The Logos Story

As told in 1997

The following account tells the true story of an improbable business venture undertaken in the spirit of the Psalmist's bold declaration, "Unless the Lord builds the house, those who build it labor in vain"(Ps 127:1).

- I -

This is a story about a small, multinational company, the Logos Corporation, that was interiorly dedicated to God at the moment of its conception 27 years ago, in 1970. Its history since then has been so unusual it caused a knowledgeable investment banker to say of it recently "Logos is not a business, it's a mystery." As you will see shortly, the many unlikelihoods involved in its formation, its product, and its financial history do indeed seem to defy natural explanation. First and foremost there is the unlikelihood that any commercial enterprise begun by penniless people and with 50-100 well-paid employees could survive on its own for 27 years without ever once realizing a single dollar in profit, in fact, while incurring annual losses often in excess of two million dollars. Yet this is the case with this little company. This circumstance is not because the business was ill-conceived or had nothing worthwhile to sell or was poorly managed. Rather it is because the product—a computer system that translates between natural languages—was so difficult to build, involved such advanced and problematic technology, that it took virtually all those years to develop it and then get the marketplace to accept it. This situation is still going on—technical work still needs to be done, the marketplace is still half asleep, the balance sheet is still awry—but *mirabile dictu*, the company is still going strong. The picture isn't all negative of course: today the Logos translation system is being used profitably (for its users) by well-known multinational companies in a dozen nations of the world. But while this shows that the company has already given something of demonstrable value to the world, it must also be said that from a financial perspective this Logos Corporation should have sunk into oblivion many years ago. So this is a story about

a company that has all its life mysteriously contravened the economic laws of gravity, a company as it were that has come to walk on water, by the grace of God and some graced individuals.

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The second unlikelihood relating to Logos Corporation concerns the fact that the product this company aimed at developing and bringing to market—a computerized translation system—was considered by the best scientific and technological minds of this country to be unbuildable. Let me explain. In the earliest days of the computer, back in the 50's, computer pioneer Alan Turing proposed that these new electronic super-calculators should not only be able to crunch numbers but also be able to do things like play chess and translate languages. Turing was prescient about computers and chess, but the case with language translation turned out to be quite otherwise. To be sure, right after his seminal remarks, numerous attempts were indeed begun worldwide to build just such computer translation systems (known as machine translation systems—MT for short). Government funding flowed freely into university-based research projects for ten years until 1967 when a devastating evaluation by the National Science Foundation (published in a document known as the ALPAC Report) almost overnight brought all these efforts to a halt. This famous report, in assessing the achievements of these projects to date, found them unacceptable and unpromising, and concluded that translation by computer was in all probability not feasible. It appeared that natural language is too complex, too ambiguous, too fuzzy to lend itself to logical, numerical treatment by any method then known to the state of the art. By the late 60's the received wisdom was that MT could not be done and, as a consequence, virtually everyone abandoned the field.

The dust had barely settled on this debacle when Logos Corporation was formed (in 1970), to pick up this task and attempt the impossible. It is said that necessity is the mother of invention and so it was in this case—a unique national need had suddenly arisen just then that made another attempt at MT worth considering on the part of the government. And here was a tiny new company, Logos, claiming it could do what Oxford, MIT, Harvard and IBM and many other powerful organizations around the world had tried and failed to carry off.

The opportunity had to do with the Vietnamese war and President Nixon's intention late in the war to turn the fighting over to the South Vietnamese and bring our soldiers home. It was called the Vietnamization Policy. This was in the late 60's when the U.S. public had grown restless and unsupportive of the long drawn-out conflict. It seemed like a good idea but there was a major problem—to turn the war over to the South Vietnamese forces meant the U.S. had to supply them with advanced military equipment, equipment that they had to learn to use and maintain. This in turn meant that they either had to acquire a good command of English or be given thousands of military training and maintenance manuals translated into Vietnamese for this purpose. Neither solution seemed realistic. Teaching the South Vietnamese forces English so that it could fight our kind of war would take years. And someone calculated that it would take at least seven years to translate the manuals needed. The problem was so serious that an emergency meeting of the President's Scientific Advisory Council was convened at the White House to see what could be done. One of the participants at that meeting, Evrett Pyatt (later to become Under Secretary of the U.S. Navy), suggested using computers to do the translation. Everyone present knew of the negative ALPAC conclusions regarding prospects for this sort of thing, but Pyatt said he had heard tell of a little company that claimed it had a solution. It was worth looking into at least. And so this is where I came in. The little company was Logos Corporation which I had formed just weeks before in anticipation of this very need. I was contacted and brought to Washington at once to make my case.

