstrief Institute decided to expand into training *family nurse practitioners*—nurses who would work with general practitioners and family physicians, internists, and pediatricians involved in primary care both at IU Medical Center and throughout Indiana. Shirley Ross and Barbara Norton, both RNs with IU School of Nursing, received joint appointments with the Institute to develop the new program. In March 1972 the program was approved for funding as one of seven projects under the NIH program called PRIMEX. The Bureau of Health Services Research and Evaluation awarded a four-year grant to the DCHS, and the first class of sixteen students began a six-month training program that June. Beverly Flynn continued her role as evaluator, and Dr. Robert Chevalier, internist and medical director at St. Francis Hospital, assumed a part-time position as medical director for the program.

This program also met with success. Every member of the first class of family nurse practitioners was employed immediately after graduation, and in June 1973 a second class of twenty-two students, including three men, was enrolled. By December 1974 the PRIMEX program boasted fifty-six graduates, of which fifty were practicing in Indiana. Eventually the nursing school took it over and made it a two-year program with a nursing degree as a prerequisite. As far as Ray Murray knows, this was the first nurse practitioner program in Indiana.

Close on the heels of the medical nurse clinicians and

family nurse practitioners followed yet another category of physician extender. The Institute started planning for *physician's assistant* training to take place in Fort Wayne, Indiana. This two-year program was patterned after Eugene Stead's program at Duke University—a year of basic and clinical science instruction and a year of clinical clerkships. Federal funding was obtained, and the first class of twelve students began training in August 1972 under family doctor Fred Schoen and physician's assistant Dan Fox. The physician's assistant concept proved rather popular. The Institute received about fifty letters of interest per week and received three hundred applications for the twenty positions available in the class that would start in 1973. Nine months before graduation, several members of the first class had already received job offers in the Fort Wayne area. It was hoped that IU would grant associate degree status to graduates by the following year. Not long after, the program was fully accredited by the AMA's Council on Medical Education.

The Fort Wayne program was an indication that the Regenstrief Institute was beginning to set its sights beyond the clinics of Marion County General Hospital and the neighborhood health centers of Indianapolis. The objective early on had been to disseminate what was learned at the Institute to communities throughout the state, as well as to physicians' offices. A fourth-year medical student began surveying the delegating habits of Indiana physicians in order to understand the role that family nurse practitioners and physician's assistants might play in private practice. A potential use for them was found to be in small towns with populations of less than two thousand—these towns often had a difficult time attracting physicians. The Institute sponsored six- to twelve-month preceptorships for a number of the newly trained physician extenders with individual and group practices in nearby cities, whose physicians would continue supervising them when they began practicing alone in remote areas.

The Institute kept its eyes peeled for opportunities to make a difference anywhere around the state. Ray Murray learned that Gary, Indiana, was in trouble after several years of urban unrest. The usual physician shortage, plus a projected shortage of skilled staff for the many ancillary services

of health care, threatened serious deterioration of inner-city inpatient and ambulatory care unless immediate short- and long-range plans were put in place to correct the situation.

Together, the Regenstrief Institute and the DCHS secured a one-year grant from the Robert Wood Johnson Foundation and the United States Steel Foundation to find out what types of health professionals could help primary care physicians in Gary. They envisioned starting some sort of physician extender training and coming up with new approaches to delivering health care within the school system. For consulting with mayor Richard Hatcher's people, Ray Murray was made an honorary citizen of Gary. A similar comprehensive two-year study of East Chicago's public health system soon followed.

While Regenstrief Institute director Ray Murray looked statewide for problems to solve, Regenstrief Foundation director Eugene Stead continued expounding a broader perspective on health care delivery. Following up on the concept of universal entitlement, Gene Stead was thinking in ever widening circles, beyond the Regenstrief Institute and even beyond Indiana's boundaries, to solving the nation's medical care problems. Featured Sunday, March 7, 1971, in Leila Holmes' column, he called for a compulsory national service corps in which every young American would serve his or her country for two years. The country needed not just doctors, he said, but young people to tackle the problems of housing, education, transportation, nutrition, and pollution, all at the same time.

Health care for the disadvantaged could not be measured simply in units of health service provided, he continued, and higher taxes were never going to cure society's ills. A new social structure with other services besides health care was essential to overcome the public's belief that the worthy succeed by their own efforts and the unworthy fail because of a lack thereof. "What people need is a purpose for getting up in the mornings," Stead said, taking up the indigents' right to a system that preserves human dignity. Health professionals, he said, had an entree into disadvantaged neighborhoods that no other advantaged person had, implying an obligation to use that entree responsibly to improve people's self-esteem.

Though Sam Regenstrief surely shared with Gene Stead the desire to make good health care available to the common man, their approaches to the problem were developing in distinctly different directions. The great medical educator was thinking globally about building the self-esteem of the poor, whereas the industrialist was thinking quite locally about a different kind of building—the bricks and mortar kind.

"Anything that's possible physically is possible fiscally."
Sam Regenstrief

Sam Regenstrief was not the sort of philanthropist who would let other people manage his money and just hand him figures to recite at occasional celebratory dinners. Sam knew exactly where his money went and was closely attuned to what his foundation was doing. When Sam came to Indianapolis for a meeting—by this time he sat on the boards of Butler University, American Fletcher National Bank, and American United Life, as well as the Foundation board and the Regenstrief Institute Committee—he would stop in to chat with the researchers at the Regenstrief Institute. Sam enjoyed technical talk, and scientists were technical people. Ray Murray recalls being stimulated by Sam's enormous enthusiasm. "Sam was by no means impetuous, but, if he liked something, he was very enthusiastic. For instance, if we brought to him a program we were thinking of starting and explained to him what it might do, he would want to hear more about it and learn what we were doing. I had great respect and affection for him."

Although the Regenstrief Institute was chartered in June 1969, the first meeting of its governing body—the Regenstrief Institute Committee—didn't occur until the following spring. Sam Regenstrief was there when the committee convened on May 4, 1970, at 1:00 P.M. in the boardroom of Marion County General Hospital. Ray Murray welcomed everyone and distributed copies of the charter, along with reports on the status

of the Institute's interim space at General Hospital and on the planning for permanent facilities. He appointed Merle Miller, Bernard Landman, and Eugene Stead, Jr., to a subcommittee to develop bylaws for the committee.

"Extreme crowdedness" was already a problem in the Institute's temporary quarters in the Department of Medicine, Dr. Murray said, and it would become more so that fall when four to six nurses would be added under the new nurse clinician program. Dr. Stead predicted it would be even worse when new staff were appointed to the Department of Medicine in January 1971. Dr. Murray told of stop-gap plans to renovate the old record room which at present was a shell with no partitions. Unfortunately it would take the in-house renovation staff one full year to complete. The only way to do it faster would be to hire outside contractors, and the hospital had no funds to pay the estimated cost of a hundred thousand dollars. After extensive discussion, it was agreed that the hospital would donate as many supplies and equipment as it could and that the medical school and the Institute would split the cost of hiring outside contractors to do the work. Another question concerned two million dollars that Sam and the Foundation would contribute for permanent Institute offices in the to-be-constructed outpatient facility known as the Regenstrief Health Center. The gift could be interpreted as two million dollars or one-sixth of the cost of the building, whichever was greater, Merle Miller pointed out; if the Regenstrief Institute floor came to less than two million dollars, the difference could be used for the general cost of the rest of the building.

Two weeks later on May 18, the appropriate honchos assembled at a special meeting to sign the letter of agreement that would launch the building of the new outpatient facility. As befit such a momentous occasion, testimonials were forthcoming.

Chancellor Maynard Hine, DDS, noted that IU Medical Center and Marion County General had grown close together "both geographically and philosophically" and must realize that working together would be mutually helpful. Mrs. Jean C. SerVaas described the history and management of the municipal Health and Hospital Corporation (HHC) as established by the Indiana General Assembly in 1951.

Medical school dean Dr. Glenn Irwin described how the Regenstrief Foundation had come along just as IU Medical Center and Marion County General were planning new outpatient facilities in an effort to rescue the county hospital's bad image in the delivery of health care. "The Regenstrief Health Center," Dr. Irwin said, "will revolutionize delivery of health service and will provide the atmosphere for proper education and research in this very timely arena of medicine today." Dr. Arvin Popplewell seconded Dr. Irwin's comments from Marion County General's standpoint, particularly since ambulatory care had always played a secondary role in its health care delivery and the hospital had seen no substantial capital improvement in ambulatory care since 1929.

Then the chair of the meeting, John J. van Benten, introduced Sam Regenstrief to the group, noting that "one of the most important facets of private philanthropy is trying to show the way for intelligent spending of public funds." For his foundation's part, Sam said, they saw a need for this facility, and he and Myrtie were happy to work toward it "both physically and fiscally" and were enjoying it.

The group looked at a site map showing the placement of the new facility—southwest of Marion County General, with plenty of room for an adjacent parking garage—and approvals were granted all around, with the cost of construction reasonably split among the parties. The signing of the memorandum of agreement was quickly accomplished, later to be embodied in official documents of the various boards that the signers represented.

In the minds of the participants, perhaps this significant May 18 signing was attended by a fanfare of trumpets. However, if the agreement was great news to them, it was old news to the *Indianapolis Star* which had long since let the cat out of the bag. "IU Health Center Planned" proclaimed the *Star*'s banner headline on Wednesday, December 3, 1969. Sam Regenstrief's by-now-familiar press photo ran with the headline, alongside a snapshot of an aging Charles Lindbergh profiled against the jet pod of a mammoth Boeing-747 making its pioneer flight from Seattle to New York. The subhead continued, "Westside Site for $8 Million, 5-Story Building." The *Star* noted that this was the first time the HHC had worked with IU Medical Center on a joint project. An editorial in the

Indianapolis News two days later indicated that "the public is grateful for Regenstrief's generosity, and for the farsightedness of officials of the two agencies which has made the new facility possible."

Not surprisingly, there were a few details to work out. The idea for a new thirty-thousand-square-foot outpatient health center had been on the books since the original Institute charter was signed. But during 1969 and 1970 the HHC and IU Medical School had been planning separately for new outpatient facilities. With this agreement, they were creating a partnership to build a single outpatient facility that would serve both the county hospital and IU Medical Center and "provide the finest modern medical care to their patients." Marion County General Hospital was something of a hot potato because it had the reputation of being the poor person's hospital—protecting the health of the poor was the HHC's reason for being. When Unigov joined Indianapolis and Marion County, making it a consolidated city in 1971, the City-County Council reviewed the HHC's budget for the first time. Majority leader Beurt SerVaas actually proposed selling the county hospital to the medical school in order to save tax dollars while caring for the poor at the "status address" of IU Medical Center. The SerVaas proposal caused quite a brouhaha, and, although it was not adopted, it must have provided additional incentive for the two entities to collaborate on a spiffy new outpatient facility to overcome the stigma that haunted old General Hospital.

It took two years of planning and fundraising to be ready to start construction on a now much more ambitious six-floor, 180,000-square-foot, $10 million outpatient center that was to open to the public in early 1975. Sam Regenstrief was giving his name and $2 million of his own and his foundation's money to this building. The HHC was floating a $6 million bond issue and had also received a $1.2 million federal grant. The medical school was contributing $1 million to purchase equipment for the center in addition to furnishing doctors and students to train at the new facility.

At the eleventh hour, however, the parties were still haggling over who would control the medical and administrative staff of the facility. The start of construction was only a month away. "A feud is raging behind closed doors…," the

Indianapolis Star recorded for posterity. The argument, it said, boils down to General Hospital officials wanting control because they represent the taxpayers who are contributing the most money. Medical center officials want control because they claim to know how to operate a hospital and are providing staff and equipment. Asked to comment on all this, HHC president Dr. Sprague H. Gardiner said, "There are no problems. We just have to settle a few details."

Problems somewhat resolved, a ceremony on July 26, 1972, marked the long-awaited breaking of ground for the Regenstrief Health Center. Administrators from the county hospital and the medical school, HHC officials, local government representatives, employees, and friends of the HHC gathered in the area southwest of Marion County General Hospital to see the first official turning of earth.

Groundbreaking for the Regenstrief Health Center, the Regenstrief Institute's long-awaited new home

"The moment has come for which these people have been striving, and shiny, beribboned shovels bite into the ground upon which, in two years, will stand a remarkable tribute to the service of mankind through medicine." So proclaimed the caption in the hospital's house organ, ***Life…in General***, under the photograph of appropriate dignitaries putting their shoulders to the task. Pictured (from the left) were HHC chair of hospitals Dr. Arvine G. Popplewell, City-County councilman Jack Patterson, HHC board chair Dr. Sprague H. Gardiner, Dean Glenn Irwin of IU School of Medicine, Mayor Richard G. Lugar, and Samuel Regenstrief, with Myrtie Regenstrief in the background, looking on.

Watching from the sidelines was a young woman who would become keeper of the institutional memory of Sam Regenstrief from this moment to the present. She was Joanne Lepper, soon to become Joanne Fox. Joanne was Ray Murray's secretary and was quickly taking on administrative duties such as supervising the other secretaries and handling accounts payable and receivable. Drawn to the Regenstrief

Institute three months earlier by an instinct that this was the right place for her, Joanne had been a model and secretary in the fashion department at the downtown L. S. Ayres department store. She found it easy to give up the glamour job at Ayres for the Institute's shorter workday, which gave her an extra hour a day to spend with her four children at home. She did wonder, though, whether it was a bad omen when, on her very first day on her new job, she stepped in a hole in the hospital's parking lot and broke her heel. Joanne was assured that construction would be completed in short order, maybe a year at most. She looked forward to moving into the Institute's new offices.

Apropos the $2 million allocated to a floor for the Regenstrief Institute, Ray Murray remarks that Sam was very frugal with little things, yet very generous in the big things. In a meeting once, Ray heard Sam say to John Hickam, "Is one floor enough? Would you need two floors?" An extra floor might mean an extra million or so, and he was quite ready to pay that. On the other hand, Sam would look at the Institute's financial reports and ask questions about small items: Why did they do this? This seems rather high to me. Ray surmised that he was seeing the Sam who, brought up as a poor boy, was used to watching the pennies.

By December 1973, a year and a half into the construction of the new outpatient facility, the Regenstrief Institute was bursting at the seams. It had grown to thirteen physicians—either full- or part-time, with joint appointments in clinical departments in the medical school or in private practice—three PhDs, three registered nurses, and twelve other professionals. It also employed, on a temporary or part-time basis, thirteen medical students and four engineering graduate students. It was time to issue the Institute's first five-year plan.

Over its short lifetime, the Regenstrief Institute's research program had grown and developed considerably. The program had matured to the point where it would benefit from long-term planning. Step one was to reassess the Institute's goals and objectives. Step two was to establish

research priorities. In particular, the Institute needed to ensure continuing support for its research by developing programs acceptable to its three sponsors—the Foundation, the medical school, and the HHC. The Institute also wanted to assure five years of stable funding as an added attraction for prospective research associates.

Accordingly, Ray Murray and the associates compiled a five-year plan for the Institute, assigning priorities to projects according to three criteria: Was the project directly relevant to the Regenstrief Institute goal and fields of interest? Was the project considered a potentially important contribution? Could one recognize in the project the ingredients for success?

One item assigned top priority was "promotion of group practices in small towns and rural areas," seemingly a direct response to Sam Regenstrief's concern for health care in Connersville. Throughout Indiana, demand was growing for traditional medical services and for new preventive and health maintenance services, but most medical students were choosing careers in specialties and not in primary care. Rural regions and inner-city areas were losing physicians, and younger doctors were establishing practices in the suburbs. A study undertaken by the Institute determined that establishing integrated group practices—practices that would include physicians from various specialties—would be the single most effective innovation the Institute could make in rural health care.

And so, in the summer and fall of 1972, as the bulldozers buzzed and steel girders rose out of the ground adjacent to the county hospital, the Institute began to create model group practices in certain medically deprived areas of Indiana. Dr. J. Hardigg assumed directorship of the program in 1973 while also responding to Governor Otis Bowen's request that he reorganize the medical care system in the Indiana Department of Corrections. Dr. Hardigg died suddenly, just a month before the first model group practice opened its doors.

The first group practice was established in Paoli, Indiana, in July 1974 and involved three primary care physicians from IU Medical School. The Institute lent its expertise to the Paoli project in a lot of ways. It worked with the regional

health planning group in this most doctor-short area of southern Indiana to identify a suitable community for the new group. The health systems engineers worked with the architects to design a building for optimum patient flow. Medical record formats were designed, including an *encounter form* that documented the office visit and doubled as an appointment and billing form. Data from this form was neatly stored in the Institute computer for an ongoing practice analysis. So that they could later measure the impact of this practice, the Institute sponsored a survey in Crawford and Orange counties to find out what people in the community felt their health care needs were and what kind and how much health care they were receiving.

A similar practice was planned for Connersville, but recruiting physicians proved difficult. At last, in September 1974, two internists agreed to join the two surgeons already recruited and settled in to a busy practice. However, the physicians already practicing in Connersville received the model group not as the intended godsend but as interlopers, and the practice never succeeded. Nevertheless, there was talk of the Institute designing group practices even as far away as Pennsylvania.

Closer to home, Drs. Joe Mamlin and Charles Kelley were cooking up a scheme to improve primary care delivery at the county hospital and at the new outpatient facility noisily taking shape just outside its doors. Theirs was a two-pronged approach.

First, they would mount a demonstration project using a special group of primary care internists along with nurse practitioners and appropriate technology, focusing on a limited patient population on the northwest side of Indianapolis. The project would tightly link a neighborhood-based health center to the services at Marion County General Hospital. In particular, hospital records of selected patients would be transferred to the neighborhood center so that follow-up care could be handled in the heart of the community and "greatly improved health care could be delivered." Drs. Duke Baker and Steve Roberts would look over their shoulders to model the whole operation.

Second, the Mamlin-Kelley team would launch a program to promote training and retention of primary care

internists for the county hospital and the Regenstrief Health Center. Beginning in 1974, primary care would be a new training track for the medical school, and the Mamlin-Kelley program set up the administration and funding to make it happen. The Institute would guarantee support of a limited number of general internists until the project could become self-sufficient.

Amid the dirt and din of construction, the closely wed Regenstrief Institute and Department of Community Health Sciences (DCHS) made serious business of educating students in this new area called primary care. MBA students from IU (Bloomington), industrial engineering students from Purdue, and IUPUI medical students and graduate students—all were being enticed to apply their educations to solve the problems of health care delivery. Lectures and seminars taught them about innovations that were being developed, and part-time employment in the medicine clinics let them work with these new methods in model practice settings. Patient education also received Institute support as improved methods were sought to help diabetic patients comply with their treatment regimens.

And where was Dr. Clement McDonald as the jackhammers pounded and the dust rose over the bones of the emerging center? Why, Clem was busy bonding with his new PDP 11/45 minicomputer, computerizing the medical records of the county hospital's diabetes and renal clinics and part of the general medicine clinic. Two thousand patient records had been entered and were being maintained so far. In addition, he was working on a program for managing ancillary data from the clinical laboratories, the pharmacy, and the appointment system, which he called the Ambulatory Care Information System (ACIS). Its records were going to be used right away to implement and evaluate the Mamlin-Kelly neighborhood center model practice. In his spare time Clem was working on a mechanism for storing, editing, listing, sorting, reorganizing, and doing statistics on large storage files, something that might come in handy when working with all this electronic data that he was assembling. The Institute's 1974 annual report modestly requested funding for "one programmer and a clerk and a limited amount of peripheral equipment for the computer

to permit us to utilize our computer facilities more completely and effectively."

Through the changing seasons of 1973 and 1974, Sam Regenstrief—flanked by officials of the HHC, IU Medical School, and the Regenstrief Institute—must have donned hard hats from time to time to tour the construction zone and gaze admiringly as the bricks and mortar went up on their new Regenstrief Health Center. Now that the three parties had agreed to partner on such a complex venture, they had a further nut to crack—how to manage this thing.

Again Sam's advisor Merle Miller was called upon to exercise his diplomatic skills, as it soon became apparent that major questions had been left unsettled. Merle argued that, because each of the parties owed allegiance to its principal mission, the health center should not be under any one of them. A special governing entity was needed that would make each party see the center as theirs and enable them together to make an outstanding health center, not just a "good-looking addition to the hospital for purposes of a glorified outpatient clinic." Merle told Mayor Lugar that he was working on a plan whereby Indianapolis would have the finest medical facility in the country, that all the ingredients were there, but that he might need the mayor to "knock some heads together" to make it happen. Meanwhile, he advised Sam Regenstrief, "it is a mistake to let your constructive efforts and imagination get bogged down in a political mess where a victory would be wonderful but a defeat would not be fatal…." Merle indicated he would like to see the Institute embark upon some areas of research that would not require cooperation of governmental bodies in any formal way and where Sam could gain a lot more satisfaction out of the progress that the Institute could achieve just on its own.

Diplomacy prevailed over the knocking of heads, and a Joint Operating Board (JOB) was created to promote "more integrated planning and operation of the Regenstrief Health Center." Made up of representatives from each of the three partners as well as a "public" member, the JOB busied itself with a series of discussions concerning alternative management schemes for the health center. For inspiration, board

members visited Seattle to study a successful contractual relationship between Seattle's city hospital and the University of Washington School of Medicine. They liked what they saw and decided to copy it.

In May 1974 the JOB created a task force, led by Mr. Richard Laird of the Institute's Health Systems Engineering and Management Sciences section, to develop operational plans for the health center to facilitate administrative planning. Mr. Laird became the interim administrator of the health center, and the Institute loaned a health system engineer and secretary to this new administrative group, which would be paid by the HHC.

The Institute became fully engaged in making a success of the health center. At least 85 percent of the Health Systems Engineering division's people and resources were devoted to preoperational planning in 1974. A federal grant to the Regenstrief Institute helped out. Plus, the fledgling computer medical database system was devoted almost completely to "developing an efficient and effective and economical information and communication system" within the health center. Graduates of the family nurse practitioner program would be moved from Marion County General's outpatient clinic to the center when it opened. And the Institute was supporting the medical school's creation of a new section of general medicine focusing on primary care that would bring together the general internists who would be the mainstay for the center's physician services.