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In retrospect it seems unlikely that a tiny fledgling company of just a few people, with no track record and no money, barely a month old, should be called upon to address a crisis of this importance. The qualification that made Logos unique and that brought us to the government's attention seemed pure happenstance—I happened to be the only person in the United States in 1969 who (1) knew some Vietnamese, (2) knew something about computers, (3) knew something about machine translation, and (4) believed he could do the job. I was the farthest thing from an expert in any of these areas, but the combination was unique and did indeed give me an advantage over companies like IBM when they inevitably tried to muscle in on the opportunity. I went to Washington

and made my case to a room full of anxious officials who, for all their skepticism, knew they had little choice but to give me a try, assuming I was real. To test this last qualification, they asked me one question about the system I proposed to build for them—how good will it be? I answered, "Not very good strictly speaking, but good enough to do this job." I was told later that had I said anything else I would not have carried the day. That day is still very vivid in my mind. Our company, only just born, could now take its first breath of life.

Logos Corporation soon received a small contract to demonstrate a prototype capability of English-Vietnamese translation. We were given a long list of English technical terms concerning helicopters and were told that on the day of demonstration our system would be asked to translate into Vietnamese twenty pages from a previously unseen Army helicopter manual employing those terms. We had all of three months to build this prototype. Now all we had to do was pull it off. Given the history of this technology, our own lack of genuine expertise, the short amount of time granted us, the fact that we were virtually starting from scratch, our prospects understandably were not considered good. Evrett Pyatt admitted to us later that government experts had chided him for chasing after "fools' gold."

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Had those officials in Washington asked me how I was going to pull this off, I would not have known how to answer. The truth is I didn't know. I just felt I could do it, and somehow my confidence must have come across. Happily the officials at that Washington meeting never asked. I had some rather vague ideas of an approach, not yet really worked out in my mind, but underneath was this bedrock conviction that any difficulties arising along the way would get solved as we went along. Looking back I see that there really was nothing in my academic or professional background that should have allowed me to feel that way, nothing in terms of my conventional secular preparation. As it turns out there was a reason for such boldness, one I did not become aware of until later, and of which I will speak in a moment.

I am by nature a somewhat retiring person. My academic background was in philosophy and theology. At one point in my youth I was trained in several languages by Air Force Intelligence. One of them was Vietnam-

ese. This was before the war and there seemed absolutely no point in learning Vietnamese at the time, as far as I was concerned personally, and my study of the language was halfhearted at best. After military service I studied theology and for several years served as a Protestant minister engaged in ministry to the bohemian community of New York's Greenwich Village, until my conversion to the Catholic Church in 1960. Following my conversion, I made a living as a contributing editor for the Columbia Encyclopedia, writing and editing articles on the lives of the saints. I eventually drifted into the computer field in the early 60's at the age of 33, initially as a technical writer. Up to this point in my life, my chief bent was literary. I was always good at languages but they never much interested me and I positively detested grammar and things like parsing. Nor did I ever exhibit any talent for technology or science. Yet at some point early in my new computer career I began to read about the difficult machine translation problem and almost at once conceived the idea that, hey, I could build a machine translation system that really worked. It was this pure naked conviction alone that brought me to the attention of the government at that moment of crisis.

Well before I ever thought of forming my own company, I had gone to see the government's leading expert on machine translation, a man by the name of Zbigniew Pankowicz, to talk about my interest in this area. He was a Polish nobleman who came to the U.S. after having been incarcerated in Buchenwald and Auschwicz during World War II. By this point in my life I was a VP in a small software company and on my own initiative had begun to look more seriously into this problem of machine translation. I had dinner with Pankowicz on that first encounter and we talked about the possibilities of a Vietnamese system. I remember at one point leaning over the table and saying to him, with the deepest conviction, "I just want you to understand that I can do this." He must have believed me for he spoke of me later to Evrett Pyatt. The rest is history.

The fact that Logos was small, green and virtually penniless wasn't the main reason we were such an unlikely candidate for this undertaking. What made our selection and subsequent accomplishments most unlikely was the kind of people who made up Logos in those days and who would eventually pull this off. It is here in the people that we get to the heart and soul of this story.

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By the time this opportunity arose in 1970, I was living as a member of a Catholic lay community of over 100 adults plus scores of children of all ages, on a two hundred acre farm in the foothills of the Catskills north of New York City. The community had been formed some years earlier by a man we call here simply H. He was a brilliant individual, gifted in extraordinary ways both intellectually and spiritually. Above all he was a staretz, a spiritual father in the classic sense (and my spiritual father), a man chosen by God to prepare souls for Him. A book could be written about this man but it is God's will that he remain hidden.