By the end of 1974, the JOB had a provisional plan. In the first phase of operation, the facility would serve patients of Marion County General and a select number of patients formerly served at IU outpatient facilities. Eventually most of the patients served by the university system were to move to the Regenstrief Health Center, and even the outpatient services of the local VA hospital would be integrated into it.

Just to complicate matters, during 1973 it became clear that a new emergency room would be required to serve the entire medical campus. Plans were developed for such an emergency room to be located in a new building that would connect the Regenstrief Health Center and the Myers Building of Marion County General. With the participation of Institute researchers, plans for this "bridge building" were

expanded to include space for the X-ray and medical record departments as well. Final plans were approved in late 1974, and the HHC successfully floated another bond issue to fund this addition.

Meanwhile, excitement was growing on the county hospital's third floor: The Regenstrief Institute would soon have a new home. Half of its allotted twenty-eight thousand square feet of space was to be located in central offices on the fifth floor of the Regenstrief Health Center. The remainder would be dispersed to satellite centers throughout the building, which were to be located near every major operational clinic and laboratory. The reason for this was strategic. Eugene Stead was convinced that it would be a bad idea to occupy just the fifth floor, which was basically what Sam Regenstrief paid for. Stead reasoned that, in any institution, space is a bigger resource than anything else—it's the going currency. So, if you want to study a particular clinic, you have to have space to negotiate an entree into that clinic—very important access for a health care researcher!

As far as the fifth-floor central offices were concerned, the Regenstrief Institute was going from rags to riches—from basically no offices to a hundred times the office space. But with the Institute still so new and programs and projects sprouting like manna in the morning dew, the concern became how to configure the space to accommodate both current and future areas of interest. Director Ray Murray was prepared to divide the space in the usual way—walled offices, a few conference rooms, secretarial space, and so on. But industrial engineer Steve Roberts, familiar with the *open office* concept that just then was growing in popularity, said why not take the opportunity to create something different? He proposed a "landscaped" office. Instead of walls, they would put up partitions in various heights and colors—burnt orange and avocado were all the rage in the early 1970s. The idea was to preserve openness, informality, and flexibility. If a new person came on board, they could move the partitions aside, create a new office, enlarge an office, or change the traffic patterns.

At first everyone was concerned about the possible lack of privacy, but Steve Roberts showed them literature on open offices and added to his proposal a few rooms with walls for

private interviews and group meetings to dispel their qualms. Finally a decision was made to go with the open concept. "I loved it once we had developed the floor plan that way," Ray Murray says. The Institute's annual report boasted that "this more functional office plan has been carried out at no added cost." (It's so nice to have an industrial engineer around the house.)

Excitement about the imminent move to the Regenstrief Institute's new digs was mingled with a growing uncertainty as to the Institute's mission and focus. Early in the planning, members of the Foundation became concerned about being too closely aligned with Marion County General Hospital. Rather than trying to deal with issues of care for Indianapolis's indigent population, they wondered whether the Institute should have a regional or national focus—or at least study the more mainstream commercial physician practices, where potentially their research results could have a more widespread impact.

As the concern about the Institute's focus began to emerge, Joe Mamlin was a vocal advocate for maintaining a link to Marion County General. He held the position that it was unpalatable for the Regenstrief Institute to sit detached and uninvolved in the turmoil of a large urban hospital for which a medical school was responsible. Gene Stead, increasingly skeptical that investing money and effort in the county hospital was a wise use of Sam's dollars, thought the Institute should work instead toward a broader influence.

Eugene Stead was a man who inspired awe. Besides being a national figure in medical education, he was very opinionated, very powerful, and very assertive. Joe Mamlin recalls arguing with Gene in the hallway and almost coming to blows, "but in a worshipful way." Gene would make a strong assertion and Joe would make it clear that he just felt strongly the other way. At one point Gene said to him, "Joe, I keep a careful accounting of the decisions I make over the years, and I can tell you I'm right only about 50 percent of the time." "The level of integrity with which he agreed or disagreed with things was a good lesson," Joe Mamlin says in retrospect.

Clem McDonald did not know of Eugene Stead's stature, which was probably a good thing. Clem had been trained under Harvard Medical School graduates at University of Illinois, and he wasn't aware of Stead's renown as a trainer of chiefs of medicine. Gene would try to tell Clem what to do—"Now you've got to do this. You'd be a fool not to"—and Clem would say, "I'm not going to do that." Gene wanted him to get involved in a statewide program that Clem perceived as "fluffy" in its goals and with little likelihood of success. Building a computer-stored record was hard enough to do locally. Clem could imagine the difficulties of doing it in sites scattered all over the state. Gene was telling him, "You'll be a nothing, you'll be a nobody"—powerful words from a man of great stature. But in this case Clem, heedless of who he was tangling with, continued steadfastly on the path he had set for himself. A year later Gene Stead came to Clem and said, "You know, I was wrong." The two soon became good friends.

As an outsider from Duke University and a man who wielded great power, Eugene Stead may have been resented by some of the local administrators. Perhaps because they had worked hard to get where they were, they didn't like someone pushing them around, telling them what to do. The stresses and strains of in-house politics were beginning to show.

Minutes recorded at the Regenstrief Foundation meeting of May 13, 1974, show that Gene Stead laid out for the board a choice between two models. "Model one" consisted of pursuing a broad program of research projects as had been done in the past, living in the Regenstrief Health Center but not making that the principal focus. "Model two" consisted of devoting all of the Foundation's energies toward the narrower focus of making the Regenstrief Health Center a model of efficiency in health care. Dr. Stead added that, if the board chose model two, he was not the man for the executive directorship, for his real interest lay in research. Further, he was convinced that the Regenstrief Health Center could not be made to work effectively under its present division of powers between the medical school, the county hospital, and the Institute.

Ray Murray and the other board members did not agree

that such a choice had to be made. They saw no reason why the Foundation could not continue to support research as it had in the past, while emphasizing the practical application of its findings to Regenstrief Health Center operations. As Institute director, Ray Murray had lately found himself increasingly in the hot seat. Sam Regenstrief would come in with a new idea for a project, and Eugene Stead would argue for something along different lines. These two major forces weren't always pulling in the same direction.

Ray Murray was torn within himself too. His heart lay with the pilot projects that were under way in Fort Wayne, Paoli, Connersville, Gary, and East Chicago, whereas Sam Regenstrief was more drawn to the applied problems of running an efficient outpatient facility. Ray was gratified by the programs he had started at the Institute and the young people he had brought along who were turning out to be great researchers, but he began to think about getting back into academic medicine.

After that board meeting and Gene Stead's ultimatum, the fences were not mended. The Regenstrief Institute geared up to devote 80 percent of its effort to supporting outpatient services at the county hospital and the Regenstrief Health Center. The renowned Eugene Stead quietly packed his bags and went home to North Carolina.

Looking back at that time, Joe Mamlin says he still feels close to the man. "Any young person in medicine who had a chance to meet Gene Stead, even to see him, would feel privileged. One of the great things about the Institute was that it very strangely brought to Indianapolis a person like Gene Stead and allowed people like me to interact with him. He was a powerful part of the Institute brain trust…and he certainly left a mark, even though a lot of people have forgotten about those days. It was an important phase of the Institute's coming of age."

Sunday, September 28, 1975, dawned full of promise. The new Regenstrief Health Center was about to open its doors. And a magnificent edifice it was. During the three years since the groundbreaking, it had risen to six stories plus basement, with a structure able to sustain four more

stories in the future. It encompassed 210,000 square feet—room for fourteen clinics—and cost over fourteen million dollars.

A beribboned invitation to that afternoon's dedication ceremony evoked the image of a finely constructed building:

> designed with a fireproofed steel structure, concrete floors on steel decking, and a precast concrete aggregate paneled exterior.

At 2:00 P.M. the Crossroads of America Scout Band, James Leavitt, director, commenced its introductory concert.

> Non-load-bearing F-shaped panels, average size 7'11" high by 25' wide, give the effect of fins running the full height of the building. The back faces of the panels are 'Meramec' aggregate, the fins white quartz, the whole accented by bronze aluminum doors and windows with bronze glazing beads.

At 2:30 P.M. the colors were presented, the national anthem sung, and prayers offered by Rabbi Murray Salzman, Father Joseph Barry, and the Reverend Rubin Fields, Sr., of the United Community Voluntary Love Your Neighbor Nurses-Patients Aid Service.

> Five elevators carry patients to their respective destinations and as traffic loads increase, the facility is designed to accommodate two more.

Speeches ensued—Mrs. Jean C. SerVaas, chair of the HHC; Steven Beering, dean of the medical school; Robert van Hoek, MD, of the U.S. Department of Health, Education and Welfare—interspersed with the dulcet tones of the county hospital's School of Nursing chorus, the Harmonettes.

> The interior is painted or vinyl-covered gypsum wall board on metal studs with vinyl

floors and suspended accessible acoustical tile ceiling with recessed lighting.

At last the doors were flung wide by Sam and Myrtie Regenstrief. Their portraits hung in the lobby for all to see. It was a time for thanks and celebration.

Three months later, Sam received Ray Murray's letter of resignation. "After a great deal of thought and with considerable regret," he was withdrawing as director of the Regenstrief Institute and chair of the DCHS "as recent events make it very unlikely that the goals we have worked for over the past several years can be accomplished." The following fall Ray Murray took a position as chair of medicine at Michigan State. He had been a strong leader, a gentleman who commanded respect and was able to pull the team together. He was, and would remain for years afterward, the Regenstrief Institute's only full-time director.

Myrtie's photo graced the dedication program for the new Regenstrief Health Center

With the departure of Ray Murray and Eugene Stead and the opening of the Regenstrief Health Center, an era came to a close. Both men embodied the part of John Hickam's vision that wanted to apply innovative minds to the improvement of health care. Talented researchers had been and would continue to be recruited, but the next generation of leadership would take a slightly different turn.

The part of John Hickam's vision that sought to ensure the survival of a failing county hospital was enshrined in this edifice known as the Regenstrief Health Center. The county hospital, tied to a glitzy new facility destined to serve a wider range of outpatients, now had a new image. And it had a new name, too, commemorating William Niles Wishard, MD, a grand old man of Indiana medicine who had pioneered genito-urinary surgery, founded Indiana's first school of nursing, and in the 1880s erected Indiana's first up-to-date general hospital. Now and henceforth, Marion County General would be known as Wishard Memorial Hospital.

OF RATS AND RECORDS

As the Regenstrief Institute came of age in the mid-1970s, it found itself needing a fresh start. It had a new director—Walter Daly, chair of the Department of Medicine at the medical school—and Walter had inherited a few problems. The Institute lacked focus—it had not been rudderless, but it simply had too many rudders. It was also getting behind in its agreed-upon payments to the medical school, mostly due to communication snafus, but it became clear to Sam Regenstrief that he needed someone to watch the financial situation. He couldn't do it himself because things were heating up in Connersville, and he was very busy with his company. So, as Ray Murray handed over the reins to Walter Daly in July 1976, Sam arranged for Len Betley—the attorney with Ice Miller Donadio & Ryan who handled much of Sam's legal and tax business—to be appointed treasurer and chief financial officer of the Regenstrief Foundation.

It fell to Walter Daly and Len Betley to set a course for

the Regenstrief Institute and to put its financial house in order. They also had to prepare for a big change that was coming about, one that would redefine the very structure of the Foundation and the Institute. The wheels had been set in motion the year before Walter assumed his directorial duties, and the restructuring would fundamentally alter the agenda the Regenstrief Institute set for itself and the way it conducted its business.

When the Regenstrief Institute was chartered in 1969, it was conceived as a department of the HHC, just as Wishard Memorial Hospital is a department of the HHC. The Institute was not a part of the Regenstrief Foundation. The Foundation was simply a grant-making entity that helped to support the Institute and did not have active operations of its own. This created a problem for what Sam wanted the Foundation to do.

It all had to do with taxes. Tax laws regarding charitable organizations were very loose until Congress passed the Tax Reform Act of 1969, which created and put distinct limitations on a new class of charitable organizations. The law said that, in the case of a *private foundation* such as the Regenstrief Foundation, there were restrictions on how much a person could give yearly and have it be deductible. Sam Regenstrief was putting considerable amounts of money into the Foundation, so the law affected how much he could deduct.

A more long-range concern was also created for Sam, because the law set limits on a private foundation owning control of an operating business. The problem was not immediate because Sam was alive and still owned most of the stock of his company, D&M. Sam was simply making cash contributions to the Foundation. The problem would come later when some of his estate would go to the Foundation. Sam had wanted to set up the Foundation so that at his death it would have a controlling interest in D&M. That way, members of the Foundation could perpetuate D&M to the benefit of its employees and provide continuing revenues for the Foundation. This vision of Sam's wouldn't work under the new law. The first problem—that of charitable contributions—could readily be solved by recasting the Foundation as an operating foundation. But this would not solve the prob-

lem that would be created when the Foundation inherited Sam's D&M stock.

About that time, Len Betley had been following a story in the press about Howard Hughes Medical Institute. Hughes had a similar problem because it owned a substantial operating company. To get itself off the hook, Hughes had gotten a provision written into the 1969 tax law that applied specifically to its case. A subsection of the Internal Revenue Code exempted so-called *public charities* from private foundation rules, including the rule against owning control of a business. The new tax law very narrowly defined public charities as colleges and universities, churches, hospitals, and organizations engaged in the active conduct of medical research in conjunction with hospitals. Only institutions fitting that definition could qualify for an exemption.

It occurred to Len that, with some restructuring, the Regenstrief Foundation might be able to qualify as a public charity under the so-called Hughes exemption. The Institute couldn't become a school, a hospital, or a church. Its only hope was to restructure itself as an "organization engaged in the active conduct of medical research." With Sam's blessing, Len set out to do just that. The basic changes were to establish the Foundation as the active entity and to make the Institute a division of the Foundation rather than a department of the HHC. Accordingly, the Foundation's articles of incorporation were amended in September 1975 to say that it was "organized exclusively for charitable, religious, educational, and scientific purposes, including but not limited to the carrying on of the active conduct of medical research and particularly the carrying on of such research into the delivery of health care and health care systems." This contrasted with the previous wording which emphasized "the making of distributions" to tax-exempt organizations. Ironically, Sam had not set out to promote an active program of medical research. But between the new tax law and Sam's desire to perpetuate D&M by having the Foundation run it, the Institute was now about to set a new course.

But first Len had to convince the IRS that the restructured Regenstrief Foundation would qualify as a public charity under the Hughes exemption. He had to prove to their satisfaction three things—that the Institute was doing

actual research as opposed to developing products or providing services; that the research was really *medical* research (for example, industrial engineering research wouldn't qualify); and that the Institute was doing its own research, not simply making grants to some other party.

This was going to be tricky. If a researcher helped a clinic install a computer, that was not research, but service. Writing computer software to solve a medical problem came awfully close to crossing the line into development. And what about the researchers doing time-motion studies in doctors' offices? Was this really research and, if so, was it really medical research?

On June 24, 1976, Len Betley submitted all the necessary documents to the IRS requesting a change in the Regenstrief Institute's tax status from a private foundation to a medical research organization (MRO). The response that came back said, basically, "No, we're not sure what you're doing is research; therefore we don't think it's allowable. But you have an opportunity to appeal if you want to." The IRS made it clear that it saw little hope of the Institute qualifying for the exemption. Meanwhile, the Hughes Medical Institute was still embroiled in a lengthy dispute with the IRS concerning its own murky status, so there was no confirmed precedent to follow. It was time for Len Betley to beard the IRS lion in its den.

Len and just-appointed Institute director Walter Daly packed their bags for Washington. They arrived on October 12 at 1:00 P.M. and were escorted to a cubbyhole to present their case to two young IRS staffers—accountant types—who knew nothing at all about hospitals or the medical system. Len had some sympathy for these young men who were going to have to make such a big decision in a complete vacuum in this little cubbyhole, but Walter was aghast that people with so little knowledge about the subject would be making a decision that would set the course of the Foundation and Institute for years to come. Len and Walter spent hours telling the staffers all about what the Institute was doing and trying to convince them that this qualified the Institute as an MRO.

To be fair, the IRS was dealing with a relatively new animal—Hughes' institute was one of the few examples, and

it was destined to be a precedent-setting case. Regulations adopted in the wake of the Tax Reform Act of 1969 defined all the minute details and were actually quite helpful to the Institute's case because they went beyond basic medical research of the test-tube type to cover health care research. Len and Walter argued that what the Regenstrief Institute was doing was research into health care delivery. They talked a lot about Clem McDonald's medical records work and about how this was not only helping to improve health care but also helping researchers to determine the best ways to improve it. The fact that several federal agencies had awarded grants to the Institute for precisely the type of research they were already doing carried a lot of weight. They just kept hammering on the point that the new regulations were broad and that the Institute fell within them.

Success! Len and Walter got the IRS to change their minds. On January 1, 1977, the IRS granted the Institute public charity status—provisional status in that the Institute had to report back in five years to again prove that it qualified. "Convincing the IRS was a significant problem," Len recalls, "because if we hadn't succeeded, the twig would have been bent in some other direction, and we would not be where we are today. If the IRS hadn't ruled in our favor, we would have done something else with Sam's money and maybe have taken the Regenstrief Foundation on an entirely different course."

On the other front—transforming the grant-giving foundation into an active operation—wresting the Regenstrief Institute out from under the control of the HHC proved easier said than done. This change meant that Institute associates and staff were to become employees of the Foundation rather than the HHC. The HHC and the medical school were not excited at the prospect. But Sam Regenstrief and the Foundation had all the marbles, so the necessary changes were made.

Between February and April 1976, twenty-seven employees were transferred on paper from the HHC to the Institute. They were health systems engineers, systems engineers, operations research analysts, management systems engineers, programmer analysts, systems analysts, research assistants, computer programmers, research associates, and various sup-

port personnel. "Since that time," Len wrote to the IRS, "the activities of the Institute have been fully taken over by the Foundation and the Foundation is now the operating entity." It was a huge change administratively, because until then Wishard Hospital had been responsible for the Institute's personnel policies and procedures, payroll, purchasing, and such. Indeed, many of the rules that today govern use of space, employee policies, and use of funds derive from the Institute's peculiar tax position and date from that time when Len and Walter talked the IRS into dubbing it a public charity. They are rules made to satisfy an IRS highly suspicious of Hughes Institute, the prototype MRO.

"Almost like Monopoly money,
money for Sam Regenstrief was purely a matter
of what he wanted to accomplish."
Walter Daly, director, Regenstrief Institute (1976–83)

Walter Daly's long, steady tenure as director of the Regenstrief Institute lasted from 1976 to 1983, when he departed to assume the deanship of the medical school. During this time, Sam Regenstrief took an active but nonintrusive oversight position. He didn't want to stick his fingers in the pie; he just wanted to be involved because he enjoyed it and wanted to know what was going on.

Walter's challenge was to define the Institute's program and scope of operations, though later he would feel that he had little impact. He saw this still as a period of very early development. "Most biological systems as they develop don't do much at first, or at least don't seem to. Embryos have a few cells that develop and stick together and don't look like much, but after a time they explode in ways that are identifiable. I think this was that kind of period."

Recalling Sam Regenstrief the man, Walter Daly says he never met anyone quite like him. Sam had a unique approach to problems, and especially to money. Most people have a set amount of money and bills to pay and things they want to do with money, which gives it an emotional significance.

Sam, on the other hand, was able to de-emotionalize money. Not that he threw it away—it wasn't that at all—money just was not an emotional issue. He would say, "What does it take? Here it is." Or "I don't like it. Tear it down." Even if tearing it down wasted a large investment, Sam's thought was, "Let's do something else with the money." To Sam, money was a tool to accomplish something.

Sam never told Walter what his expectations were for the Institute, but Walter believed Sam wanted to develop approaches that might be identified as industrial engineering and apply them to medical care. Though never expressed, it was Walter's impression that Sam didn't give a fig about research. He would have been happy to spend his money to see the people who go to Wishard Hospital have a better experience. But if medical research was what it took so that Sam could set up his foundation the way he wanted, then medical research it was going to be.

"Research is like politics.
You're only as good as the last election."
Charles Clark, codirector,
Regenstrief Institute (1993–97)

As Institute director, Walter Daly presided over what might seem to be a very confusing assortment of researchers to an outsider—associates, fellows, student interns, part-timers, joint appointees, consultants—and an equally bewildering set of funding sources—contracts, subcontracts, external grants, internal grants, and so on and so on. It's hard to sort out who the various researchers actually belonged to and which research the Regenstrief Foundation actually supported. Our guide through this period is a series of annual reports prepared by Walter and his Institute colleagues, each organized in three parts: A summary of the year's research, plans for next year's research, and a budget request to the Foundation.

The Foundation's money was intended as seed money to launch new projects and get them up and running so they

could demonstrate their worthiness to other funding sources. Those other sources awarded grants either to the Institute or to the entity that actually employed the researcher, if the researcher involved had a joint appointment. With the close collaboration that existed between the Institute, the medical school, and Wishard Hospital (still under the HHC), it is difficult to pinpoint exactly where to place the credit for a piece of successful research. The Institute was usually behind the scenes, though, getting things started and moving them along.

The success of Institute projects could be measured in myriad ways. Perhaps project expenditures did not go over budget, or the project was going well enough to attract outside funding. Maybe an associate got an article published in a research journal, was invited to sit on a distinguished panel of experts, or was asked to help a government agency evaluate proposals. Or a project attracted a talented researcher as a full- or part-time associate or fellow. Perhaps researchers applied for a big grant from an agency other than the Regenstrief Foundation and got it. Throughout the "medical research" years, on all these scores, the Regenstrief Institute just got better and better. Lay members of the board of directors tended to ask, "What of value is resulting from the research?" Although the question was not inconsistent with the traditional academic measuring stick of grants and publications, it was sufficiently novel to be disconcerting to some of the researchers.

Sam Regenstrief was little involved in the Institute's day-to-day operations, other than to say how the money would be spent. In order to be sure he was getting good value for his money, he asked the board to create an oversight committee—the Scientific Advisory Committee—which it did in September 1975. The committee's charge was to keep the projects efficient and related to the Institute's aims. Committee members were to review all new projects sponsored by the Foundation from a medical and scientific point of view, monitor all ongoing projects, and suggest new directions. Sam's nephew-in-law Harvey Feigenbaum, who had joined the Foundation board in 1972, was put in charge of this committee. He was joined by Steven C. Beering, then dean of the medical school, and Walter Daly. The committee reviewed

each year's proposals and recommended to the board whether projects should continue to be funded at the same level, be expanded, be dropped, or be pared down to keep them in bounds.

Once the Scientific Advisory Committee was in place, Sam never once second-guessed the board. The committee was given a dollar amount—nine hundred thousand dollars—to spend each year. They had to stay under that dollar amount, but, other than that, there was no challenging. Because of his respect for academia, Sam was not going to second-guess them the way he might second-guess somebody who ran a press. He loved to sit in board meetings and hear Walter Daly and the others talk about something they were doing. He was proud of the scientific papers that were published. But he never suggested that the researchers do something else.

By mid-1976 the Institute was large enough to boast a series of sections: The Management Sciences Research section, headed by industrial engineer Steve Roberts; the Management Sciences Demonstration group, under group leader Charles Fox, MBA; the Computer Sciences Application section, under Clement McDonald, MD; the Department of Medicine, run by Joe Mamlin. As grants obtained in the early 1970s ended, several projects fell by the wayside or sought funding elsewhere. The physician extender training programs faded from sight, as did the model group practices and the surveys of practicing physicians around the state.

The Management Sciences Research section was just finishing up a one-year $177,000 contract awarded to the Institute by the Department of Health, Education and Welfare for ambulatory care clinic efficiency systems studies, or ACCESS, for short. A series of reports analyzed and documented in depth the management tools, technology, and patient processing in three Wishard clinics, pinpointing problems and suggesting solutions to make sure the Regenstrief Health Clinic operated smoothly.

The Management Sciences Demonstration group was developing a consistent way for the health center to handle patient referrals from at least thirty-five agencies. They were also helping the public health division of the HHC evaluate their computer information system. They helped move the Wishard clinics to the health center in an orderly fashion,

and they evaluated the effectiveness of Wishard's ambulance division to prepare for countywide implementation of the 911 emergency number.

The Computer Sciences Application section was going to town with systems and subsystems for collecting patient data from labs, pharmacy, radiology, and so on, as well as designing mechanisms to capture and retrieve long-term records for patients with hypertension. Their work was also taking an interesting new turn—looking at how computerized patient records could be used to actually influence physician behavior.

Two years later, by mid-1978, a couple of new sections had crept into the Institute's annual report: a section on Pediatric Epidemiologic Research, under Morris Green, MD; a Vascular Laboratory, under John Glover, MD; and Studies of Diagnostic Radiological Procedures, under Eugene Klatte, MD. In the annual report, at least, it was beginning to look a lot like medical research. Walter Daly's introduction noted that, "by the end of this year, those projects with weak research orientation will have been dropped or recommended for elimination. Others have been reshaped to require data gathering and permit hypothesis testing. The commitment to research in a specifically defined medical field has been reaffirmed and strengthened."

From the researchers' perspective, it was clear they were not just being handed money and asked to report back in twenty-five years. The Regenstrief Foundation board looked for signals that the research was going somewhere. Although Clem McDonald remembers his charge was to "do good work," it was no secret that the board expected to see things happening and did sometimes beat on the researchers fairly hard, saying they were not showing this and not showing that. The board's concern was allayed when a major paper was published, when a big grant came in to fund an extension of a project, or when suddenly a bunch of new sites were clambering to use Clem's medical record system.

The board must have been excited when, in December 1976, Regenstrief Institute work showed up in a really pres-

tigious publication. With a paper entitled "Protocol-Based Computer Reminders, the Quality of Care and the Non-Perfectability of Man," Clement J. McDonald, MD, had made it into the *New England Journal of Medicine*, in a "special article," no less. This was not the first and by no means the last article that would be written about the Regenstrief Medical Record System and its uses, but it was a firm indicator that the RMRS was beginning to attract national attention.

The study was about doctors making mistakes and how to help them eliminate mistakes. Clem McDonald had been testing a computer-based *physician reminder* system for some time. This time he got the methodological bugs worked out and was able to demonstrate a distinct effect in an adequately controlled experiment.

It's a fact that doctors make mistakes, Clem argued in the NEJM article. Ruling out malicious intent, the medical industry assumes these are made out of ignorance and that, if doctors get ongoing training and recertification, they will achieve perfect knowledge and make no further mistakes. Clem McDonald looked at doctors' mistakes from another angle, reflecting new theoretical developments on information processing that grew out of computer science. He reasoned that, even if doctors knew everything there was to know about medical science, they were still limited in what they could apply at any given time.

Information theory said that the human brain simply can't take more than a set amount of stimulation without losing some of its attention to detail. Earlier research on airplane pilots using flight simulators had shown that sensory overload was often to blame for pilot errors, and many of these errors proved "fatal." Similarly, in a busy practice setting at peak load, doctors might be prone to sensory overload and could easily overlook important information.

Since much of what doctors do in a clinical situation is rote, repetitive tasks, Clem reasoned, what would happen if the computer took over some of these tasks? This might free the physician to concentrate on essentials, such as putting together the best treatment plan. He set about using the RMRS to take some of the information processing load off the physician's brain.

The first component of Clem's experiment was a set of

treatment *protocols*. These were statements defining a specific clinical event and the course of action to "correct" that event—in other words, rules of care. For example

> If the patient is taking "cardiac glycosides," and
>
> If last PVC test shows "more than 2 PVCs/MIN,"
>
> Then "consider cardiac glycosides as a cause of cardiac arrhythmia."

Clem's study made use of 390 protocols like this, developed out of treatment strategies described in the medical literature. Most of the protocols dealt with conditions managed by drugs, such as high blood pressure, or side effects caused by drugs, such as elevated blood potassium. Here are some other examples.

> If a patient is taking potassium wasters and has had no uric acid test since one year ago,
>
> Then order a uric acid test.
>
> If patient is pregnant and taking sulfonamides,
>
> Then stop sulfonamides if near term because of possible hyperbilirubinemia.

Based on data entered at the last visit, the RMRS "knew" when a patient was due for the next checkup and what drugs the doctor had ordered at the last visit. It also had these 390 protocols stored in its memory. Thus, on the night before the patient's next checkup, it could print a list of specific things for the doctor to watch for—physician reminders. The protocols generated three types of reminders for doctors—to observe a physical finding or inquire about a symptom (such as the frequency of angina); to order a diagnostic study; to change or initiate a therapeutic regimen.

How might this be used in real life? A realistic scenario

using the cardiac glycosides protocol described earlier might look something like this: It's mid-June, and doctor Kate is seeing patient Bill who is taking the drug digoxin—a cardiac glycoside—to control his angina. The RMRS "remembers" that Bill showed eight premature ventricular contractions (PVCs) per minute when tested last February. It gently nudges Kate to review Bill's drug regimen by printing the reminder, "Consider digoxin as cause of cardiac arrhythmia since last PVCs/MIN > 2. 13-Feb-75, PVCs/MIN = 8."

Chances are that doctor Kate already knows to watch out for elevated PVCs with digoxin. But in case she is distracted—Bill may come in with some other physical problem that has him all concerned—the reminder is there on paper to cue her review of Bill's drug therapy. In Clem McDonald's study, doctor Kate was not obligated to do what the reminders suggested, but she did have to note on each reminder whether she agreed with it or not or whether it was caused because some other piece of information was missing (not input into the RMRS).

Clem studied the behavior of nine doctors during sixteen clinic sessions using the computerized reminder system. The RMRS provided reminders to half of the doctors, along with a summarized patient history. The other half got just a list of drugs the patient was taking, along with the patient history. Then, halfway through the study, the RMRS switched the group of doctors to whom it gave reminders. That way Clem could compare each doctor's behavior both with and without the reminders.

There was a distinct difference in behavior. Each of the doctors responded to more clinical *events*—a physical symptom, an ordered lab test, or a change in therapy, for instance—when they received reminders (51 percent of 327 study events) than when they didn't (22 percent of 385 control events). This was true regardless of whether they were interns or residents, so the amount of medical training had no great influence. The bad news was that the doctors who had received reminders during the first half of the study reverted to a lower response rate when the reminders were discontinued. But this was actually good news for Clem because it meant the difference in behaviors could be attributed to the reminders—they worked.

Clem's conclusion? "I believe that the results are most consistent with the initial hypothesis: That the amount of data presented to the physician per unit time is more than he can process without error. The computer augments the physician's capabilities and thereby reduces his error rate." If Clem's hypothesis was correct, at least some physician errors could stem from built-in limitations of the human mind. The implications? To avoid error, doctors would have to commit more time to processing patient data. But since primary care physicians were already saturated, the only way to give more time to processing one patient's data would be to take time away from other patients. In other words, some people would get less care.

The solution? Again, Clem was the man with the plan. "Machines are better suited than men to the mindless and repetitive tasks [that the protocols represent], and for such work, computer power will soon become cheaper than manpower because of the cost revolution being wrought by large-scale integrated circuits." Thus, he concluded, "though the individual physician is not perfectible, the system of care is, and the computer will play a major part in the perfection of future care systems."

For the next twenty years, Clem McDonald's medical record project would continue to evolve and grow and deepen in its sophistication and capabilities. It was given the name Regenstrief Medical Record System to clearly identify it with the Regenstrief Institute and to honor the man whose Foundation made it possible. The RMRS never received any federal support for development because, although a lot of federal money had been available when the Institute first got into computer projects, the funding stream had dried up by the time Clem was ready to start competing for those dollars. Only later were federal funds forthcoming for studying the system. "It could not have been developed without Institute support," Clem says. Projects similar to the RMRS have been tried in several other universities, but, as of this writing, none has had institutional support. The one that comes closest is a project at Latter Day Saints Hospital in Salt Lake City, originally funded out of a commitment by a group of Mormons. Other programs have been funded just with grants. The RMRS is unique in having re-

ceived the kind of long-term funding that ensured the continuity of the program.

Perhaps Sam Regenstrief smiled to himself when he read the news of Clem's NEJM article in the *Richmond Times-Dispatch*, picked up from the Associated Press in Boston. "There is too much data coming at doctors," Dr. Clement McDonald was quoted as saying. "It's all bookkeeping, and humans aren't good at this." Clem's physician reminder study represented the convergence of several lines of endeavor that Sam's foundation was making possible. It embodied all the work Clem and his associates in the computer sciences application group had done to computerize patient records, lab results, pharmacy orders, and appointment scheduling at the medicine clinics. It embodied their painstaking programming to make the computer generate appropriate protocols based on the best that was known about medical treatment. It embodied, too, a new feature of actually intervening in medical care through the medium of the computer. The RMRS was now a tool for tinkering with the system, for tightening the nuts and bolts in the industry of health care delivery, and it all was taking place under the Regenstrief Institute microscope in a unique hospital/clinic research laboratory.

Whether the doctors were thrilled about the findings of the physician reminder study is open to debate, but around 1978, a crisis occurred that nudged the county hospital into conceding that the Institute researchers maybe had something to offer. McDonnell Douglas Corp., the company that sold Wishard Hospital its billing system, had come out with a new product to do outpatient care systems. Clem McDonald's group were running their own system, the RMRS, to do appointment scheduling and registration in the medicine clinic in order to know when the patients were coming in and to give the physicians reminders—all fundamental to the research they were conducting. The hospital administrator said they were going to get rid of the current system and use the new McDonnell Douglas system. Joe Mamlin said, basically, "Over my dead body." He prevailed, at least partially, and the RMRS appointment scheduling program was preserved. How-

ever, a new billing system was installed, with Clem's appointment data funneled into it.

The new system turned out to be a disaster. It could not keep up with the volume of billing. It would take thirty-six hours to bill twenty-four hours worth of data, and, if complications arose, the process had to be done all over again. Billing fell further and further behind until the hospital projected that, on the present course, it would go bankrupt within two months. The administrator came to Clem and asked, since he was collecting all this data, could he please reconnect it to the old billing system? Clem said yes, the billing system got back in gear, and the hospital was saved. Suddenly the researchers were not just crazy researchers anymore, but heroes. Since then, Clem says, Regenstrief Institute/Wishard Hospital relations have been harmonious.

Joseph Mamlin was now also chairing the Division of General Internal Medicine within the Department of Medicine. The scene of his operations had moved from Wishard to the Regenstrief Health Center, and he was managing a general medicine clinic uniquely suited to research by virtue of its "organization, physical plant, and leadership." With about forty thousand patient visits annually and nearly a hundred physicians, the clinic was organized to facilitate asking questions and finding answers about improved medical diagnosis and treatment. Starting in July 1977, the medicine clinic's patient population was distributed to a set of primary care teams, each consisting of full-time faculty, a small number of house officers (interns), and support office personnel. Each patient was in the care of a specific team, which afforded better follow-up. Medical records were decentralized to the primary care teams, patient visits were regulated by a computer-based scheduling system, and clinic spaces were rearranged to be more conducive to the functions of an office practice model. This format was deliberately selected to represent private physician office settings so that research findings could be applied to the private practice setting while still meeting the demands of ongoing health care research. To optimize the environment for research, every doctor received training in how to interact with the RMRS. Every patient encounter, lab test, drug order, and appointment was captured electronically. Everybody was happy—patients got

good primary care and researchers got a microenvironment to study and manipulate. Joe Mamlin characterized his setup as "laboratory readiness."

As was true for every change the Institute made, the model clinics were immediately subject to scrutiny by behavioral scientists. What did the young physicians-in-training think about primary care? Did the facility and spatial arrangement appeal to all types of patients? Was it possible to provide a single, cost-effective standard of care to patients of different socioeconomic status in one facility, regardless of insurance and care reimbursement method, given that Wishard had the reputation of being a charity hospital? Would patients get better care if a twenty-four-hour phone line was available to their primary care team?

The clinking of champagne glasses might have been detected around the fifth floor open-concept offices on the day in 1977 when it was announced that the medical school had just been awarded $1.5 million to start a national Diabetes Research and Training Center at the Regenstrief Institute. Joe Mamlin, Steve Roberts, and Clem McDonald must have slapped each other on the back, since it was obvious that NIH was impressed with the unique research laboratory they had created for just such an undertaking.

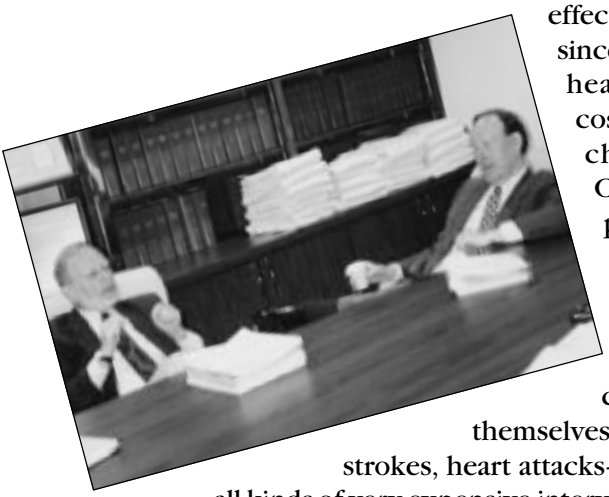
Along with the huge NIH grant came a new kid on the block, one who had been biding his time doing basic research on laboratory rats at the nearby VA hospital for eight years. He would be the principal researcher for the medical school on the diabetes grant; for the Institute, he would staff an office-based medical information research section along with EdD Stuart Cohen. He was Charles Clark, Jr., MD.

Charles' interests were a good fit with the Institute's since his clinic had already incorporated much of the RMRS, particularly the reminder system and the interventions. He already knew Clem McDonald from years earlier when Clem was looking for guinea pigs to try out the fledgling medical record system. In fact, the diabetes clinic may have been the very first implementation of the RMRS. Charles was also a good fit because he came from the lineage of John Hickam, who had been his mentor at IU Medical School and who encouraged him to get his research training.

The Diabetes Research and Training Center grant had

two components. One was fairly traditional biomedical research, and the other was research on how to improve the ability of practitioners to care for patients with diabetes. Since the latter was an aspect of health services research, Charles and Walter Daly agreed that it fell into the scope of the Institute's mission. Between Charles Clark's expertise in chronic diseases and the electronic record-keeping system used at the health center, a perfect laboratory was in place to explore several important ways that health care could be made more accurate and more cost effective. So the match was made. Charles Clark took up residence in the Regenstrief Institute and started spending NIH's money.

Chronic diseases such as diabetes, hypertension, and high cholesterol provided an ideal arena in which to test the effects of cost-saving measures, since each was a major public health problem with huge costs attached. Patients with chronic diseases, says Charles Clark, "are like people who have fallen from the top of a very tall building. They feel pretty good all the way down." When the catastrophic consequences manifest themselves—end-stage renal disease, strokes, heart attacks—medicine jumps in with all kinds of very expensive interventions. The patient population served by Wishard Hospital had a high incidence of diabetes, which is particularly devastating among poor people because they often don't get the kind of preventive care required. Charles was looking for interventions that could give his patients at the diabetes clinic a parachute on the way down.



Charles Clark (left) shown here with dean Robert Holden of the IU med school, focused on patient/physician processes in the diabetes clinic

The first study the Diabetes Research and Training Center undertook was a diabetes education study called DIABEDS. It was perhaps the first controlled clinical trial of the effect of education on the behavior of physicians and patients—and on treatment outcomes. It was the existence of the RMRS, along with the prospect of Institute support, that stimulated

Charles to think broadly on this kind of outcomes research. Without these two ingredients, a controlled trial would not have been possible. In particular, the electronic infrastructure that Clem McDonald was integrating into the delivery of health care—sort of a central nervous system for the hospital and clinics—was essential in capturing all the "events of significance" that occurred to patients during the course of their disease. This infrastructure permitted a system of reminders to physicians about what to do for patients at certain points, but it also had much broader implications. Systemwide interventions could be introduced and then studied.

Charles hypothesized that the microsystem—the environment of the examination room and the interaction between physician and patient—has the most impact on physician and patient behavior and ultimate treatment outcomes. He and other Institute fellows designed studies both large and small to investigate the effect of changing this microsystem.

Shoes and socks were grist for the research mill in a study undertaken by Stuart Cohen. When ushered into the examination room, certain patients were advised to take off their shoes and socks or assisted in doing so. Other patients left them on. Doctors then came into the rooms to conduct the examinations. Ninety percent of the barefoot patients got their feet examined. Only twenty percent of the shoe-clad patients got their feet examined. Feet reveal a lot in a diabetes patient, so a simple thing like instructing patients to take off their shoes and socks could improve care and affect outcomes.

It made sense to study whether the microsystem of the examination room did or did not support immediate patient care. Take one example: You're a doctor examining Nettie Smith. You're supposed to check her eyes, but the equipment in the room does not include an ophthalmoscope, and you've got twelve patients to see, and you're needed back on the ward because you have five admissions. Nettie probably won't get her eyes examined today. Maybe you'll make a note to examine them the next visit, but they don't get examined today. Structuring the microsystem for good care may seem an obvious solution, but the researchers felt it was impor-

tant to document that simple changes—such as having an ophthalmoscope in the exam room—could have an effect on patient care and to verify that changes in the system would have an effect on costs. Plus, researchers occasionally find that obvious solutions do not work.

Charles Clark and his colleagues tried a series of interventions aimed at educating physicians and found that their behavior did change. They also found that, when the interventions were dropped, the physicians reverted to their previous behavior. Although this was disturbing, they were excited by the discovery that providing a care-supporting environment was as helpful as educating the physician. The real impact came when information was made available at the moment the patient and the physician were together in the examination room.

Although Charles Clark knew Sam Regenstrief only as a gray eminence who put in an occasional appearance at the Institute, the concept of putting the "right information in the right hands at the right time" harkened back to Sam's roots as an efficiency expert. Building dishwashers depended on motors, tubs, and doors all arriving in the proper quantities at the start of the final assembly line. If production of any part was erratic or behind schedule, the assembly process would start and stop, while labor costs continued to mount.

A present-day diabetes study explores the impact of putting the facts in the physician's hands at the precise moment they will be most useful. The glycated hemoglobin test measures how well diabetes patients are doing on average. As red blood cells circulate, some of them become glazed like a donut from the sugars that also circulate in the blood. From a single blood sample it's possible to tell the patient's average blood sugar level for the past two months by counting the number of glazed red blood cells. This indicates how well the patient is regulating his or her diet and otherwise controlling the blood sugar level.

The problem is this. You draw the blood sample, send it to the lab, and get the results back in about a week. By then, the office visit is but a vague memory. The test result passes under the physician's eyes and goes into the patient's folder. Unless that physician is exceedingly conscientious, nothing

is done with those test results until the patient shows up for the next visit. By then, the result is obsolete, because it is now a month later, and the patient's condition may have changed. The net result is that someone has spent time and money on a meaningless test.

The Ames Company in Elkhart, Indiana, makes an instrument that gives instant results on the glycated hemoglobin test. So Charles Clark and his group have devised a controlled study comparing the effect of instant results versus week-later results. Half the patients are tested right before seeing the doctor using the Ames device. The nurse makes a notation on the chart so that the doctor can use the result right away. Half the patients get their results later from the laboratory. The researchers are looking at differences in behavior under the two scenarios. The medium for examining these differences is, of course, the events of significance captured by the RMRS.

The results of this study may seem obvious, but again, the key is to document, little step by little step, the effect of obtaining timely test results, then to judge the effect on costs and share that information with the medical community. Charles Clark is the first to admit that health care research has not led in a straight line from "nothing" to "perfection." Rather, it has led from "not so good" to "somewhat better." Simple interventions, like a timely glycated hemoglobin test that tells how well patients manage their blood sugar levels, may be like the pennies that Sam Regenstrief managed to shave from the cost of a dishwasher unit, only the savings won't appear until much later. The interventions in chronic diseases cost money, and there's often not much to show for them along the way, so history waits to tally up the benefits in postponed or reduced complications—and reduced medical bills—during the later stages of disease. Meanwhile, the RMRS is working in the background, collecting myriad events of significance for future study.