Despite his intellectual gifts, H published nothing, cared little for the limelight, and remained virtually unknown until his death in 1980. He functioned rather as a director of souls to any and all who came to him for help and guidance. Eventually a community of some two hundred men, women, and children formed around him, and many hundreds of others—priests, nuns, and laity—came for counsel and spiritual help. The community operated with the blessing of the diocesan auxiliary bishop and had a common economy, rather like a kibbutz. Its members were drawn from every walk of life: teachers, social workers, nuns (who left their orders to join this community), several priests, a lawyer, a cab driver from Israel, some computer specialists, a farmer, a few medical doctors, some engineers, mechanics, a steady stream of fresh graduates from Catholic colleges, dozens of mothers and scores of kids of all ages—all living under obedience as spiritual sons and daughters of this spiritual father. Except for our Vietnamese linguists, all the early workers at Logos Corporation came from this Catholic kibbutz.

I too lived under obedience to my spiritual father and so it was natural that I would approach him first about this idea of forming a company. I told him of the opportunities I foresaw and of my conviction that I could solve this problem. He seemed genuinely interested, if a little cautious. "To do something like this you will need Ph.D.'s from Harvard," he said. I said if we need them we'll get them. He looked at me for a while and then said, "Well then, do it." That was all I needed. When Logos was formed shortly thereafter, H became its first Chairman of the Board.

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It takes money to start a company and our little Catholic kibbutz lived from hand to mouth and could never have undertaken something like

this. We made a few feeble efforts to raise it on Wall Street and from some individual private investors all without success and then, unexpectedly, we received our funding from the most unlikely source of all—a loan from a nun. This sister was a spiritual child of H's who came to be with him from time to time. Like all religious she had taken a vow of poverty, but her circumstance was rather unusual. Her wealthy father had given considerable sums of money to her order under the proviso that should his daughter ever need funds at some point or other, she should be allowed to draw from a special account in her name. For this nun, Logos became such an occasion. The loan was not especially large but it was all she had and enough to get us started. A year later we were able to repay it down to the last penny—the only financier ever to be so favored in the long history of this company.

The company got its precious name from H in what always seemed to me to be a favor from heaven. As we were getting ready to form this company, we needed to decide on a name. I asked H if he would name it for us and he came up on the spot with some kind of playful acronym. I forget what it was but my instant reaction was to reject it. "No," I said, "we ought to have a serious name, a name that really means something." He looked at me quizzically for a moment and then closed his eyes and sank into what seemed like the deepest contemplation. This went on for many long minutes. When he came to, he said simply, "Call it Logos."

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Logos began its life in the bitter cold winter of 1969-1970 in a small unheated milk house on the community farm. At first there were just two of us, my partner and spiritual brother from the community, Charlie B. and myself. We painted the walls and installed a Teletype machine that enabled us to communicate with a timesharing computer in Stamford, Connecticut. Charlie was a gifted mathematician who could take my half articulated notions and program them into cogent software. Working day and night, we began to program the pieces of this system. Sometimes, late at night, it was so cold in the unheated structure that the ink on the Teletype ribbon would be frozen, and nothing would appear when the machine printed—not until the incessant pounding melted the ink. When that first government contract finally came in, we moved to a larger single-room building in town, installed more modern equipment and added more staff from the members of our community. Among these

were several teaching sisters who had left their orders in the post Vatican II chaos, a few students just out of high school or junior college, later augmented by a few college graduates, and finally a handful of mothers from the community, mostly with liberal arts degrees. And we found a gentle Vietnamese scholar by the name of Binh who agreed to join our little enterprise. All of these Charlie and I had to train from scratch to use computers and to work with language in the particular way needed.

Three months later, when the time came for our demonstration, a plane load of some twenty-five government officials, experts, and military types jammed into our little facility, among them a Vietnamese army colonel. There were vocal naysayers among them too, one an expert from Rand Corporation who seemed only too eager to spot all our shortcomings. But the angels were with us. We ran the test text through the system and gave the output to the Vietnamese colonel. Our own Vietnamese linguist poured over the results with him. At one point our linguist Binh put his finger on something and said, "Well, that's not right." The Vietnamese colonel peered closer and then stood up and announced. "No, the machine translated that correctly." That was the turning point. Smiles crept over bureaucratic faces all around and, naysayers notwithstanding, we were on our way. Not long after that, Logos got a seven figure contract to build a real, full blown working translation system capable of translating warehouses full of manuals.