Industrial engineering has gotten into the act too. In the mid-1970s, finished with the preoperational planning for the Regenstrief Health Center, Steve Roberts and his management sciences group turned to tackling the problem of uncertain outcomes in long-term diseases like diabetes. At the time, there was no body of outcome data available to

judge which treatment modes were more cost effective. But everybody was aware that, in its end stages, diabetes could lead to very costly treatment such as kidney dialysis—a whopping twelve to thirty thousand dollars a year—or a kidney transplant—at twelve to twenty-five thousand dollars. Clinical comparisons of alternative life-saving treatments were out of the question for moral and ethical reasons, so Steve Roberts hit on the idea of simulating different treatments and outcomes using the computer. Computer simulation techniques were relatively new in those days, so Steve had to develop a special computer language—Integrated Network Simulation language—to describe the "nodes" and "branches" of a decision tree before he could even begin to teach the computer to model decisions made in treating a person with chronic disease. Steve simulated a series of forks in the road, the paths taken being determined by patient characteristics like age, length of time on dialysis, the chances of a transplant patient rejecting the graft; medical system variables like changing costs of treatments; and choices the physician might make about treatment. Such a model made it possible, for example, to compare the costs and patient outcomes of "tight" versus "loose" control of blood sugar or to predict the impact of policy decisions, such as whether insurance should reimburse an especially costly treatment.

As the decade of the 1970s came to a close and the deadline approached for the IRS to make permanent its provisional ruling on the Institute's status as a public charity, a casual reader of the Institute's annual reports might have been surprised to find rats added to the research repertoire. Although actual Institute support for the project was minimal, annual reports touted the groundbreaking work of Dr. Ting-Kai Li, who was studying alcoholic rats. He had succeeded in raising a strain of rats who were genetically predisposed to alcoholism and was slicing and dicing their brains to isolate the neurochemical mechanism by which the furry creatures came to crave the grape. Presumably, alcoholism's status as a chronic national health problem opened the Institute's doors to this traditional style of basic medical research.

Nor did other new lines of endeavor stray far from the medical research mode. Dr. Eugene Klatte led a group that

evaluated the new magnetic resonance imaging (MRI) machine, comparing this and other imaging procedures to traditional diagnostic methods to see which was most cost effective. Dr. John Glover's arteriosclerosis laboratory was documenting the natural history of peripheral vascular disease—hardening of the arteries—isolating the risk factors, developing measures of severity, and describing the disease mechanism following deep venous thrombosis (DVTs or blood clots). His group also evaluated noninvasive means of diagnosing vascular conditions, such as ultrasound imaging, looking especially for techniques that could be used to screen large numbers of patients in little time.

As the 1980s rolled in, papers continued to be published, researchers were recognized by their peers, and Institute projects received national and international attention. The RMRS was adopted by the U.S. Air Force at Wilford Hall Hospital in San Antonio, Texas, and by Digital Equipment Corporation as part of its new line of health-service-related computer activities. Wishard Hospital bought a large computer so that it could coordinate with the RMRS research computer for a hospital-wide data-gathering system. Clem McDonald completed a term on the fed's health services agency study section that surveyed grant applications to the Department of Health and Human Services. Steve Roberts received accolades for an outstanding paper at the 12th Annual Simulation Symposium and published the first paper on the use of simulation in a major clinical journal, *Annals of Internal Medicine.* Both Steve Roberts and Clem McDonald won large peer-reviewed federal research grants. The National Council on Alcohol Research recognized Ting-Kai Li as outstanding investigator of the year.... Meanwhile, Harvey Feigenbaum and the Scientific Advisory Committee were continuing to prune, shape, and redirect Institute projects to make sure Sam Regenstrief got value for money.

By all accounts, the Regenstrief Institute was achieving great success. Yet, as each year's annual report cited solid achievements and glowing prospects for the coming year's research, perhaps Sam found himself facing a bit of disappointment. A man who had so much success in industry and who could move things so quickly in his own company must have been frustrated to find the health care industry so slow

to adapt and change. Its problems were not quite as easily solved. Sam once acknowledged this to Steve Roberts—said it was easier for him to make money than to give it away to get change.

But at least the issue with the IRS was resolved. On June 10, 1982, the IRS officially confirmed the Regenstrief Institute's status as a public charity, pursuant to sections 509(a)(1) and 170(b)(1)(A)(iii) of the Internal Revenue code. That left the door open for Sam Regenstrief to configure his foundation so it could sustain his dishwasher company for the lasting benefit of his Connersville hometown.

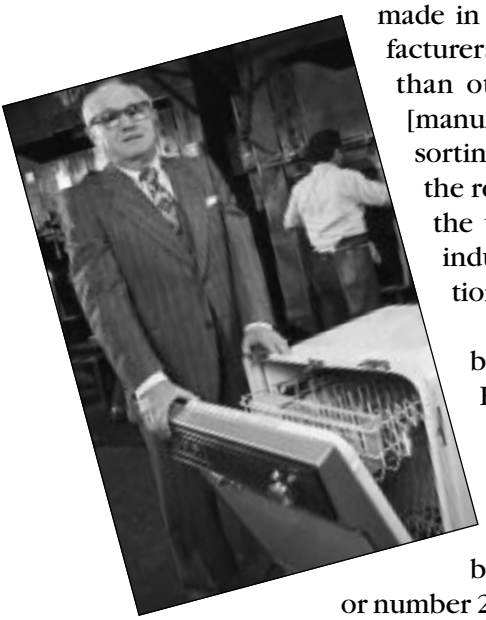
THE SHOW CLOSES

"No one who looks back on the glory days of D&M would attribute the success of that company to anybody but Sam Regenstrief—the genius, founder, leader. That's the beauty of it and also the sadness of it."
Steven Sample, president,
University of Southern California

While the Regenstrief Institute researchers were engrossed in conducting medical research, Sam Regenstrief was still busy making money. By 1978, D&M revenues ran close to $175 million, and net income exceeded $6 million. *Fortune* magazine calculated that, if D&M were to go public, it might command a market value of $65 million. But Sam's

company had never shown a deficit, had never borrowed heavily, and had absolutely no problems with cash flow. Sam still did not have the slightest intention of taking D&M public. Said he, "I don't need the funds and neither does the company."

Fortune had unearthed the secret of this humble man and his surprising wealth. The magazine's February 12, 1979, issue featured Sam Regenstrief in an article entitled "In Search of the Elusive Big Rich" by Arthur M. Louis, where Sam was listed among fifty-nine men and three women who had amassed privately held fortunes of fifty to seventy-five million dollars. In sleuthing out these "private rich," the magazine had found quite a few real estate operators, newspaper publishers, and independent oilmen, but hardly any manufacturers—not because there was no money to be made in manufacturing, but because manufacturers tend to have heavier capital needs than other companies. "Only rarely can [manufacturers] become giants without resorting to the public securities markets," the reporter observed. "Sam Regenstrief, the undisputed king of the dishwasher industry, provides a remarkable exception to that rule."



A humble man of surprising wealth, Sam was undisputed king of the dishwasher industry

Harvard's updated case study book also found the Dishwasher King's story exceptional. The business school noted the irony that, in 1984, "the clear market share leader for dishwasher manufacturing was neither GE nor Whirlpool, who between them were either number 1 or number 2 in all appliance categories. Nor was it any of the top seven appliance manufacturers, who between them controlled anywhere from 80 percent to 90 percent of the appliance industry, but instead a small privately held company called D&M."

In the late 1970s and early 1980s, dishwashers were still selling like hotcakes. Now and again D&M looked at making other products, but they were selling so many dishwashers—and every year selling more—that there was little

incentive to expand the product line. "We've got a one-act show, and it better be good," Sam used to say.

Sam was right about the one-act show, in more ways than one. For the management style he used, he couldn't afford to expand the management team to accommodate new products or to increase his engineering group to handle new tooling. As he grew older, rather than beginning to step back from day-to-day operations, Sam still wanted to be in on everything. Sam would be talking to someone in the engineering department, and the man would say, "Sam, that just isn't right." And Sam would say, "Look, I don't want anybody around here that is smarter than I am." He wasn't entirely joking about that. He wanted to call all the shots, and he couldn't do that in a really big operation.

Sam considered jumping into another product only when a big customer asked him to do it. Dick Goodemote remembers once when Sam came close to making water heaters for Sears. Sears got nervous about its water heater supplier being heavily in debt. D&M, on the other hand, was free of debt and easily had the capacity and know-how to make water heaters. D&M also developed a prototype ultrasonic dishwasher unit, but neither product was pursued.

Microwave ovens were a big opportunity that Sam passed up. D&M could have easily made microwaves. The technology was there twenty years before the first models were produced commercially. No one picked up on the idea because market research said the "older generation" would never learn how to cook with a microwave—manufacturers were having enough trouble getting people to switch from gas ovens to electric. The young people who might want a microwave were unlikely to be able to afford the four- to five-hundred-dollar cost, which in those days was practically like buying an automobile.

Sears even asked Sam to start a microwave oven business. D&M already held key patents on the controls, thanks to engineer Steve Sample's noodling. Had Sam pursued this, the whole history of the company and the Foundation might have been quite different, but for some reason he wasn't comfortable with the idea. He decided to keep the company as it was. "Why mess up something that's working" became something of a theme in Sam's business life.

Sam Regenstrief had no particular desire to be powerful, his niece Phyllis Feigenbaum recalls, "but he did want to control his own destiny." Perhaps this is why he did not feel compelled to dominate the entire appliance industry. He did intend to dominate dishwashers, however, and controlling his own destiny was clearly the concept behind a series of acquisitions that Sam made during the mid-1970s.

In business terms, the concept was *vertical integration*. Today, says engineer Tom Duncan, most appliance makers merely assemble parts manufactured out of house by specialty companies. If they need a motor for their appliance, they get one from GE, Reliance, or Packard. But Sam Regenstrief felt strongly that manufacturing was more efficient if it was vertically integrated. More than any other appliance maker, Sam liked to get as much of the manufacturing into his own plant as possible. So, if D&M needed a stamping, D&M made its own. Sam didn't buy any stampings outside except as components of some other part that he bought outside. Today, nobody makes their own bearings, electrical components, or wiring, but Sam did a lot of that. He made his own wiring harnesses, he made switches, he made valves. He looked into all these things and decided he could do them better himself. This may be another reason why Sam decided not to diversify into other products.

Sam did have to purchase a few parts that D&M could not make, and before long he couldn't resist purchasing the companies that made these parts. Within the space of a few years, Sam bought a number of small supplier businesses.

One of these businesses was Wallace Expanding Machines, Inc., in Indianapolis. Wallace had a subsidiary called EMP, near 16th Street and White River Parkway, where Sam's friend Ralph Roper worked. Sam bought Wallace in 1969 because D&M used their presses to make custom machine tools and metal fabricating equipment. Wallace had long been a principal supplier of metal expanding and forming equipment to the appliance and auto industries, and they had a unique technology for expanding metal that Sam—the metal bending man—particularly admired. It involved rearranging the molecular structure of steel under pressure to achieve greater strength and uniformity with less scrap-metal generation than traditional primary stamping

techniques. Besides making machine tools for D&M, Wallace was supplying all the firewalls for certain models produced by Ford Motor Company.

Sobenite Inc. in South Bend was another company that Sam purchased. This was a plastics operation that had the tooling to supply injection-molded plastic doors for D&M dishwashers. Sam thought they could supply better parts if he owned the company, so he bought it in March 1976. Things didn't work out the way he had planned, because Sobenite seemed to feel that, once D&M owned them, D&M should accept anything they made no matter what the quality. There were "quite a few scuffles" about that, Tom Duncan remembers.

In the middle to late 1970s D&M had almost more dishwasher business than it could handle at the Connersville plant. But because the plant was surrounded by the town of Connersville, local expansion was not feasible. Sam looked around and found the perfect facility in the "Rose City" just twenty minutes by car from Connersville. The plant was at 1767 Sheridan Street in Richmond, Indiana, and had ninety-nine acres surrounding it. It was a manufacturer's dream—one million square feet of plant space, with everything set up in a straight line so that production could go from the front end to the back end and straight out the door. The plant had a varied history. Crosley refrigeration company had opened it in 1937 after a flood and fire destroyed its Cincinnati site. Avco Manufacturing Corporation purchased it from Crosley in 1945 and became one of Richmond's largest employers, with nearly four thousand workers producing one refrigerator every twenty seconds. After Avco left the appliance business, the plant produced ammunition for the military, and, when D&M purchased it in 1975, it was Avco's precision product division.

Besides the attractiveness of the facility, Sam had good reasons for opening a second dishwasher operation in Richmond. The portable dishwasher business was falling off, with production moving to under-the-counter models, and Sam had his eye on a new scaled-down dishwasher for families with just a husband and wife at home. This smaller dishwasher, holding half a dozen plates and cups, would sit on a countertop and be powered by the pressure of tap water.

Sears projected a whole new market and huge sales for this eighteen-inch dishwasher, and the Richmond plant could be tooled up to manufacture it.

A third reason for buying the Richmond plant also had to do with Sears. The Connersville plant was aiming to produce fifty-seven hundred dishwashers a day, which was just a little out of reach for the plant, and Sam could not consistently make it do the volume he needed. He and operations VP Bud Kaufman became concerned. They had fourteen or fifteen customers, but they were having to give Sears production preference because Sears was the meal ticket for the plant. They were afraid that some of their other customers might go to court with the intent of proving that D&M was restricting their sales volume by not manufacturing their products. Sam was advised to buy a facility so that, if D&M was taken to court, it could show that it was alarmed by the same thing and was taking action to steer the company on the right course.

So Sam put down his money and bought the Richmond plant. The facility was in good shape, but D&M had to set in a new porcelain system and a new paint system, and they had to purchase a new overhead conveyor and additional rack-making machines. Getting the machinery ordered, setting it in place, and dovetailing it to work as one entity was quite an undertaking—it took about fifteen months before dishwashers started rolling off the assembly line. Then just about the time they got the plant up and running with staff, machines, and everything, the schedule dropped off. So D&M was sitting high and dry with the auxiliary plant, and the schedule wasn't going up. "Just the frustration of running an industry, I guess," says Bud Kaufman, who later ran the Richmond operation. Sam backed off on the Richmond facility and scheduled it only whenever additional capacity was needed. But D&M paid a price for leaving the plant idle—just to put guards on the gates and pay taxes cost about a million dollars a year. It was a rocky road for the employees in that plant, too. The plant would gear up for production with five, six, or seven hundred employees and, the next thing you know, they'd be down to two hundred. Although the eighteen-inch dishwasher never hit projections and Sears eventually withdrew it from the market, the Richmond plant

served D&M quite nicely as a place to take the overflow orders for its standard twenty-four-inch machines.

Sam's next expansion of operations took him back to his roots as a refrigerator man. Refrigeration was Sam's first love, from his earliest days in Connersville at the old Rex Manufacturing plant with the wooden floors. About the time Sam was purchasing the Richmond plant, he became aware of a refrigerator company called Absocold that was for sale in Ionia, Michigan. Absocold made three models of refrigerators for private labels, including the minimodel used by college students in their dorm rooms, and Sears was their biggest customer. Sam knew all about manufacturing for Sears, and this was a chance to get back into the refrigerator business that he knew so well. Sam bought Absocold in 1976; his partner in the deal was Chuck Gibson of Gibson Refrigerators in nearby Greenville, Michigan. Gibson had recently been purchased by White Consolidated Industries (WCI), a large conglomerate that seemed to be swallowing up appliance companies throughout the Midwest. Sam was not content to leave Absocold in Michigan—he preferred things closer to home where he could keep an eye on them. So he moved the company to Richmond, just next door to the D&M dishwasher operation.

When Absocold moved to Richmond in 1978, Ed Mulick came with the furniture. Sam had bought Absocold from Ed's father-in-law. At the Ionia plant, Ed Mulick had been Absocold's vice president in charge of whatever-anybody-else-didn't-want-to-do, and he supervised the move to Richmond and set up production in the building side by side with D&M's dishwasher plant on Sheridan Street. The two plants shared the same driveway, which would lead to some interesting problems later on.

Consistent with Sam's vertical integration scheme, both Absocold and the Sobenite plastics company in South Bend got their custom machine tools and metal fabricating equipment from Wallace Expanding Machines in Indianapolis. Sometimes the Wallace people got in over their heads because, according to Sam, there was nothing Wallace couldn't do. Ed Mulick would phone over to Connersville and say, "Sam, where is that welding machine that we were going to have? Wallace hasn't delivered it yet." The next day, Wallace

would be delivering the machine at Absocold, on Sam's orders. Wait a minute, the thing isn't done yet, but by golly it's been delivered. So guys from Wallace would drive over to Richmond to work on the machine and finish it there.

Meanwhile, Bud Kaufman was becoming bored with dishwashers. The Connersville operation was basically running itself, and he felt Sam was just wasting money on him. One day in August 1980, he sent a letter to Sam announcing his plans to retire. But Sam said, "You're too young to quit working" and offered him the presidency of Absocold, which he knew would be a challenge. A month later Bud was at Absocold to oversee the rebuilding of more than 75 percent of the production facility in the east building of the Richmond plant. They went to one-piece cabinets with injection-molded vacuum tubs, foam insulation, magnetic gaskets, and compressors imported from Japan, so they really changed the Absocold product from what it was originally. When the man in charge of the dishwasher operation across the way retired, Sam told Bud, "You watch them both. You ain't busy." So Bud Kaufman took charge of both the dishwasher and the refrigerator operations. Three years later he went back to Connersville as a vice president of D&M, and he did finally retire in 1986.

When Bud Kaufman joined D&M in 1960, they made four hundred dishwashers a day. Before he retired the schedule had jumped to fifty-seven hundred a day, and sales had exploded from "a piddly nothing" to over two hundred million dollars a year. If numbers were any reward for Sam, this must have been gratifying. *Fortune* magazine certainly found the story remarkable and said so in its 1979 article. "D&M's business, consisting entirely of sales under other people's labels, accounts for a stunning 40 percent of the dishwasher market. GE, with an estimated 25 percent, is an unimposing second. 'I assure you that we don't get all that business for sentimental reasons,' Regenstrief remarked dryly. 'It's all due to pricing.' He says D&M charges up to 20 percent less than GE for comparable dishwashers. The old efficiency expert is always the first in the industry to buy new production ma-

chines that cut down on time and labor. Before illness struck, he would regularly roam the company's [three] plants pointing out countless ways to save pennies."

Illness struck Sam Regenstrief in early 1978—two heart attacks and a stroke. During Sam's long hospitalization and recuperation, Mark Dyken, chair of IU's Department of Neurology, supervised his medical evaluation, and doctors cared for him in Connersville too. By early fall he had recovered enough to return to D&M. In a message to his employees in the company newsletter, Sam referred to the stroke as an "act of God" and wrote, "I want to tell all of you that I am back and fully capable of working, but only under certain restrictions set forth by my doctors. One…is that I cannot get too deeply involved in too many problems."

Curtailed from personally seeing to the details, Sam had already discovered serious problems since his return. "…I find that we have not met schedules and that we have had to cut the bonuses to the lowest that we have had" (lower than in D&M's first year of operation). Waste of materials was eroding profits too. From Sam came this impassioned plea in the newsletter.

> There is no way in the world that a company can survive without customers or without making money. If we don't correct this situation in a short time…, we will be headed for serious trouble…. It has always been the general opinion that if we got into serious trouble in our operation that "Sam will get us out." I have heard this many times…. I have always tried my best to be fair and honest with all of you. That is why I am telling you now that our present problems must be resolved and that we must get our operations back on the right track and continue to grow or we will not survive. I intend to be at D&M as much as my health will permit, but I am honestly telling you now that I would not pour money into a losing company and one that cannot grow. Growth is the only answer to survival. If we don't get our present

> problems settled, I am afraid that I will have no other alternative but to give up the ship because I will not pour additional funds into this company if it continues to operate on the same trend that it has in the last eight months. This time we ARE in trouble, and I wanted to write to all of you so that no one will be laboring under the delusion that I am bluffing, as a lot of people are saying, because this time we are all in trouble from myself on down to the last person hired at D&M. I hope you won't let me down, and I won't let you down.

Sam spoke from the heart to the workers who were so close to his heart. What Sam said about not letting his employees down rang true. He had always had a soft spot for the workers. It was not just an emotional attachment, Ed Mulick remembers. Sam would say, "Those are my people out there in the factory and they are important because they make me money. The people here in the office, they cost me money. You need to learn that, Mr. Mulick."

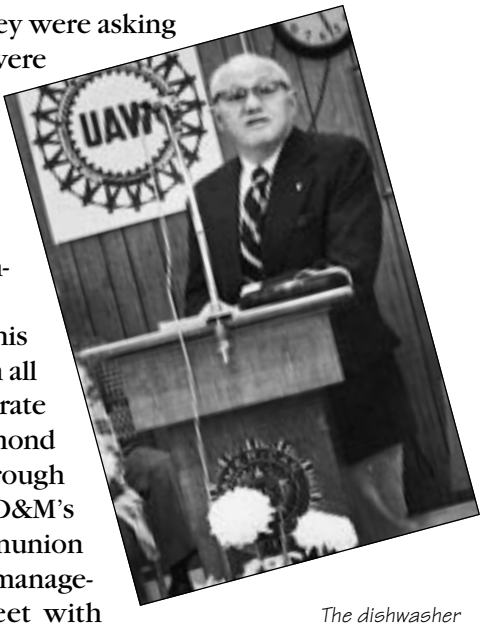
Sam never fired anybody, even when they needed firing. Once a young worker, a truck driver, was caught stealing dishwashers—stealing dishwashers!—and he was fired immediately. Dick Goodemote recounts what happened next.