Our little company built that system in a year, completing it on time and within budget. The system was tested by the South Vietnamese in Saigon and was judged capable of producing translations that, with post-editing, were found to be of from "good to excellent" quality. Before long, the U.S. Army, Navy and Air Force began sending us crates full of manuals. We enlarged our staff and set up a full-scale production line. We had already translated about five million words into Vietnamese when one morning we got a telephone call from the Pentagon telling us to stop everything—the war was about to end.

In official reviews after the Vietnamese war was over, Evrett Pyatt cited our project as having constituted one of the outstanding technology success stories of the entire war effort. Indeed, the Pentagon formally acknowledged that the feasibility of large-scale machine translation had now been demonstrated. Zbigniew Pankowicz, who had been the government's technical administrator of the Vietnamese contract, received

the Pentagon's second highest civilian award for his role in this project. Our little band of nuns, students, and mothers had indeed chalked up an outstanding success and we were proud as punch. But the original reason for Logos was over. Now we had to find new reasons for being.

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That was in 1973 and somehow we survived and so has machine translation as a technology. Slowly, painfully, from that point on, Logos, and machine translation in general, began its long crawl back into respectability and technical viability, not only in the U.S. but around the world. Today there are scores of commercial systems and hundreds of Ph.D.'s being awarded every year for research in this field, a few of them even about the Logos system. Not all these systems are successful, not all the brainy ideas being proposed will ever work very well. In fact, most never do. As someone once said, natural language is the most complex event in the universe. Getting a computer to cope with it will always involve an unlikely stretch. Yet the Logos approach continues to be in a class by itself and to have by far the best track record, more than any other commercial or university-based system in the world.

The outgrowths of that original system nowadays translate between English, French, German, Italian and Spanish and are generally viewed by big multinationals as the only real game in town. And these Logos systems keep getting better year after year. Of course Logos is not the same Company today as it was in the early days. The company has nearly one hundred people today, only five of whom originally lived in that lay community. The company is scattered over facilities in Germany, Italy, Canada, California's Silicon Valley and New Jersey. Almost everyone in the Company has an advanced degree, including those Ph.D.'s from places like Harvard that H said we would need. As you walk through the modern facilities of our Company nowadays, you will hear any number of languages being spoken.

From all appearances, then, the Company is thriving. And that surely is a hopeful sign in light of yet another situation that is brewing. We live in an age of information explosion, increasingly so now with the Internet. Information is surging around the globe like tidal waves, most of it in English. People on the other side of language borders would prefer that information be in their own language. For many it is inaccessible unless it

is. Much of this information is trivial of course, and worse in some cases, but much of it is vital too, to commerce, education, culture, science, technology, and even to the Vatican (which now has a Web site on the Internet). As in the days of the Vietnamese conflict, the task of translating all this information far exceeds human resources. And even were there enough translators (which there aren't) and people could afford their services (which they can't), much of this information could not get translated fast enough for it to be useful. As this issue heats up, as it surely will, little Logos Corporation expects to be there in the middle of it all, offering translation that will be near instantaneous, affordably cheap and eminently useful even if still far from perfect. And who knows, perhaps someday in the distant future this technology will become a bridge over the Babel of more than 3000 languages that have divided peoples since time immemorial. Far-fetched perhaps, but at least it's now feasible, technologically speaking. The story of this little company, then, seems far from finished.

OK, that's Logos Corporation, more or less, from the outside looking in. Now let me tell you something about this Company from another angle, more from the inside looking out.

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There is a joke that used to be passed around the Logos Board of Directors whenever the Company's periodic financial difficulties seemed about to bury us—*nothing matters so long as we retain the movie rights to the story.* There's not a little truth in that, for the most extraordinary things have happened to this company, particularly in the area of finance. The following is a typical example of what I mean. One day in the late 70's the company was down to its last few dollars and could not make its payroll. At the bleakest point, a loose acquaintance of our financial VP walked in one afternoon to chat, learned of our difficulties, and wrote a check on the spot for 100,000 dollars. That sort of thing has happened time and time again where someone or some group would show up and pull the firm back from the brink. This company has almost expired so many times that, after a while, one becomes inured.