The man's father knocks on Sam's door and addresses the CEO and owner of this big corporation and says, "Sam, you know they fired Johnny. They fired Johnny, and I think it was unfair. He made a mistake but he's a good worker…" and goes on like this to Sam. Sam said he would take care of it, and that same evening he told his people to hire Johnny back. And they did.

Sam never talked much with his family about his business, his success, or his millions. The only time Phyllis and Harvey Feigenbaum saw him angry or heard him complain about anything was when his employees went on strike. He was irate, Harvey recalls, because he treated his employees well and felt betrayed. By all accounts, D&M's benefits package was exceptional for its time. Today D&M retirees are still

taken care of from a small office on Ohio Street in Connersville, the D&M Liquidating Trust.

Sam had the worst labor contracts in the area—from a management perspective—because at the final moment of negotiations Sam would interfere for the benefit of his employees and give the unions what they were asking for. Sam seemed to feel that unions were good for people if they represented the people and did not try to run the company. Sam told the union negotiators, "Do whatever you want to do, but you will not run this company. If you want to run a company, you have to buy your own."



The dishwasher magnate who knew all his employees by name strove to create happy nonunion shops

Sam had a vision of merging all his companies together and having them all be nonunion. He wanted to demonstrate to the UAW in Connersville and Richmond that it was senseless to be going through all these labor organization efforts. D&M's plants would be models of happy nonunion shops. On several occasions, Sam's management team would be called to meet with D&M's attorneys from Ice Miller Donadio & Ryan and Absocold's lawyer from Cleary Nance Rankin & Cooper of Grand Rapids. They would all sit around a table and hear Sam talk about his vision of merging his companies.

The advice from the Ice Miller attorneys was always the same: "Sam, don't do that." Everyone figured that the only result of bringing all the companies in close proximity would be to make it easier for the UAW to organize them. "But you didn't tell Sam not to do something," says Ed Mulick. So the next thing they knew was that the Richmond D&M workers went out on a wildcat strike. And of course the Absocold workers who shared the driveway with D&M wouldn't cross the picket line. Ed Mulick and Bob Selze, who headed up the Richmond D&M plant, were called down to Connersville to give an explanation. And who got the blame for starting the strike? Absocold. Ed's saying "I warned you this would happen" and "you're full of you-know-what" didn't improve the situation.

By the time Ed returned to Richmond that day, he had three messages from the corporate treasurer saying he was fired (this was only the first of many times that Ed Mulick got "fired" by Sam Regenstrief), but he was supposed to get with Sam and talk about it. As it turned out, this was the kind of confrontation Sam reveled in. "He almost liked to have people stand up to him, if they knew what they were talking about," Ed recalls. "Of course, if you didn't know what you were talking about, he ate you up and spit you out in pieces."

Stories are told of Sam going out on the picket lines, smoking a cigar, and playing cards with the guys on strike, and of him telling them why they didn't need to do all this and what he would do for them and how. As Sam's health began to fail, even when negotiations got bitter, there was always the question, "Bud, how's Sam?" There had to be love there someplace, Bud Kaufman says. Though Bud and the D&M management team also thought a lot of their employees, they kept in mind that customers were relying on them. So prior to a contract negotiation deadline, they would try to stock the warehouse with enough dishwashers to carry them through the four, five, or ten weeks of the anticipated strike.

The strikes were particularly messy because several union locals were involved. Employees of the Richmond plant were represented by the International UAW and its Local 2042, and employees of Connersville were represented by two separate units of its Local 151. Hence D&M employees were covered by different collective bargaining agreements with different expiration dates. The danger, of course, was that, if one plant went out on strike, sympathy strikes at the other two would soon follow. D&M negotiated a clause that forbade sympathy strikes unless, by its own action, D&M involved its other plants in the labor dispute by shifting struck work to them. Thus the union was guaranteed that its members would not be required to perform the struck work of a sister local. D&M, however, soon found out it was not secure against sympathy strikes. Instead, D&M was subjected to a shutdown when the union made an unsubstantiated *claim* that D&M had moved struck work. The only one who gained by this mess was Michael H. Boldt of Ice Miller Donadio &

Ryan, who got an article published about it in the March 1982 *Labor Law Journal*.

The strikes merely served to complicate an already cloudy future for D&M. The economy was in bad shape, and changes were afoot in the dishwasher industry. Sam did not appear to be overly concerned. In fact, as Nancy Comiskey noted in a 1981 *Indiana Business* article celebrating "The Remarkable Mr. Regenstrief," he saw more opportunities now than ever before for the person just starting in business. "When you have to dig yourself out of trouble, you find out how to do it without a shovel. You use your fingers and fingernails. The opportunities in the coming years are great, but it will be slow and rough. Increased productivity and cost containment are the only things that can pull us out of this trouble."

The dishwasher industry was changing in ways that nobody at D&M had foreseen. Product lines were consolidating. Where there had been ten manufacturers, pretty soon there were six, then five, then four, and as of this writing there are probably three. D&M might have been one of those three, says Len Betley, if it hadn't been for the second big change in the industry—the move toward full lines. It now became important for a manufacturer to be able to go to a large developer, distributor, or discount chain and say, "I have a full line. I've got dishwashers, I've got stoves, I've got refrigerators, I've got washers and dryers." What had once been a fragmented industry was consolidating both within and across lines. That was bad for D&M because, aside from a few refrigerators, it basically offered dishwashers. The one-act show had nothing else to offer. Even if Sam had wanted to expand into other lines, enormous resources would have been needed to tool up for new products, and, although he had a very nice company, its coffers weren't of the same magnitude as a GE, Whirlpool, or Westinghouse.

GE had been breathing down Sam's neck for years, and now they played a clever trick to beat Sam at his own game. Dick Goodemote recalls: GE had always competed with D&M but never achieved the volume to meet or beat Sam's unit cost. They figured out that the only way they could produce sufficient volume to get the unit cost down was to create a totally automated production line. They spent an enormous

amount of money to automate their plant in Louisville, Kentucky. In fact, GE spent much more than the product could afford. But they convinced the U.S. government that they were engaged in research on automation and robotics, research to help them beat the Japanese manufacturers. So they were allowed to write off the cost of the plant while taking a great deal of cost out of their product. And that's how GE became a major competitor in the dishwasher business.

At the time, D&M was not really a leader in the bells and whistles that housewives wanted in their dishwashers. Technology was beginning to proceed around D&M. But at its Louisville plant, GE made one particular innovation that really threw down the gauntlet: plastic door caps. These were the interior linings of dishwasher doors. D&M was tooled up for metal doors and tubs, not plastic. To compete with GE on this front, a huge infusion of capital was needed to retool the production line for plastic door liners and plastic tubs. What should D&M do? Hundreds of Harvard business school students were probably assigned to read about D&M in their 1984 case study books and to come up with an answer. Back at D&M, meanwhile, Sam's strong leadership was never more needed.

Sam Regenstrief never dreamed of retiring. He thought retirement was the one thing that started trouble in your life. So it was no surprise that, when illness struck, Sam toughed it out and kept on working. In his fifties and sixties, Sam had never looked particularly healthy. He was compact but not robust, and he had a sallow complexion. After Sam's strokes began, he suffered various physical impairments, and his attitude changed. It was hard to put a finger on what had changed—Sam's sentence structures had always rather challenged his listeners, so the effects of his illness were hard to distinguish from his ordinary quirks.

When Sam was in the hospital or recuperating at home or at his condo in Boca Raton, his day-to-day leadership and direction were sorely missed. With his bicycle-wheel style of

management, absence of the hub wreaked havoc with the spokes. Running the company became difficult when Sam wasn't there to tell everyone from the president on down what their decisions should be. Part of what made things difficult was that Sam had always forced decisions that people didn't agree with, and, from 1959 into the late 1970s, Sam's decisions had turned out to be right most of the time. The board of directors didn't realize until too late that the Sam who was still trying to run D&M from his convalescent bed was not the Sam they had known before. He was no longer as in tune with the marketplace.

No one on the management team felt they had a mandate to step up to the plate. Like the nail in the old Chinese proverb, anyone who tried got hammered back down. Sam did not have a number two person. He had a full complement of officers—a vice chairman, a president, and various executive vice presidents—but he delegated to none. He treated everybody alike, and he made all the decisions. The same energy and decisiveness that inspired his people to get things done made them uncertain, in his absence, as to their responsibilities and what they were free to do or not do. To put it bluntly, they were afraid to make decisions.

Sam's emotional attachment to his company only reinforced this effect. He would have a stroke and be out for a while. When he returned, he would discover that someone had done something new, something Sam had not been involved in, so Sam would redo it. About the second or third time that happened, Sam's managers just stopped doing things, and the company went on cruise control. At a time when the industry was changing, D&M was without leadership.

This left the door wide open to the competition, who had always lurked in the background to try to steal away Sam's huge volume. Having completely modernized their plant in Louisville, GE had all kinds of new capacity, and they started entertaining thoughts of private-label manufacturing, which Sam had had a corner on for so many years. D&M had a lot of the same modern technology under development, but it was on a back burner. It wasn't brought into the product line simply because at that time Sam's leadership was missing.

Sam began to have lapses in judgment. He could have owned all the dishwasher business in Canada, says Dick Goodemote, but he lost it. He clung to old friends and old relationships. Some of these people, knowing how well off Sam was, would lean on him and bring up old times. Then at board meetings he would surprise everyone by saying, "Oh, I've changed that deal. I'm going to work with [so-and-so]." And so-and-so would lose him all the Canada business.

When Sam was convalescing in Boca Raton from a heart attack, he had internal auditors making routine visits to his companies in South Bend, Indianapolis, and Ionia, keeping tabs on things. They would call in their reports to Sam's nephew Marvin Silbermann, who had risen through the ranks to become vice chairman in charge of operations at the Connersville plant. Before the decision was made to move Absocold to Richmond, Sam had picked a man that he knew from the Philco days to run the company in Michigan, but reports were coming in that this man's wife had moved into the office and was running the show. Rather than let Marvin Silbermann take care of the matter, Sam called Ed Mulick and asked him to fire the guy—this was Ed's own boss that Sam wanted him to fire! Ed took this as an indication of a soft side of Sam, who could be strong and tough about some things but not about others. Sam was mad about what the reports were telling him, but this guy was an old friend, so he didn't want Connersville management to handle it. Ed took care of things by calling Marvin to come up and give the man his walking papers.

"Sam Regenstrief was a free agent.
He did what he wanted to."
Jim Marcus, investment banker, Goldman Sachs

The kinds of people Sam had on D&M's board of directors were specialists who wanted to be working for him. It was like a club for him, and there were a lot of people who never really spoke up. Sam basically didn't listen to anybody

about anything anyway—he made up his mind and did what he wanted to do. In the early days of D&M, that decisiveness was partly responsible for his success, but in the later years it became a liability. Sam could no longer cope with things, but he didn't realize it, so he just stopped being productive. It seemed to those around him that the less capable Sam became, the harder he held onto his decisions.

At some point, though, he must have realized that he needed more from his board. Much as Sam Regenstrief disliked confrontations, he began to add to the D&M board a group of directors who would challenge him and ask the hard questions. Len Betley recalls that Sam would grow nervous before board meetings, anticipating the challenges he might meet. This new cast of characters was made up of men whom Sam had encountered through the D&M business and had come to respect, but who were "outsiders." One by one they came on the D&M board during the early 1980s—Steve Sample, electrical engineer turned academician; Jim Marcus, Sam's trusted advisor from Goldman Sachs; Dick Goodemote, retired national manager of Sears merchandise development and testing lab; Leroy Silva, Sam's advisor on technical matters who successfully defended D&M's electronic control patents in litigation; and Len Betley. They joined outside director Merle Miller of Ice Miller Donadio & Ryan who had been on the board from the start.

Sam was not particularly looking to be confronted. He was thinking ahead to the survival of his company and his foundation. He had decided to transfer control of D&M to the Regenstrief Foundation, and he did it by intertwining the two entities' boards of directors. The same outside directors who sat on the D&M board were brought onto the Foundation board. They were all people who had a long association with Sam and thus had a deep personal stake in the Foundation. Marilyn Mitchell was named secretary of the Foundation board. By 1984 six of D&M's thirteen directors (including Sam himself) constituted six of the Foundation's twelve directors. "This is [Sam's] personal insurance policy for the perpetuation and control of Design and Manufacturing after he is gone," said D&M's strategic plan.

Dick Goodemote and Jim Marcus were on Sam's executive committee at D&M, and indeed they brought

questions to Sam that Sam hadn't thought about. What about your pay structure? What about your bonus plans? These had always been kind of hip-pocket setups and, if Sam got around to thinking about them, he might do them better.

As his health worsened, Sam began to distrust and lack respect for his own top managers. For their part, they began to realize that when they explained things to Sam they just weren't getting through. The outside directors grew concerned and began to get more involved. They asked Sam: What if your chief engineer Tom Duncan got ill or decided to retire? (Sam: He wouldn't do that.) What about your successor, Sam? What if you get hit by a truck—who's going to run this place? They had all come to the operation from different angles. All had consulted with Sam about certain things, but none of them had the big picture. As the picture began to take shape in their minds, they became very uneasy. They began to talk amongst themselves—a phone call before the board meeting, a brief conversation in the hall—to try to understand what was happening in the industry, what was happening to Sam, and what was happening to the employees, trying to come up with a strategy for dealing with a very complicated personal and business situation, all while Sam was still alive and fading in and out of the business.

Sam became forgetful. He would make agreements over the phone and forget them. People would say, "Sam, I talked to you last month and you said [this and this and this]. And I took your word for it." At Sam's request, Marilyn Mitchell began to listen in on all his calls and make a note of anything Sam committed to during the conversation. Other signs not uncommon in stroke victims began to appear—mood swings, quickness to anger, crying for no apparent reason. Sam Regenstrief was a very sick man, but he was still the controlling stockholder of D&M.

At a D&M board meeting in the early 1980s, to everyone's shock, Sam turned to Len Betley—the newest member of the D&M board, carrying the working title of secretary—and said, "Len, you run this meeting." Though equally shocked, Len did what Sam told him to. He ran the meeting. In time Len would become the de facto chairman of the board, then the acting CEO, and, after Sam's death, the actual CEO of Design and Manufacturing Corporation.

"With payroll, purchases, and sales
running into the millions annually,
it was a lucky day for Connersville
when Sam Regenstrief decided to locate here.
This community hopes that the next twenty-five years
will be as fruitful for D&M
as the past twenty-five years have been."
H. Max Walters, Connersville historian,
Connersville News-Examiner

Design and Manufacturing Corporation had all the outward signs of success as it celebrated its silver anniversary. Sam Regenstrief had seen his baby take form and grow from an initial work force of 160 to more than 1,000. A celebratory dinner with banners and hoopla was held for D&M officers and all those employees who had been with the company from the very start. The men came up one by one to shake hands with their esteemed employer, who remained seated but was all smiles. Sam was presented with a plaque bearing all the brand names under which D&M's dishwashers had been sold over the years. The employees received limited-edition silver medallions picturing a dishwasher, the slogan "Quality First, Because We Care," and the words "15 million dishwashers, 1959–1984." A photographer was commissioned to take everyone's picture. Of the original 160 employees, 40 were still with the firm.

D&M's Silver Anniversary party featured a plaque for Mr. R, presented by Marilyn Mitchell

D&M's Three-Year Strategic Plan, dated February 14, 1984, commented on the company's accomplishments.

> Design and Manufacturing Corporation has just completed its 25th year of operation. [T]he 25 years were good for everyone

> associated with D&M, and we trust that we gave our good friend and customer, Sears, the best possible product at the best possible cost.... It is our opinion that the next 25 years will be much easier than the first 25. Getting established in the industry was a challenge. We met that challenge. Being the best supplier in the industry was our commitment to our customers. We met that commitment. Continually gaining in market share each year was our goal. We obtained our goal yearly. These are the philosophies on which this company was founded, and on which this company will stand.

It was business as usual that year at D&M, with the usual twists and turns. Under Ed Mulick's supervision, the plastics operation in South Bend was closed down and merged with Absocold. Sobenite had the tooling for injection molding, but Richmond was a lot closer than South Bend, and Sam was on a drive to bring all the outsourced operations closer to home. The Absocold plant had plenty of space and had bought some equipment with the eventual aim of injection molding the tub as well as the door lining.

In June Sam and Myrtie Regenstrief contributed a two hundred thousand-dollar challenge grant to the Fayette County Boys' Club, a "significant boost" to the club's campaign to raise funds for the purchase, renovation, and maintenance of the former YMCA building at Ninth and Central Avenue. The *Connersville News-Examiner* carried a life-size photograph of the signed check on the front page, along with Sam's customary press photo and a drawing of the future renovated building bearing the name "Sam N. Regenstrief Boys' Club." The new facility would allow the club to expand its basketball program beyond the elementary level into junior and senior high school age groups and would make room for computers, life skills courses, and more tutoring.

Thanksgiving day was spent as had become the custom, with nephew Allan Cohn and his wife in Indianapolis. Allan and Babs put the turkey in the oven and then drove to

Connersville to pick up Sam and Myrtie, returning in time for a light lunch. After dinner, it was back to Connersville to take Sam and Myrtie home. The Cohns had done this for several years—long days, but a lot of fun.

Meanwhile, trouble was brewing at the Sears Tower in Chicago. The giant retailer had all its dishwasher eggs in the D&M basket, but nobody seemed to be taking over the reins from Sam Regenstrief. The powers that be at Sears headquarters were getting increasingly nervous. D&M's 1984 strategic plan tried to convince Sears that there would be an orderly assumption of new leadership, citing recent "major steps toward strengthening the corporation management and executive staff" and noting that "Mr. Regenstrief takes much more pride in teaching than just in leading his team." Moreover, the plan said, D&M was registered with Purdue University to receive its catalog of graduates each year from the School of Engineering, the School of Business and Industrial Management, and the School of Technology. It was also maintaining contact with Indiana University, University of Cincinnati, Miami University, Ohio State, and Indiana Vocational Technical College—contacts that would "enable D&M to stay abreast of employee candidates from which we can choose the cream of the crop" and assure having a young group for future growth.

Two years later, D&M's strategic plan was still trying to convince an increasingly disgruntled Sears. It outlined "essential ingredients necessary for an ambitious, aggressive program of product design and development effort." Seeking an infusion of new ideas, the plan called for staffing the engineering department with fully degreed engineers who had the potential to become future leaders of D&M and revisiting "wild" ideas for new designs that might have been summarily rejected in the past. A quality control plan promised to continue to reduce the ratio of in-warranty service calls to sales by upgrading the formal education requirements for new hires and encouraging employees to further their education at local institutions. The plan touted new testing equipment to gauge nickel thickness, color and gloss standards, electrical and leak parameters on motor-pump assemblies, and hypo/electrical testers for all assembly lines. It established a supplier rating system to pin-

point quality problems and reward preferred suppliers for continued quality.

If Sears lacked confidence in the leadership and innovativeness of their one-and-only dishwasher supplier, Sam himself didn't help the situation. Because Sears had a much better reporting system for field service problems than did Sam's other customers, their reports often looked inflated by comparison, and Sam was reluctant to believe that D&M machines had as many service calls as Sears said they did. He discounted the field service reports to the extent that he antagonized some of the people at Sears. Not long afterward, Sears moved a portion of its business to Whirlpool. You could tell which Kenmores were Whirlpool-made because they had speckles on the enamel tub interior, whereas D&M's tubs were a pure white.

Receiving a knock on the door one morning in 1985, Myrtie Regenstrief refused to let the staff writer for Richmond's *Palladium-Item* interview her husband, but she indicated that Sam was aware of the latest news—that D&M was planning to relocate its Richmond dishwasher production to Connersville, costing the city some six hundred jobs. The Richmond plant had seen many ups and downs since Sam purchased it, as the economy and orders fluctuated. In 1981, D&M had partnered with its biggest competitor, GE, to produce dishwasher motors at the plant. The millionth motor rolled off the line in 1983, when production averaged fifteen hundred motors a day. But by 1984 workers with seniority back as far as May 1978 were being laid off. Sanyo Electric Co. of Japan was now considering the site, among several, for a possible refrigerator manufacturing plant.

Things were tough all over. Back in Connersville, the *Palladium-Item* noted, D&M employees had gone on strike.

> A bargaining committee member of UAW Local 2042, which represents workers at the Richmond plant, said he believes the Richmond decision and the current strike at D&M's Connersville plant stem from the

company's evolution from a one-man, family-owned operation to a "less sensitive" corporate structure. "They (D&M employees) are all grateful to Sammy," the committee member said. "But now there's the Lee Burkes, the Bud Kaufmans and Marilyn Mitchells."

Though Myrtie Regenstrief declined to let Sam be interviewed for the article, she did tell the *Palladium-Item* that, even after four heart attacks, the seventy-five-year-old D&M executive was still involved in decision making at D&M. "He still goes to the company," she said. "He does it part-time, a lot of it from home."

That Myrtie was quoted in the papers was rare for a person with her reputation for being very quiet in public. Everyone who knew her agreed that Myrtie Regenstrief was a very sweet, terribly nice woman. It was generally assumed that she played the role of patient, long-suffering wife because she had devoted herself to taking care of Sam. That was a handful, everyone perceived, because Sam didn't listen to Myrtie any more than he listened to anybody else. But Myrtie was clearly a supportive presence for Sam. Perhaps in their private moments he shared his hopes and dreams, as well as his concerns. He was not one to discuss these things in public. Nor was Sam inclined to show affection for Myrtie in public. In fact he was quite capable of saying unkind things to her, but, by God, nobody else did! Myrtie especially supported Sam's plans for the Regenstrief Foundation and showed great interest in it.

Fiercely protective of Sam, Myrtie insisted on caring for him personally when illness struck

Myrtie was also fiercely protective of Sam. If you were unkind to Sam, Myrtie would be your enemy for life. Even when Sam became ill, Myrtie brooked no suggestion that he was in any way diminished. As Sam's health declined, Myrtie devoted herself totally to his care. Nurses and other help were on hand, but Myrtie insisted on caring for Sam

herself and personally cooked all his meals. Allan and Babs Cohn coaxed them to move to Indianapolis to a nearby condo so they could take care of Sam, but it never happened. Sam still came to Indianapolis to attend board meetings at the Foundation, sitting there with Myrtie on one side and sister Helen Barrett on the other. His speech became less coherent than ever.

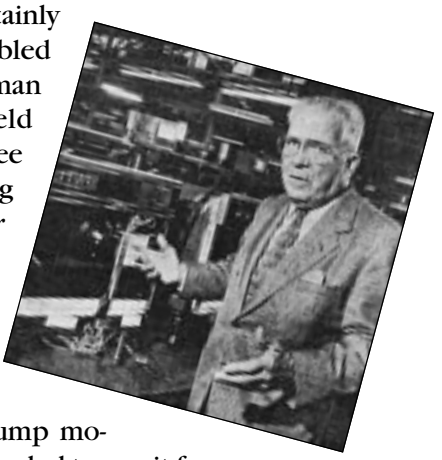
It came as a shock to everyone when Myrtie passed away. Though snapshots of Myrtie showed her wasting away, people had the impression that she was the picture of health and that Sam was the one who was ill. As athletic as Myrtie was—an avid golfer and bowler—she should have lived on long after Sam. But caring for him took a major toll, and one day she was gone. Myrtie B. Regenstrief died of a pulmonary embolism on Wednesday, May 14, 1986, in the Fayette County Hospital after she fell and broke her hip. The newspapers said she had been a member of Indianapolis Hadassah, Indianapolis Athletic Club, and Tri Kappa sorority. Contributions to the Regenstrief Institute or the Regenstrief Boys' and Girls' Club in Connersville were welcomed.

"Dishwasher Firm Hopes To Make Comeback" was headlined in the *Indianapolis Star* on April 28, 1987. The competition was beginning to catch up with the Dishwasher King. First, the article said, D&M watched its Canadian sales slip away largely due to unfavorable currency valuations between the U.S. and Canadian dollars. Then GE stole most of D&M's Tappan and Magic Chef contracts, which amounted to 9 percent of D&M's business. "If that wasn't bad enough, Whirlpool horned in on the king's exclusive contract to supply dishwashers to its biggest customer, Sears, Roebuck and Co. Those were the dark days at D&M, the corporate pride of this eastern Indiana city of Connersville." D&M's market share had slipped from nearly 40 percent to 20 percent.

A little-known but lucrative source of income for D&M was also on its way out, the *Star* noted. The patents on solid-state appliance controls which D&M had developed with Purdue engineers, now used on nearly every electronically controlled microwave and dishwasher in the appliance in-

dustry, were about to expire in the early 1990s. In fact D&M had already successfully sued Amana and Sharp for patent infringement to the tune of millions of dollars in settlements.

Lee Burke, introduced as Sam's right arm back in 1972 at the Horatio Alger Award Dinner, certainly proved to be just that during these troubled times. He was the reliable, dependable man who kept production moving and held things together. At seventy years of age, Lee Burke was president and chief operating officer of D&M. He described for the *Star* the cost-cutting measures that D&M had already implemented. They bought two million dollars worth of presses and dies to make plastic inner doors, replacing the steel ones. They had automated the labor-intensive assembly line for pump motors, reducing the number of workers needed to run it from forty-two to twenty-one. D&M had unloaded its Richmond plant and consolidated production at the Connersville plant. There was talk of holding the line on salaries for the 1,750-strong work force, but the UAW three-year contract was about to expire, and during the last contract negotiations the workers had walked out on strike. Other than complaining of an aching back, the *Star* reported, Lee Burke showed no signs of wanting to retire. Nor did he project a change of hands for D&M in the future. "We aren't out trying to sell it or anything like that," he said.



Lee Burke was Sam's right-hand man at the beginning of D&M, and at the end

By now, however, it was clear to everyone that D&M's options had narrowed considerably. "It became painfully apparent that it was time to do something or we were all going to be working for Regenstrief Institute," says Ed Mulick, "and those doctors over there weren't necessarily interested in running a manufacturing company." Ed Mulick had risen to the post of D&M vice president, managing the relationships between purchasing, engineering, manufacturing, and quality control and "keeping all the egos in line." The key people at D&M were by now aware that Sam had transferred all his stock—representing about 83 percent of the company's outstanding equity—into a trust originally set up to be administered by Myrtie Regenstrief, Harry Ice, and Len

Betley. The major beneficiary after Sam's death was to be the Foundation. So ultimately the Foundation would own D&M.

From their vantage point of being seated on both boards, the outside directors could see three basic options: Do nothing, invest in new technology to regain a competitive edge, or sell D&M.

If they did nothing and kept taking money out of the company for the Foundation, eventually the company would grind down financially. They decided that milking the company in this way would be unfair to D&M employees and to Connersville. The second option—to take D&M's cash hoard and reinvest it in new technology to compete with the GEs and Whirlpools of the world—was only slightly more palatable. Given Sam's interest in the Foundation and the need to generate a nest egg for the Foundation, it did not make sense to take the cash and borrow money to bet on a new investment in the business. The board made a conscious decision not to reinvest. That left only the third option—to sell D&M. Sick as he was, Sam Regenstrief mercifully was not a party to the decision.

The board began to look for buyers. There were only six conceivable buyers in the world. Two were barred from the arena by antitrust considerations. Two others had already bowed out for various reasons. White and Maytag were the only viable buyers left. The board instructed Len Betley to sell the company to one of those two. Early on, Len discovered that Maytag would not pay anything near the asking price for D&M. Fortunately, White—technically WCI, a Columbus, Ohio, unit of the former conglomerate White Consolidated Industries, which had been acquired in 1986 by the Swedish-owned home appliance company, Electrolux—did not get wind of that, and Len got a commitment to purchase.

The life of a company ends not when it is sold, but when its assets are dismantled and dispersed. The bulk of D&M's assets were sold to WCI on December 5, 1987. Ed Mulick bought Absocold and stayed on as president of D&M to oversee the sale of the remaining assets. Long before the end, he says, people had the sense that D&M wasn't going to last a whole lot longer because everyone knew it was pretty much Sam Regenstrief's energy and leadership that moved

his company from 1959 until the time his health took him away from it.

Less than six weeks later Sam Regenstrief was dead. The classic American rags-to-riches story made easy fodder for the *Indianapolis Star* obituary writer. "Samuel Nathan Regenstrief, an Austrian immigrant who sold newspapers as a boy, dropped out of high school and went on to become the world's largest manufacturer of dishwashing machines, died Sunday in his Connersville home. The publicity-shy millionaire-philanthropist was 78." "The productive, energetic life of 'Mr. R' has ended at 78," echoed the *Star*'s editorial writer, "but the way he spent it will go on inspiring others, and the gifts he gave will go on giving health and life far into the future." The *Connersville News-Examiner* invited friends to call at Miller Funeral Home from 4 to 9 Tuesday.

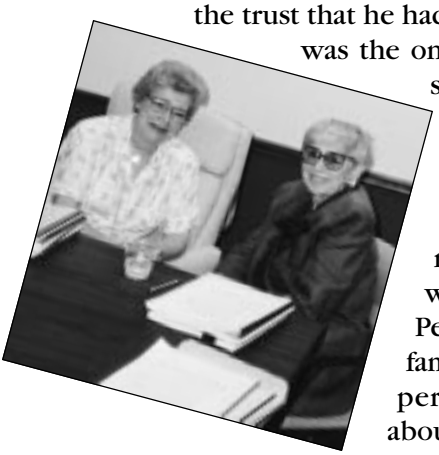
On Tuesday morning, a memo went out to all the employees of WCI dishwasher division, Connersville plant: "Sam Regenstrief, nationally known industrialist and founder to Design and Manufacturing Corporation, died Sunday evening at his home.... Tomorrow at 1:55 P.M., in respect of Mr. R, we will halt production for five minutes of silence in memory of him."

Funeral services were held the next day, Wednesday, January 20, 1988, at 2 P.M. at the Aaron-Ruben-Nelson Mortuary, 1328 West 86th Street, Indianapolis. Sam's remains were buried at Beth-El Zedeck Cemetery, North. Five minutes before the funeral, the Connersville plant began its moment of silence with an announcement.

> In just a short while, Samuel Nathan Regenstrief will be laid to rest. Although his...body has been absent from our midst for several years, Sam's presence has always been felt. He was dedicated to his company, to his employees, and to his community. His day-to-day leadership touched all our lives as he built this company into what it is today—a leader in the appliance world.
>
> The silence of the machines symbolizes the silence of this great man. Our memories of Sam will linger in our minds forever. Sam,

you taught us so much—and we thank you.
You will be missed.

Upon Sam's death all the assets of his estate went to the trust that he had had the foresight to create. Len Betley was the only surviving administrator of the trust, since both Myrtie and Harry Ice had died in the intervening years. Sam's instructions were to give a portion of the estate to his and Myrtie's surviving siblings, nephews, and nieces. The remainder, about 80 percent of his estate, was to go to the Regenstrief Foundation. Perhaps it never occurred to Sam that his family or friends might value some of his personal belongings as mementos. Just about everything he owned was taken off to storage and auctioned off. Even Marilyn Mitchell had to vie with strangers at auction for a particular table of Sam's that she was fond of.



Marilyn Mitchell and Helen Barrett at the final D&M board meeting

As the distribution of the Regenstrief fortune was worked out, the community and family continued to grieve. Sam's sister Sara received a letter of condolence from Congregation Beth-El Zedeck. "His death is deeply felt by the entire community to whose welfare he richly contributed throughout his life. The memory of his good deeds of Tzedeka will continue to serve as a lasting blessing."

Selling D&M proved a wise decision for the Regenstrief Foundation, but sadly the Foundation could not accomplish Sam's goal of perpetuating the company for the benefit of the employees in Connersville. WCI eventually lost most of the dishwasher business and shut down the Connersville plant. In the years to follow, the outside directors would ask themselves now and again whether the D&M board made the right decision. It seemed clear to them that, if they had taken a different course, Sam would have lost his foundation too.

Director Steve Sample puts the demise of D&M in perspective. "Some people build institutions," he says, "and others run a one-man show." An institution builder constantly nurtures and encourages younger people to take responsibility,

even lets them make mistakes, because that's how they grow. An institution builder creates a hierarchy, a structure that can survive after the genius is gone. D&M was more of a one-man show. Sam ran his company idiosyncratically, dominating it with his unique, forceful personality, and he never built the human infrastructure that it needed. The company could not survive the passing of the genius.

With the Regenstrief Institute, however, it was very different. Sam put together a strong board, anticipating his own demise, and he let the experts run the research…and, of course, nothing helps build an institution like an endowment. Suddenly the Institute was going to have forty million dollars to work with, and more when the estate was settled. It was a whole new ballpark and high time to figure out what the Regenstrief Institute really stood for and where exactly it was headed.

MINING THE GOLD

It is ten years since Sam Regenstrief died. Yet here he is, presiding over the brand spanking new sixth-floor offices of the Regenstrief Institute. A bronze bust of Sam sits on a black pedestal in the lobby. Presented to him at D&M's silver anniversary party, the bust once watched over Sam's Connersville offices during his extended recuperations. For many years it saw visitors come and go from the Institute's vintage 1970s fifth-floor headquarters. Now Sam's sculpted likeness greets visitors in the brightly lit, cool gray entryway one floor up. Sam has died and gone to heaven on the sixth floor of Regenstrief Health Center.

One of those most responsible for keeping Sam's memory alive and well is Joanne Fox. In a research world peopled by multiply affiliated scientists, she is the top administrator who wears only the Institute "hat." As official keeper of the institutional memory and guardian of Sam's personal mementos, Joanne indoctrinates new employ-

ees about who Sam Regenstrief was and how he came to found the Institute. Joanne also sees to the care and feeding of the Institute's huge staff, making sure each person enjoys the benefits and perks of working in a premier research institute.

Joanne Fox has personally attended to the details of decorating the new sixth-floor offices. The walls are adorned with collages created by Sam's sister Helen Barrett and paintings by her husband Art. Since joining the Institute as Ray Murray's secretary in 1972, Joanne has seen the staff grow from ten people to eighty-five. She is proud that the turnover is very low.

A somewhat revised cast of characters surrounds Joanne today. Len Betley, Clem McDonald, and Charles Clark are still very much in evidence. Clem, the sure-of-himself young physician/computer whiz determined to computerize medical records is now regarded as a founding father of a new science called *medical informatics*—the science, engineering, and technology of computer hardware, software, and communications as applied to medicine. Elected in 1994 to the prestigious National Academy of Science's Institute of Medicine, he's on his way to becoming a gray eminence himself. A new generation of researchers is lending its expertise. The names of William Tierney, Siu L. Hui, Marc Overhage, David Smith, Chris Callahan, Lisa Harris, Dan Clark, Emmanuel Lazaridis, Morris Weinberger, Andrew Zhou, Paul Dexter, Michael Murray, and countless other scientists grace a steady stream of research proposals and journal articles emanating from the Regenstrief Institute. Close by at the medical school, the original researcher, Joe Mamlin, although not directly involved with the Institute, remains a good friend and major influence. True to Sam's and John Hickam's intent, innovative minds from many walks of life—sociologists, biostatisticians, physician researchers, and computer scientists—are addressing the problems of health care delivery under the Institute microscope.

In 1967 Sam Regenstrief thought medical care ought to run more like a good factory. Thirty years later, the rest of the world has caught up to Sam's vision. The public cries for more efficient, less costly health care, while the lumbering

health care system desperately tries to shed its excesses of paperwork and unwieldy patient processing to meet the demand for streamlined service.

The Industrial Age that spawned the Sam Regenstriefs of the world has given way thirty years later to the Information Age, which is changing everything about the way business is done. Although Sam could not have foreseen how fundamental that change would be, he was ahead of his time in wanting to see technology applied to the improvement of health care.

Ironically, the public is having to drag medicine into the new age. "The medical industry is paying the price for ignoring information technology's potential for three decades," reported Glenn Rifkin in a 1993 *New York Times* article. "While most industries spend up to 6% of revenues on data systems, health care devotes barely 1%." Hospitals are realizing that they missed the boat when they bought big computer systems years ago but used them only for accounting. Although many hospitals have computer systems, only 1–2 percent have made a start toward keeping electronic medical records. Considering that (according to Institute researcher William Tierney) up to 40 percent of all hospital costs are related to the generation and storage of information, it makes sense that information technology can improve efficiency.

In the thirty years since the Regenstrief Institute was a mere gleam in Sam's eye, other institutions have made strides in computerizing records too, places like Brigham and Women's Hospital, Henry Ford Health System, CAPP CARE, and Harvard Community Health. Health care delivery is a hot research topic now. The federal funding stream has turned back on and medical researchers everywhere are scrambling to get a piece of the action.

The new science of medical information systems and data processing has blossomed. Optimistic medical informaticians of the early 1970s thought hospitals could convert to electronic medical records (EMRs) within a decade. Although computer technology has indeed caught up to the vision, organizational barriers are keeping the dream from being realized quite that swiftly. Ohio State University

uncovered the problems when it surveyed a thousand health care system developers at a May 1993 meeting of the American Medical Informatics Association in St. Louis—insufficient funding for EMRs, lack of adequate interfaces, lack of clear objectives, lack of definitions or standards, and the fragmented environment of health care. Consequently, it will be the year 2000 before the infrastructure is in place to have such systems. "It's very hard," says Clem McDonald. "The analogy is not a heart transplant, it's a brain transplant." At least the traditional physician resistance to such systems shows promise of easing up. The under-forty crowd is at home with computers and ready to see health care practice reengineered into an electronic database.

"So you're with the Regenstrief Institute. What do you do?"
Question in search of a succinct answer

Just how far has the Regenstrief Institute come with Sam's idea that health care delivery should be run more like industry? Close analysis of the metaphor leads to rather a maze of complexities. Let's see how the analogy plays out.

Sam Regenstrief thought of health care delivery as a system not unlike a dishwasher factory. A dishwasher factory has inputs—sheet steel, motors, racks, timing devices—and it has outputs—dishwashers. Between inputs and outputs reside the processes that convert the raw materials to a finished product. A dishwasher factory has a good set of tools to gauge the success or failure of its processes. A timekeeper can put a stopwatch to them. A manager can evaluate department schedules and budgets to see if the processes operate efficiently and cost effectively. If a particular department is behind schedule or over budget, someone can pinpoint the difficulty and work on correcting it.

As a system, the health care industry also has inputs, outputs, and processes. But here begins a world of differ-

ence. Every one of these terms is ill defined. You don't simply input sick patients and output healthy patients. Patients often enter the system for reasons other than being sick—some want to prevent illness, some seek only reassurance—and many who leave the system are far from healthy.

The problem is how to define input and output so that meaningful comparisons can be made. You might want to describe each input (each patient) in some sort of precise terms both before and after it is processed by the health care system. Sound reasoning, but each patient has a different burden of disease and a different risk for death and disability, and robust measures of these concepts are simply not available.

Even if you could accurately pinpoint the extent of the disease burden and risk both before and after processing, another methodological dragon rears its ugly head: Processing is different for every patient. Patient A consults Dr. Jones, while patient B consults Dr. Brown. How efficient is Dr. Jones's process compared to Dr. Brown's? The only way to tell is to look at large numbers of patients entering and leaving the two systems over time. When patient C comes along, what is the likely outcome of consulting Dr. Brown versus Dr. Jones? The answer can be stated only as a probability based on a comparison of large samples of Jones and Brown patients.

To really see the effect of either doctor's medical interventions, you need to track the course of disease and health in patients A through Z over a long period of time. This *outcome research* is very difficult and very costly. Just to complicate matters, patients often migrate from system to system, leaving Dr. Brown for Dr. Kim when they change jobs and insurance or move to a new part of the city, state, or country. In other words, though the input may stay the same, the process is a moving target.

The factory analogy breaks down further because no comparable gauges exist to identify trouble spots needing attention. Without appropriate process measures, the limited resources for studying the system cannot easily be focused on the areas with the greatest potential return.

To try to get a research handle on the problem of health care delivery, Regenstrief Institute researchers have adjusted their research microscope to a finer, more basic focus—how to improve the care at one individual patient's encounter with one doctor.

Individual patients X and Y consult Dr. Kim. Patient X complains of vomiting, diarrhea, and fever. Patient Y complains of severe headaches. Dr. Kim selects some form of processing according to each patient's complaint. The process can be a diagnostic work-up—a blood test, chest X ray, bone scan, angiogram, or whatever. Or the process can be a therapy, such as a drug regimen or a change in diet or exercise. Then Dr. Kim looks for improvement in the patient's condition at the next scheduled visit.

From this *micro* view, we see many processes that can be described in a fair amount of detail. We can think in terms of patient states and the health care actions required to clarify, correct, or protect against those states. Some of these processes are well understood. In those cases, we can define them as *rules* linking specific patient states to specific actions such as tests, treatments, immunizations, or referrals.

But we are still not out of the methodological woods. We do not have standardized ways to record patient symptoms. The customary method for recording these is the doctor's free-form notes written on the chart, and these notes may not record all the symptoms, just the most salient ones. Our process rules may be vague or nonexistent, and, even when we do have good rules, sometimes the doctors don't follow them. We are hard-pressed, too, to measure subtle changes in health and functioning that may occur as a result of the doctor's prescribed regimen. "The patient lived" versus "the patient died" is a poor measure of success. Few patients are satisfied to simply survive medical processing—they want a decent quality of life.

Despite this somewhat daunting scenario, Institute researchers have made a lot of progress in defining what goes on at the micro level of patient/physician interaction. They are taking their cues directly from industry's great strides in productivity, which seem to rest on two foundations: obtaining or generating better information about the inputs to outputs that define industrial processes, and using the com-

puter to do so. Their best hope for gathering more and better health care data on a large scale is by inserting computer systems into the interstices of the process.

So Institute researchers are working on optimizing the capture of events that occur during the physician/patient interaction and are using the computer to monitor and intervene in the process when necessary. They have studied how doctors decide which kind of processing to order. And they are experimenting with placing essential information in the hands of the physician at the moment the decision is being made. They hypothesize that, if all physicians are given comparable information via the computer, this will cut down on the variability of physician processing. In turn, the patient can expect more comparable care from many physicians, and researchers can find the processing much easier to study. Everyone's happy.

A wondrous thing has happened during all of this. A unique alchemy is afoot at the Regenstrief Institute. It is mixing the ingredients of talented researchers, the Regenstrief Medical Record System, the patients and doctors of Wishard Memorial Hospital and the Regenstrief Health Center, and the faculty of IU Medical School and creating gold—researchers' gold! The Regenstrief Institute has created its own gold mine, and medical researchers will reap the profits for years to come.

The first order of business—capturing the events that occur during the physician/patient interaction—has proved a rather formidable task since it requires physicians to give up their customary paper-and-pencil methods. Wishard physicians have used a clinician's workstation since 1987 to order all diagnostic tests and since 1989 to write all inpatient orders. Medical faculty and house staff write more than 140,000 inpatient orders and 25,000 outpatient prescriptions directly into the computer each month—they call this information system the Medical Gopher. The system captures data on more than 13,000 patients seen annually at Wishard's De-

partment of Medicine. More than 240,000 patients are logged into the RMRS.

"Achieving our goals will involve or depend upon the RMRS that carries troves of clinical observations and linkages to other sources of clinical knowledge, and actively interacts with physicians about the best course of care."
Regenstrief Institute Mission and Goals Statement, 1996

Order entry is a special leverage point in the care process. It is at the point of ordering that physicians can do either harm or good. This is where they demonstrate their unique competence or where they can make mistakes. This is also where they generate most of the cost of care. Using the computer to capture the order provides an opportunity to learn more about the care process as well as to control it. It also eliminates the manual step of a clerk transferring handwritten orders to a final action document, thus avoiding time lags and transcription errors.

The computer can prompt the physician to provide additional detail about what he or she orders and when, and it can provide guidance and feedback about those orders. In the RMRS, guidance starts with problem-oriented menus of treatment choices. Before accepting a drug order, the computer checks to be sure the patient has no allergies, diagnoses, or medication use that would make the drug dangerous or less effective. The computer shows how much a diagnostic test will cost and reminds the physician when the test was last performed. It produces compact summaries of the patient's current state for efficient review. Finally, it provides textbook information that the doctor can consult to learn, for example, whether certain bacteria cause disease in humans, or what is the normal dose and use of a certain drug.

Sounds great, but does it work? And what exactly is the effect? In 1984, with a $1.6 million grant from the National Center for Health Research and Health Care Technology Assessment, the Institute undertook five years of

controlled trials of physician order entry. A controlled trial might look like this: During the first phase of an experiment, half the doctors enter their orders into a portable PC workstation, while the other half write orders by hand on paper charts. During the second phase, all the doctors enter orders on the computer, but only half receive treatment guidance or reminders.

In a study on outpatient test ordering, the computer screen showed some of the physicians the charges for each test being ordered and the total charge for tests for the patient for that day. This had a decided effect on physician ordering. Those physicians who saw the charges for tests ordered 14 percent fewer tests per patient visit, and charges for tests were 13 percent lower ($6.68 less per visit). Proof of the effect came when the charges were no longer shown on screen—the effect disappeared. *The New England Journal of Medicine* thought this worthy of a special article in its May 24, 1990, issue.

Another controlled trial, reported in the *Journal of the American Medical Association* (JAMA) on January 20, 1993, yielded more good news, this time for inpatient ordering—use of the workstations resulted in substantial savings for Wishard and its patients. It lowered inpatient charges per admission by 12.7 percent, with similar reductions in charges for beds, tests, and drugs. It lowered estimated hospital costs by 13.1 percent. "If similar effects were found nationwide," the authors proudly proclaimed, "the potential savings could be in the tens of billions of dollars annually." Researchers believed the effect was due to providing prices of tests to house staff and to making recommendations *not* to use certain expensive drugs, tests, and procedures in certain circumstances. They also felt that their test-ordering menus led to more selective, problem-oriented testing and longer intervals between tests.

The price tag for these inpatient results? A twenty thousand-dollar workstation network per ward, with additional costs for installation and maintenance. Also an extra five and a half minutes per patient (per ten-hour observation period) for interns entering the orders electronically, but these extra minutes were offset by easier management of the "scut" cards that the interns carried with them on rounds to make notes

about the patients. And, happily, questionnaires probing how the interns felt about using the computer revealed a positive "getting to know you" effect. Physicians were starting to see the computer as their friend.

Dr. Marc Overhage has been making further refinements to the Medical Gopher order entry system. Now it can capture patient-specific information that traditionally could not be analyzed because it was recorded as free text, such as physician's notes and clinical consultation requests. The computer can even provide a digital image of the physician's signature for prescription writing.

Institute researchers are also going after a type of data that traditional medical records have not captured at all—subjective data about the patient's symptoms, satisfaction, and attitudes about various care options. The traditional health system has focused on identifying and resolving medical problems, so human variables and self-reported data such as the patient's clinical history tend to be documented poorly if at all. This has posed an interesting problem—how to convert *soft data* into *hard data* that can be captured in a database. The psychosocial team is hard at work on this.

Dr. Lisa Harris and associates have developed a standard patient-centered questionnaire covering information critical to treating the whole patient, including patient preferences for care, perceptions regarding patients' quality of life, and their satisfaction with care. The team is exploring how to make this information available to practitioners in a useful manner. Nurses are collecting it as part of the admitting procedure, entering the data into portable Gopher workstations that are radio linked to the RMRS so that the information immediately becomes part of the electronic patient record.

For those who question the usefulness of soft data, consider that Dr. Fred Wolinsky found the question "how do you feel" to be the best predictor of an elderly patient's prognosis—a lot cheaper than a battery of tests. Other psychosocial studies have explored the disparity between the health of the poor versus the well-off; risk factors related to race and social status; a community-based intervention on obesity in African-American women; the rate of complications in complex real-world trials of new drugs and treatments (such as

warfarin use in veterans at the VA hospital); and the effects of early primary care and social support on recovery from hospitalization.

"We will continue to evaluate,
in controlled clinical trials,
both computer- and non-computer-based
interventions for improving the efficiency
and quality of health care."
Regenstrief Institute Mission and Goals Statement, 1996

With the tide of information capture—inputs and outputs, both hard and soft—beginning to turn in a positive direction, Institute researchers are focusing on yet another aspect of the physician/patient microenvironment: how doctors decide what processing their patients should get.

Computer-simulation guru Steve Roberts, in the Institute's 1984–85 progress report, pointed out an interesting irony. Medical science, he said, is an impressive accomplishment built upon the vast experience of countless generations. Ancient diseases have been eliminated; injuries once fatal or permanently disabling are now repaired; minute tumors deep within the body can be located without penetrating the skin. In contrast, a relatively primitive process links the science of diagnosis and therapy with the personal objectives of the patient. "Clinical decision making still depends on the patient's ability to communicate and the physician's ability to empathize, much as it has since the first societies designated the role of healer. It is as though flight were mastered without corresponding advances in the science of navigation."

Doctors order tests, prescribe drugs, and decide whether patients are admitted to hospitals and when they are released. With economic pressures permeating the clinical environment, these clinical decisions are more crucial than ever. As more and more tests and procedures become available, patient expectations grow while costs rise and resources shrink. Doctors are expected to weigh cost factors, yet no system-

atic guidelines exist to tell them the costs and health consequences of decision alternatives.

Now that Wishard and Regenstrief Health Center doctors are giving up their paper-and-pencil ways, the computerized medical record system is making it possible to learn more about how they decide on what care to give. Under the Institute microscope, researchers continue to isolate *process rules* to help doctors make better decisions. Using the best current understanding of human cognition and behavior, and considering the clinical realities of the practice of medicine, researchers are also figuring out the best ways to organize and present medical information to improve both physician and patient decision making.

A very simple example of a process rule might be, "All patients who are over age sixty-five or who have congestive heart failure, renal disease, or chronic lung disease should get a flu shot in fall or early winter." Researchers are gathering information about whether doctors and patients adhere to such rules when the rules are presented. If a rule is not followed, they ask why. Is it because the rule does not embody all the factors that the doctor might consider? Or is it because the health care delivery system is set up in a way that prevents or discourages the rule from being followed?

For many care decisions, process rules either do not exist or are not well defined and accepted. Doctors can defend their decisions only on the basis of historical tradition, anecdotal evidence, or the cycles of the moon (in effect, this is what they do when they schedule return visits on one-month or three-month cycles). In these cases, the Institute seeks to develop rational, consistent process rules from whatever data sources are available—either a database of hundreds of patient visits or specially designed clinical trials that collect comparative data under different clinical conditions.

Drs. Marc Overhage and William Tierney have developed comprehensive process rules for the treatment of three major health problems—hypertension, asthma, and congestive heart failure. Their eight hundred rules go far beyond the Institute's earlier reminder systems and deal with the total management of a medical problem. For example, the process rules suggest specific antihypertensive drugs for pa-

tients with different demographic and clinical characteristics. They suggest the escalation of doses according to clinic-recorded blood pressure measures. When ceiling doses are reached, they suggest the addition of a second or third antihypertensive. Researchers are studying the direct effect of these comprehensive reminders on both physicians and pharmacists, using surveys, time-motion studies, and data captured electronically about the providers' actions.

As good process rules are developed to feed into the electronic guidance system, researchers are helping to define good health care practice in general. For several years, the Institute has been involved in a national project to develop *protocols* for quality care in major diseases, leading to better, less costly outcomes. Spearheaded by Dr. Robert Dittus, who followed in the methodological footsteps of Steve Roberts but lent his own expertise as a practicing clinician, the project is one of a series known as the PORT studies.

In 1990 a new federal organization, the Agency for Health Care Policy and Research (AHCPR) handed over five million dollars and chose Indiana University and the Regenstrief Institute to become one of fourteen original sites nationally designated as a Patient Outcomes Research Team (PORT). This PORT's first assignment from the AHCPR was to learn all there is to know from medical records about a costly but common procedure—replacement of knee joints with artificial joints. To carry this out, Dr. Dittus' clinical practice analysis section partnered with the School of Public and Environmental Affairs (SPEA) locally and with prestigious national groups the likes of Pittsburgh Research Institute, Research Triangle Institute, and the University of Toronto. Together they took a series of detailed looks at huge databases being assembled nationally from Medicare records.

Bob Dittus and his colleagues looked at the Medicare claims of about four hundred thousand patients who underwent knee replacements between 1985 and 1990 in the United States and Ontario, Canada. After a good deal of number crunching, they were able to describe geographic variations in how knee replacements were ordered. They could also relate the surgery to such factors as age, race, gender, insurance status, physician and hospital supply, and medical/surgical complications. Then they surveyed a ran-

dom sample of 2,550 of these patients, asking how long the patients had to wait for scheduled surgeries, how much improvement they noticed in knee pain six months after the surgical wounds were healed, and whether they felt better socially and emotionally because of the surgery.

Doctors varied widely in their use of age as a criterion for recommending knee replacement. So the researchers analyzed their survey data and found that older patients did as well as—and often better than—younger patients in terms of reduced body pain and improved knee flexibility, general health, and mental health. Most doctors used obesity as a criterion for selecting patients for the surgery, but the survey analysis showed no special difference in outcomes for obese versus other patients.

Notice the vast amount of data—close to half a million patients—analyzed in this PORT study. A major goal of the knee replacement project—as well as of similar projects on diabetes mellitus, cardiovascular disease, musculoskeletal disease, gastrointestinal problems, cancer, and pulmonary diseases—is to synthesize huge quantities of outcome data and feed it back to doctors and patients. The idea is that someday soon patients can expect uniform recommendations as to the appropriateness of knee replacement, no matter where they live or which doctor they consult. Their doctor's recommendation should depend on patient characteristics, expected outcomes with and without surgery, and the quality of life foreseen under these outcomes. In other words, patients will get recommendations based on solid statistical analysis rather than on cycles of the moon.

The rules are thus being defined to direct the process of patient care. However, in 1994 Clem McDonald and Marc Overhage injected a cautionary note to temper the enthusiasm for—and the unmanageable scope of—defining every process precisely. Speaking to their colleagues through an editorial in the March 1994 JAMA, Drs. McDonald and Overhage called for guidelines to serve as "guardrails" rather than "cookbooks." They said guidelines should be defined narrowly to "include only rules about when to initiate and/or when to avoid medical interventions that are valid and decidable within specified medical contexts." In most cases, guidelines should be limited to simple issues, or they should

be "bounding rules" that specify what should be done at the very least and/or at the very most, without speaking to all the cases in between.

Now we refocus the research lens again to look at another level of effort—how to use the masses of data that have been collected through almost thirty years of association between the Regenstrief Institute and Wishard Memorial Hospital. A true gold mine has been created. Records are available on a group of patients who have been getting medical care at the hospital and health center since 1969. Researchers have information about these patients' health over this long period and about who cared for them and how, spanning hundreds of visits. They have stored data about what drugs the patients took, how they fared after surgery, how their diseases progressed, how they felt about their experience at the health center, and myriad other points of data.

Dr. William M. Tierney is the "master miner" credited with unearthing the research potential of this huge database. He worked with Clem McDonald for twelve years, coordinating access to the RMRS by Institute investigators and associates and improving research efficiency.

Presiding over a database of more than a million patients and nearly a hundred million individual observations, Bill Tierney knows more about its contents and how to mine the data than anyone else. He has helped many other researchers find the informational gold needed to answer their research questions—in 1994–95 alone, he provided substantial assistance on more than fifty projects. Ask Bill anything. He can help you determine the prevalence of a certain disease. He can tell you the numbers of patients available with certain characteristics that make them appropriate to be invited into your next study. He can find the costs associated with various diseases, the usage rates of diagnostic studies, the relative costs of two drugs when the overall usage patterns are considered, and a host of other economic and

management questions. He has used the RMRS to track patients in a number of studies and has followed them even long after the studies have ended.

To mine this kind of data requires special tools, and once again the Regenstrief Institute is in the forefront of development. A whole new category of researcher has gradually been added to the Institute staff since 1984, following the model of the Mayo Clinic and similar groups at Cleveland Clinic and Mass General Hospital—the *biostatistician*. This brave ilk loves nothing better than to crunch numbers and, moreover, to do it with statistical rigor.

Under the leadership of Siu L. Hui, PhD, the biostatistics group supports all the Regenstrief researchers by participating in study design to make sure information is captured cleanly and to plan for later data management and statistical analysis. For dessert, the group tackles the problems of analyzing humongous databases. Huge, complex databases—the RMRS and Medicare's hundreds of millions of claims records, for example—tend to contain a certain amount of "messy" data. It's not a pretty picture.

If you're a medical researcher, you often find yourself looking backward in time at data collected in the real world as opposed to the squeaky clean research environment. Real-world data are not routinely checked and rechecked as they would be in a research experiment, and usually no attempt is made to collect complete information on a regular schedule. Therefore, what is collected, when it is collected, and about whom it is collected are prone to bias. The analysis of such data can be complex and challenging.

Rather than scrap the whole data set, you can enlist a biostatistician to work statistical magic so that you can compare and predict with reasonable accuracy even though the data are somewhat flawed. Statistical methods to handle the vagaries of missing data and data collected at varying intervals are poorly developed, and traditional statistical methods of comparing costs of medical care frequently yield erroneous results. So the Institute's biostatistics group has developed accurate, powerful new methods for making such comparisons.

The key, they say, is to recognize that there are limits on the questions you can ask of those messy data. For ex-

ample, it's risky to use them to compare the performance of different doctors or health centers. Given the wide variation in patient variables—chance of death, hospital cost, and so on—some providers will have bad performance scores by chance alone. As much as 80 percent of performance may be explained just by bad luck. Biostatisticians advise using this type of data to improve a system, not to compare it to others.

While the biostatisticians chew on these issues, Regenstrief Institute researchers, undaunted, are forging ahead with analyses of their own humongous database. Epidemiology is all the rage—just pull all the patients with characteristics X, Y, and Z out of the hat and see what happened to them over time. Look at their risk factors and the treatments they got. This *retrospective* analysis of a database is a whole different ballgame than controlled clinical trials—it's the complex, messy real world of clinical settings.

Dr. Chris Callahan has created a unique *prospective* database of survey data, laboratory tests, resource use, and encounter data from the RMRS that he can follow in the coming years. He surveyed four thousand older patients using an instrument designed to detect depression, alcoholism, and cognitive impairment. (The depression score is another example of the "hardening" of otherwise "soft" data by means of a formal and validated data collection instrument.) Of the four thousand patients, about 16 percent have cognitive impairment. However, physicians noted such impairment in less than one-fourth of those identified as impaired by the survey.

A particularly thorny problem in the medical record briar patch has to do with trying to pool patient data from many different sources. Each patient record is an assemblage of information, only a portion of which comes from in-house sources such as the doctor's office or hospital floor. Essential data also come from outside sources such as the radiology lab, the pharmacy, the blood testing lab, the pathology lab, and various specialists. Even if these entities keep electronic records, each of their computer systems may use different storage structures; different record identifiers; different representations of dates, times, and people's names and addresses; and even different codes to represent the same meaning.

How do we get all these systems talking to each other in the same language?

The answer is to develop standards—clinical data interchange (CDI) standards, that is. If standards could be set nationally for coding laboratory test results in electronic messages, this would make it easier to pool clinical data, not just in a single patient record and not just within a hospital or clinic, but in huge research databases too. Researchers would have better data to work with, which has them excited. "Data interchange standards give life to our data—independent of the source system," says one of their articles. Enabling data exchange between clinical systems is especially important in clinical research used to drive health policy. With standards, researchers can obtain and pool the "rich troves of clinical information available across the nation."

Clem McDonald, Marc Overhage, and others have been working on this problem for some time. Standards, they say, "permit diversity of the components while promoting uniformity of the whole." As chair of a subcommittee on developing standards for transfer of clinical data for the American Society of Testing Materials (ASTM), Clem McDonald wrote an early version of such standards—ASTM 1238—which has been put into widespread use among referral labs, university medical centers, drug companies, and French lab system vendors. In 1989, he ushered in a similar standard within Health Level 7, a consortium of information system vendors, users, and consultants developing interchange standards for all transactions that occur in large medical institutions. A recent grant of one million dollars from AHCPR is funding continued development of a national standard for coding laboratory test results and a programming toolkit for transmitting clinical data over the Internet. The first version of the coding system, called LOINC, contained code names and synonyms for six thousand laboratory tests and was distributed to interested parties through the Internet in April 1995. By 1997 it had grown to thirteen thousand tests and was being widely adopted, led by the Centers for Disease Control and Prevention (CDC) and the largest commercial laboratories (Quest, LabCorp, SmithKline Beecham, ARUP, and LifeChem). Care system sites included Kaiser Permanente;

Partners Healthcare System of Boston; the U.S. Navy; the province of Ontario, Canada; and the country of New Zealand.

"We believe that the widespread adoption of computerized systems will be necessary for optimizing the efficiency and quality of health care, and we will continue to work toward that end." Regenstrief Institute Mission and Goals Statement, 1996

A most exciting development is that the RMRS is spreading throughout the city of Indianapolis and beyond, with the promise of moving away from the idea of islands of information, where each hospital, laboratory, clinic, and physician is on a different island with nothing linking them.

A link was established in 1988 with the Richard L. Roudebush Veterans Administration Medical Center and later with IU Medical Center. Now, with a $2.4 million grant awarded in 1994, the Regenstrief Institute is one of twelve grantees nationwide to be designated a *high-performance medical informatics research center* to investigate the application of technology to health care. The grant is from the National Coordinating Office for High Performance Computing and Communication and from the National Library of Medicine. It is paying to link the Regenstrief/VA hospital/IU Medical Center community medical research system to three hospital emergency rooms—Wishard, Methodist, and Community East—as well as to fifty community pharmacies, ten community health clinics, four HMO offices, and twelve homeless care sites in Indianapolis.

This high-speed computer network—the Indianapolis Network for Patient Care and Research—will test the feasibility and measure the benefits of linking care providers across organizational boundaries. Imagine the benefits to a beleaguered ER physician dealing with a patient in crisis. Quoted in the *Indianapolis Business Journal*, Dr. William Cordell at Methodist Hospital says emergency care without a patient history is like "viewing one frame of a movie and trying to determine the plot." Using the network, ERs will send their patient registration records to the RMRS and get

access to patient records already in the system. A controlled trial will test whether sharing medical information improves the cost and efficiency of emergency room care. Outcomes to be measured include the use of medical resources, cost of care, provider time spent giving care, and providers' opinions of the services.

In addition, pharmacies will send all their prescription records to the RMRS for a citywide prescription database incorporating a computer-based prescription-writing system. The prescription database promises to alleviate many drug misadventures such as duplicate prescribing, overdosing, adverse drug interactions, and undertreatment. This is significant, because a study cited by the Medical Library Association showed that fewer than 10 percent of elderly patients could report the names of all the drugs they were taking, let alone the doses.

For security, all network information will be encrypted and password protected, and no indication of AIDS or HIV will be included. In case physicians need to bone up on obscure problems or the latest techniques, the network will provide a mini medical library with on-line access to medical textbooks and all research articles published in the last twenty-five years.

The Regenstrief Institute would like to link up all ERs in Indianapolis, which could provide indicators for a wide variety of problems in the health care system. It now has grants to link the six major hospitals and two large group practices. The network should yield data that the researchers can use to plan for a comprehensive citywide medical record resource. It is their fond hope to develop a model that could be replicated throughout the nation.

As busy and productive as the research agenda has been, the 1990s have also been a time of introspection for the Regenstrief Institute.

When Walter Daly gave up the Institute directorship to become dean of the medical school in 1983, he was suc-

Joanne Fox with former Institute directors Walter Daly and Gus Watanabe

ceeded by the new chair of the medical school's Department of Medicine, Dr. August "Gus" Watanabe. Then Gus left in 1990 to become Eli Lilly's vice president for research, and the question came up as to whether the next Institute director should again be the person succeeding Gus as chair of the Department of Medicine. By now, however, the Institute had clearly grown too large for part-time management, and people also realized that one person alone could not handle the dual responsibilities of running the Department of Medicine and the Regenstrief Institute. For one thing, Sam's endowment had arrived at the Institute's doorstep and needed someone's attention to manage it. It was time to consider hiring a full-time director.

The Foundation's deliberations were attended by lengthy discussions echoing a debate that had been going on throughout the Institute's history. Is the Regenstrief Institute just a convenient flexible funding source for the medical school's Department of Medicine and a minor footnote on published papers? Or is the Regenstrief Institute a world-class scientific institute with its own endowment, board, staff, and director? A search committee was convened and charged with conveying to the candidates that they would be paid by the Regenstrief Institute and that the Institute would be their full-time job. Len Betley and Walter Daly drafted formal instructions to that effect. The next director of the Regenstrief Institute would wear only one hat.

A national search was begun. The timing was good because Sam Regenstrief's endowment made it possible to fund a full-time position. But the timing was also bad because health services research had suddenly surfaced in the public and governmental consciousness. Congress had created the Agency for Health Care Policy and Research, and the VA budget was growing. The federal government was funding any research institute that had any kind of track record and could

put together a plan for health services research. This made it difficult to recruit an external candidate—mature candidates at other institutions were happy to stay where they already had a good thing going, and they couldn't be lured at a reasonable cost. The committee kept looking, while interim director Dr. David Smith held down the fort. Two years later, the Institute still didn't have a full-time director.

Finally, two in-house candidates stepped up to the plate and, on January 23, 1993, were duly anointed by the Foundation board to share the directorship. It was Len Betley's idea. Since the outside search was going nowhere, he suggested that Clem McDonald and Charles Clark, two of the most senior researchers, get together to see if they could work out a way to direct the Institute together. They came up with a plan for distributing the labor—Clem handling recruitment of researchers, Charles handling administrative chores—and they rolled up their sleeves. The Institute had been drifting for too long.

Though lengthy, the national search for a director occasioned a worthwhile review of current and projected Institute activities with the Foundation board and the medical faculty. It also yielded valuable feedback from the outside world on what the Institute was doing. Institutional evaluation continued under the new directors. Clem and Charles brought in senior researchers from similar institutions around the country, gave them the grand tour, and grilled them with questions: What are we doing well, and what not so well? What are our strengths and weaknesses? What should the Institute do? If you had fifty-eight million dollars in your pocket, what would you do? The report came back with many favorable comments ("good on informatics") and a number of suggestions ("focus more on medical economics").

Then Clem and Charles took the whole gang to the Brown County Inn in the middle of winter for a retreat. The usual tensions brought out by such encounters came to the surface. Some researchers felt like outsiders, some felt like insiders, and some felt they had no say. But through two and one-half days of sometimes trying conversation, the group emerged with a summary of their collective thinking. This took the form of three documents: a mission and goals statement, official definitions of a Regenstrief *research scientist*

and *affiliate research scientist*, and a statement of how the Institute would evaluate itself. All these were presented to the Regenstrief Foundation board in January 1996.

At first cut, simply stated, the Regenstrief Institute mission is to improve health care…by optimizing the capture, analysis, content, and delivery of information which is needed by patients, their providers, and policy makers…and by conducting interventional studies to measure the effect of applying research findings on the efficiency and quality of health care.

The researchers now call themselves *Research Scientists of the Regenstrief Institute*. Research scientists receive financial support from the Institute and are reviewed for reappointment every three years. *Affiliated Research Scientists of the Regenstrief Institute* work on Institute projects but are neither internally funded nor housed at the Institute. All Regenstrief scientists are expected to participate in the intellectual life of the Institute and to assist in mentoring and training up-and-coming researchers.

An issue that has been the subject of occasional struggle is how to evaluate the Regenstrief Institute. Does one judge the Institute's success by the collective fruits of individual researchers' labors or by the impact of the Institute as a whole? Joanne Fox laments that the "impact" part would be easier if the Institute were engaged in something easier to explain to the public and whose progress could more easily be demonstrated.

Meanwhile the Regenstrief Foundation board is grappling with even more fundamental questions. Should the Institute more narrowly define its focus? With whom should it affiliate or ally itself? Should the Institute have a permanent faculty of its own, not connected to the university? The board's challenge is to define the entity that is the Regenstrief Institute, not so broadly that it is meaningless, and not so narrowly that it cannot attract really talented people.

The Institute has lately developed much more of a personality of its own. Now authors of its publications bill themselves as "Senior Research Scientist of the Regenstrief Institute and Professor of Medicine at Indiana University" rather than giving the Institute only passing mention in a footnote. Institute funds are no longer just someone's pocket

money; they are focused on a mission. The Institute is gaining visibility, too, with a series of Regenstrief Conferences that draw nationally known researchers to share findings around a particular topic. Proceedings are published in relevant academic journals. For example, the 1987 conference—"Role of Decision Modeling in Quality and Cost-Conscious Cardiovascular Care: Establishing the Future Agenda"—was published in the *Journal of American College of Cardiology*, with a preface honoring Sam Regenstrief. The 1989 conference on analysis of databases was published in *Statistics in Medicine*. A further reputation-building step in place since 1994 has been to earmark a part of the endowment for a Regenstrief Institute Fellowship.

Although Institute researchers have seen their work widely published in the best professional journals, the board thinks Sam would have wanted to make more of the findings accessible to ordinary folks. For careful researchers who are used to hedging every statement, the thought of publicizing Institute findings in a black-and-white way to the lay public is uncomfortable, especially since some of the findings cast doctors in a negative light. Though the researchers are willing to try, it has been difficult to get the quality media to take an interest.

Charles Clark would love to see the Institute's expertise plugged into public policy. While exploring the impact of physician education in diabetes care and the reimbursement structure of Medicare and other insurance, his group has learned much about structural and financial incentives and disincentives in the management of diabetes. His dream is that, when the legislature meets to decide what to do about health care for the poor, they would look to the body of empirical research that the Regenstrief Institute has generated to inform their decision.

Charles says the biggest administrative challenge facing the Institute is to maintain the senior researchers and to give the talented young people room to grow so that they don't feel they must go elsewhere to realize their potential. But Charles is convinced the Regenstrief Institute is now ready to recruit some real superstars. Recruitment of nationally known scientists may be difficult, he acknowledges, because the field is still small and the notables are entrenched

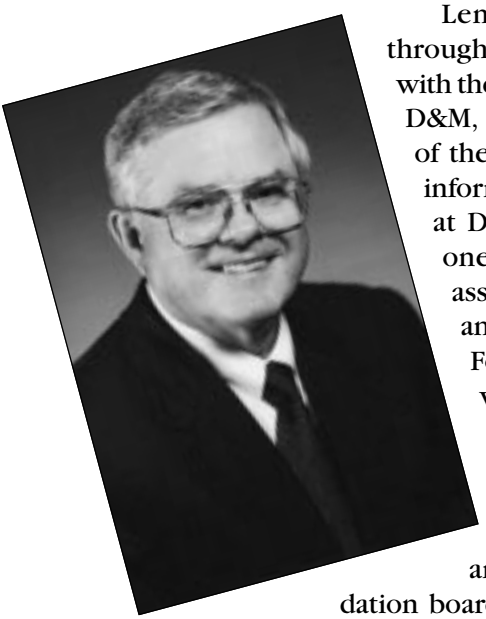
at their present sites. This forces the Institute to aim at younger but promising scientists.... And why not? They didn't do so badly when they hired Clem McDonald, Joe Mamlin, Steve Roberts, and other innovative minds back in the early 1970s.

Just who are these board members who grapple with a definition of the Regenstrief Institute? Many are family and former associates of Sam Regenstrief. The Regenstrief Foundation board of the late 1990s still reflects Sam's concept of combining family, medical faculty, and business people. Formalized in January 1995, the board structure and composition calls for three family members, three members affiliated with the medical school, and seven independent business or professional people. Those still on the board at age seventy-five retire as lifetime members.

Board members who knew Sam personally are growing fewer in number. Sam's faithful secretary Marilyn Mitchell passed on in 1993 and his personal advisor Merle Miller four years later. Sam's trusted business advisor from Goldman Sachs, Jim Marcus, who helped oversee the management of the Foundation's investment portfolio, retired from the board in 1997. In his Park Avenue condo, Jim tends to his collection of French antique clocks, listens to music, and serves on the board of the New York Metropolitan Opera. Dick Goodemote, the national Sears executive who met Sam on the day of the Kent State shootings, has retired as a member of the board but continues to be involved. To this day he continues to ask the practical questions that focus the board on stewardship of Sam's legacy—What's this doing for us? What's this doing for society?

Purdue-engineer-turned-university-president Steve Sample, obviously very sophisticated about academia and research, brings up the hard issues in board meetings, but in a nice way, without being confrontational or abrasive. Steve has pushed to see the Regenstrief Institute established as a respected name in medical research. It was he who suggested to Gus Watanabe, then Institute director, that they organize the first Regenstrief Conference as a device to build up independent stature for the Institute. Establishing the Institute

name is not just to salve the egos of board members, or even to honor Sam and Myrtie Regenstrief. The fact is, says Steve, if the Institute is going to have any long-term impact, people have to have heard of it.



Len Betley, once Sam's legal advisor and D&M board president, now presides over the Regenstrief Foundation

Len Betley—the young lawyer who through Merle Miller became intertwined with the life of Sam Regenstrief, his company D&M, and his Institute—now is president of the Regenstrief Foundation. The same informal passage of control that occurred at D&M occurred at the Foundation—one day when the Foundation board assembled, Sam simply turned to Len and said, "You run the meeting." Joanne Fox, who came to the Institute so she would have an extra hour a day to spend with her children, is an executive officer. Sam's little sister Helen Barrett, whom he helped to raise, has reached the age of seventy-five and has been succeeded on the Foundation board by her daughter Lesley Olswang. Nephew Allan Cohn and niece Phyllis Cohn's husband, Harvey Feigenbaum, still serve.

The board is undergoing a transition as those who knew Sam retire to lifetime membership. Qualifications for future board members include "business experience, especially as a 'wealth creator,' expertise in the for-profit health care sector, investment experience, a background in research, experience dealing with complicated institutional structures, and, above all, good judgment and breadth of view."

Going from year-to-year funding to managing an endowed institute has also been a big transition. The Regenstrief Foundation board now has much greater fiduciary responsibilities. They worry about how to conserve the principal and grow the endowment and decide how much of its income to spend each year.

The board could easily have decided to fold the Foundation's money into IU's endowment and make the Institute a part of the medical school. The Regenstrief endowment would have generated a spendable two to three

million dollars a year, which they could have given to the medical school dean to improve the school as he or she saw fit. Then the Regenstrief Foundation board could have met once a year over coffee and crumpets to hear the dean tell them about all the good things going on at the medical school. But that would not have been Sam Regenstrief's way. The answer, the board decided, was to manage the endowment independently: a very Sam-like decision.

Now Sam's endowment is being leveraged with big grants from foundations and government, and Steve Sample notes an entrepreneurial spirit at the Regenstrief Institute that's not always found in public universities. As with all endowments, the aim is to spend only part of the annual investment income. The rest is reinvested so that the endowment grows at least enough to keep up with inflation. To be good stewards of Sam and Myrtie's money, the board is working to grow the endowment to a hundred million dollars as quickly as possible.

Even spending three million dollars a year is a drop in the bucket compared to the money spent by NIH and other agencies. On that scale, the Regenstrief Institute is just a blip on the scope of health research in general. The Institute has not played a dominant role but it has had some influence. Says Steve Sample, the Institute has been like John the Baptist—a voice crying out in the wilderness, preparing the way, opening people's ears, eyes, and minds to the fact that how we deliver health care determines the cost and hence, availability of good care to the ordinary citizen. The Institute has played that role nobly, though with little fanfare, and its voice was heard long before the cacophony of voices we hear today had even considered the subject.

"Sam Regenstrief saw technology
not as an end in itself,
but as an instrument to human improvement.
He did not believe in the survival of the fittest,
he believed in the survival
of the sustainers…the responsible caregivers."
Rabbi Dennis C. Sasso, Congregation Beth-El Zedeck

"Is Sam getting good value for money?" the board asks itself from time to time. For the investment he made, says Jim Marcus, Sam has been getting a lot of value. "Sam was a good shopper, he always got value for money. The Foundation was set up in a very lean way and funded some very important projects." From those days in the early 1970s, the Institute has nurtured marvelous researchers who do good science published in the best journals in the country and who are able to pull funds nationally from the most competitive sources. "That wasn't the way it started," Joe Mamlin recalls. "It started with just Sam Regenstrief reaching in his pocket."

Joe thinks it's important that people remember Sam Regenstrief. He had a great influence, but many of the younger people at the Institute have no idea who he is or that they owe him a thing. It's not so much that Sam did a specific thing, says Joe, but he started a system in motion. "His legacy is like his paragraphs. You can't really define the sentences or the content—you're just overwhelmed with the picture that's painted. What's being painted here is intimately tied to Sam Regenstrief and what he wanted, but it's more of a gestalt that just comes from understanding what he meant rather than what he said."

Sam Regenstrief wanted to make this a better world for rich and poor alike. He set in motion a system—a research engine created out of a special relationship between the Regenstrief Institute, Wishard Memorial Hospital, the Regenstrief Health Center, and IU School of Medicine, with the Regenstrief Medical Record System as the key tool—that is addressing an urgent societal need and shedding light on how to make life better for many. The Regenstrief Institute couldn't be in a better area of research than it is in today, says Dick Goodemote, because the burning issue now is how to make health care delivery as efficient as we can and bring the best to the most people. "They are in the right field, the challenges are there, there is plenty of research to do, and it's going to last forever. And thanks to Sam it is very well funded."

EPILOG

A NAME TO REMEMBER

Back into the closet go the mementos…the collection of silver dollars presented to a happy couple on their tenth anniversary…the silver shovel that broke ground for a health center…the many plaques celebrating good works…the paperweight made out of a dishwasher part…the photos of smiling men shaking hands…the D&M coffee mug bearing the name "Sam."

"Society is made of three kinds of people," said Rabbi Dennis C. Sasso in his eulogy for Sam Regenstrief, "those who watch things happen, those who wonder what happened, and those who cause things to happen. Sam belonged irrefutably to the latter category….The same spirit that animated him in his business involvements…a spirit that took seri-

ously not only the needs of production, but the needs of body and soul of the producers and the purchasers, animated his involvement with the world of medicine....Sam Regenstrief enjoyed power, prestige, knowledge, and influence. But he wore an even higher distinction, what the Jewish tradition calls the 'Keter Shem Tov'—the Crown of a Good Name. It was his ornament through life and it continues to serve as his blessed memorial."

The well-worn path that Sam established between Indianapolis and Connersville is still driven today by sister Sara's boy, Allan Cohn, who has many customers in the eastern Indiana region for his heavy duty equipment parts company. When they find out he is Sam's nephew, they all say the same thing: Sam Regenstrief was the greatest thing that ever happened to Connersville. They say Sam was a friend to everybody. It didn't matter if you had a quarter in your pocket or fifty thousand dollars—he was your friend. He gave back. These people worked for Sam, but he gave it back. And they miss him dearly.

The Regenstrief name is well known in Indianapolis too—by cab drivers. To cabbies, Regenstrief means the Regenstrief Health Center, the destination requested by many of their indigent fares who get their transportation paid by some helping agency. But neither cabbies, the indigent, nor most other Hoosiers know of the Regenstrief Institute or the man behind it, Sam Regenstrief. Though the personal anonymity is probably just fine with Sam—he never did seek the limelight—those who knew and loved him, and those who now nurture his legacy, hope this telling of Sam's story will change that.

Tehi Nishmato t'rzura bitzor hahayyim.
May his soul, bound to the eternal bonds of life,
continue to be a source
of inspiration and benediction.

HISTORICAL TIMELINE

1910 ? Samuel Nathan Regenstrief born in Romania.

1929 Sam takes a job as a timekeeper at Real Silk Hosiery Mills, Indianapolis.

1931 Sam presents himself at CPA firm of Spradlin, Carter, and Jordan, becomes a partner in the Management Institute with Charlton Carter and Wells Bishop (through 1945).

1939 Sam takes over management of Rex Manufacturing, Connersville, Indiana.

1940 Sam secretly weds Myrtie Barnette of Franklin, Indiana.

1944 Rex Manufacturing becomes a subsidiary of Philco, with Sam Regenstrief its president (Sam soon becomes VP of Philco's Refrigeration Division).

1958 Sam purchases Avco plant in Connersville, founds Design & Manufacturing Corporation.

1959 D&M begins operations in January with 100 employees.

1967 Sam and Myrtie Regenstrief create the Regenstrief Foundation, Inc., with John Hickam of IU Medical School as director; D&M drops its sink and cabinet business to concentrate on dishwashers.

1968 John Hickam recruits Joseph Mamlin from the Peace Corps in Afghanistan to become the Regenstrief Institute's first researcher, soon joined by Raymond Murray, Duke Baker,

and Charles Kelley of IU Medical School.

1969 Regenstrief Institute for Health Care chartered as a department of the Health and Hospital Corporation of Marion County; Ray Murray chosen as director.

1970 Eugene Stead, Jr., assumes directorship of Regenstrief Foundation following John Hickam's untimely death; Regenstrief Institute launches pilot multiphasic screening studies at Marion County General Hospital (now Wishard Memorial Hospital) and a medical nurse clinician program under Dolores A. Morgan; IU Medical School, Health and Hospital Corporation of Marion County, and Regenstrief Foundation sign a letter of agreement to construct Regenstrief Health Center; D&M ships two million dishwashers, holds 24 percent market share.

1972 Sam honored with Indianapolis Boys' Clubs' Horatio Alger Award; Clement McDonald, internist and bioengineer, joins the Institute to work on automating medical records; Stephen Roberts, industrial engineer, joins the Institute, participating in health systems planning for future Regenstrief Health Center; Ray Murray is chosen as head of IU Medical School's new Department of Community Health Sciences; Institute launches family nurse practitioner and physician's assistant training programs; ground is broken for Regenstrief Health Center; Joanne Fox takes job as Ray Murray's secretary.

1974 Institute establishes model group practices in the small Indiana towns of Paoli and Connersville, collaborates on programs to train and retain primary care internists, and participates in planning for operation of the

Regenstrief Health Center; Eugene Stead steps down as Foundation director.

1975 Regenstrief Health Center opens to the public; Ray Murray resigns; Sam requests formation of a Scientific Advisory Committee to keep Institute projects efficient and related to Institute aims; D&M outfits second dishwasher plant in Richmond, Indiana.

1976 Regenstrief Foundation treasurer Leonard Betley requests that IRS grant a change in Foundation status from private foundation to public charity; Institute employees are transferred from Health and Hospital Corporation payroll to Institute payroll, and the Institute becomes a division of the Foundation; Walter Daly, chair of the department of medicine at IU School of Medicine, assumes Institute directorship; Clem McDonald's computerized physician reminders are publicized in *New England Journal of Medicine*.

1977 IRS grants provisional public charity status, provided the Institute demonstrates that it continues to qualify as a medical research organization; Regenstrief Health Center's medicine clinic is decentralized into primary care teams supported by computerized medical records in readiness for health care research; NIH awards $1.5 million grant to start Diabetes Research and Training Center at the Institute.

1978 D&M grosses $175 million, nets $6 million according to *Fortune* magazine, which characterizes Sam as undisputed king of the dishwasher industry; Sam suffers two heart attacks and a stroke.

1982 IRS confirms Institute's status as a public charity.

1983 August Watanabe assumes Institute directorship from Walter Daly.

1984 Under $1.6 million grant from National Center for Health Research and Health Care Technology Assessment, Institute undertakes controlled trials of computerized physician order entry; as D&M celebrates its 25th anniversary, a changing dishwasher industry brings new competition, and Sam's failing health diminishes his capacity for leadership.

1986 Myrtie Regenstrief dies unexpectedly after a fall.

1987 D&M assets are sold to White Consolidated Industries.

1988 Sam Regenstrief dies, leaving 80 percent of his estate to the Regenstrief Foundation.

1990 IU Medical School and Regenstrief Institute are designated a national Patient Outcomes Research Team (PORT) site, granted $5 million from the federal Agency for Health Care Policy and Research.

1993 *Journal of the American Medical Association* publicizes Wishard Memorial Hospital's savings as a result of the Institute's computerized inpatient ordering system, launched in 1989; following a two-year national search for a director (the position vacated by Gus Watanabe), Clem McDonald and Charles Clark assume Institute codirectorship.

1994 Institute is designated a national high-performance medical informatics research center to investigate the application of technology to health care; Clem McDonald is elected to National Academy of Science's Institute of Medicine.

1997 Clinical data interchange standards pioneered by the Institute are widely adopted.

DESIGN & MANUFACTURING CORPORATION BOARD OF DIRECTORS

Samuel N. Regenstrief 1958–87
L. Lee Burke ..... 1958 *
Charles Bottorff 1958–82
Merle H. Miller ..... 1958 *
R.H. McMurtrie 1959–74
Robert Feemster 1959–63
Melvin H. Boldt 1959–60
Fred D. Danford 1960–70
Walter A. Mogensen 1960–65
Myrtie Regenstrief 1966–72
Harold M. DeGroff, Jr. 1970–83
James Marcus ..... 1972 *
Thomas W. Duncan ..... 1972 *
Richard H. Goodemote ..... 1972 *
Marvin Silbermann 1974–83
Glen W. Kaufman 1974–86
Robert G. Scelze 1974–83
Steven B. Sample ..... 1977 *
Ralph Roper 1978–87
Merle Bright 1978–80
Leonard J. Betley ..... 1981 *
Arnold R. Kays 1983–88
William H. Yake 1983–88
Marilyn M. Mitchell ..... 1983 *
Helen R. Barrett ..... 1987 *
Allan L. Cohn ..... 1988 *

* Members of the board when the company dissolved.

Final meeting of the Board of Directors of Design and Manufacturing Corporation, July 2, 1990
Top: from left, Marilyn Mitchell, Helen Barrett, Merle Miller, Dick Goodemote, and Steve Sample
Bottom: clockwise from bottom, Richard Goodemote, Tom Duncan, Jim Marcus, Len Betley, Lee Burke, Ed Mulick, and Allan Cohn

REGENSTRIEF FOUNDATION BOARD OF DIRECTORS

Samuel N. Regenstrief 1967–88
Myrtie B. Regenstrief 1967–86
Merle H. Miller ..... 1967–95 *
Frank E. McKinney 1967–74
Logan T. Johnson 1967–77
Harvey Feigenbaum 1972–present
Richard H. Goodemote ..... 1977–97 *
James Marcus ..... 1977–96 *
Allan L. Cohn 1977–present
Marvin Silbermann 1977–82
Helen R. Barrett ..... 1977–97 *
Steven C. Beering ..... 1977–95 *
Leonard J. Betley 1980–present
Steven B. Sample 1982–present
Walter J. Daly 1982–present
Harry L. Gonso ..... 1985–95 *
LeRoy Silva 1985–present
David Knall 1995–present
Jack Snyder 1995–present
August Watanabe 1995–present
Robert Holden 1996–present
Stephen Ferguson 1997–present
Barton R. Peterson 1997–present
Lesley B. Olswang 1997–present

* Lifetime directors.

1999 REGENSTRIEF FOUNDATION BOARD OF DIRECTORS AND OFFICERS

Back row, left to right: Clement McDonald, MD; Stephen Ferguson; David Knall; Barton Peterson; Robert Holden, MD; Jack Snyder; Walter Daly, MD; Leonard Betley

Front row, left to right: August Watanabe, MD; Allan Cohn; Helen Barrett; Joanne Fox; Harvey Feigenbaum, MD; LeRoy Silva, PhD

Not present for picture: Lesley Olswang, PhD, and Steven Sample, PhD

Life directors not pictured: Steven Beering, MD; Richard Goodemote; Harry Gonso; and James Marcus

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