One of those individuals who came and saved the day was James A. Linen, a man who had been President of Time, Inc. and publisher of *Time* Magazine. When he retired from that vast publishing responsibility he

took an interest in little Logos, made some timely investments in the Company, got us a big contract with the pre-revolutionary government of Iran for a Farsi (Persian) system, and shortly (after H died) became our Chairman of the Board. (This was in the late 70's, early 80's. We had just completed the Iranian contract when the revolution occurred; it took us eight years to get paid for our work, in a courtroom of The Hague). Then for a few years we were actively represented in the marketplace by the famous sports management company, IMG, that was built by Mark McCormick and Arnold Palmer and that handles many of the premier sports figures of our time. We were even championed for a time by Charles Van Doren and the Encyclopedia Britannica. George Steinbrener, present owner of the Yankees, played a critical financial role in Logos at one point. (Each of these is an interesting story in its own right.) We have had investments by some of the most outstanding investment banks, companies and venture capitalists in the world including the super wealthy French Schlumberger family, one of the Wall Street Lerner brothers, Bessemer (the great granddaddy of American venture capitalists), American Research and Development (original investor of the computer company DEC), Houghton Mifflin, Germany's auto giant BMW, and so on.

The list of organizations and financiers who have become intrigued with Logos is long indeed. Almost always they first sent skeptical experts to investigate our technology, and invariably the experts' recommendations were positive. Several even likened what we were doing to the sort of thing that wins Nobel prizes. A computer scientist from Poland after listening to a detailed explanation of our approach, exclaimed that the system "blew his mind." One analyst from Wall Street, a foreign-born gentleman particularly sensitive to the value of language, said he ranked what we were doing on the first rung of technological achievements of the 20th century. Obviously, excessive as these statements must seem, there had to be something analogous taking place in the minds of investors who continued to pour money into the Company year after year without return. Whenever an investor had had enough, and naturally many did after a time, others would always appear to take their place. On average, this infusion of capital has amounted to two million dollars per year for 27 years. And this is still going on. In the last few years the infusion has been closer to twice that sum.

Clearly these investors have all had visions of gold at the end of the rainbow. But the reasons for their investment are more complex than that.

The most important backers over the years have always said they were attracted to Logos partly because of its religious background. They felt that the Company and its technology somehow seemed "destined" to contribute to the welfare of mankind (in their own words) and that this sense added a dimension to their investment that made their subsequent losses a bit less troublesome. No one likes to lose money, of course, but losing it for a worthy cause can reduce the pain. The Company's latest round of investors from Europe is no exception in this regard. This particular group had been following the company for a number of years, and on the occasion of their investment they alluded to the company's religious origins as relevant to their investment decision. They did not try to understand that origin, or probe it, but they were well aware of it and said they made their investment in part because of it.

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In what way can it be said that this company has a spiritual aspect? Well, nowadays probably nothing would directly suggest such a thing except for the on-going miracle of its survival. But for the first fifteen years of the Company's life, a full size picture of Our Lady of Guadalupe hung in the Company's main conference room for all to see, investors, prospective customers, visiting experts, whomever. But more tellingly it was the people who worked for this company. H once said the real genius of Logos lay in the spirit of cooperation of its workers. And it was true. We were able to accomplish what we did because we worked as if with one mind. There were no real ego problems, no criticism of each other, no dragging of feet, no withholding of information to gain advantage, only willing cooperation. The common good was everything (after God). As the technological leader, I felt as though I had fifty minds and pairs of hands as extensions of my own. And they were good minds and capable hands. There seemed nothing we could not do, could not solve, working in that spirit. In later years, when the original workers from the lay community became a small minority in Logos, the culture of cooperation nevertheless survived, perhaps not without its flaws, but enough to make Logos a different kind of company in the estimation of virtually all who know it or work for it.

Truly, this way of working must have been pleasing to God for very quickly in those early days we got into extremely deep waters, technologically speaking, and had to feel our way and make technological

decisions on a daily basis that could easily have ruined us down the road if they were wrong. But, strange as this may seem, they never were. There is something truly remarkable about that fact, given the difficulty of the undertaking, the modest educational level of those doing all this work, and the fact that we really didn't know what we were doing before we had to do it. We worked as one, sometimes as long as 16 hours a day, and always, it seemed, the result in the end had a beautiful rightness about it. A senior project engineer from Apple Computer, a technical wizard with two advanced degrees, who now works for us, after studying the innards of our system, said he's never seen any system in his life quite so elegant. Some facets of the system, he said, made him want to "leap out of his chair."

Probably it was an advantage that none of us had ever been formally trained for this work, for it allowed us to do our jobs with completely open minds, minds that could be moved to see and do the right thing. I myself have always felt that the myriad little lights or inspirations that enabled us to solve each problem as it arose, and that in the aggregate went to make up the Company's technology, were given to us as gifts. There's no other explanation for it in my mind. I say this with some authority since I am the so-called intellectual father of this system and ought to know. What I know is that, speaking for myself, I was never more than an instrument.

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My spiritual formation at the hands of H taught me to believe that God has a great deal to do with our daily work, that if we ask him He blesses the work of our hands, and even more, that He does it with us. There is nothing extraordinary in this actually. As St. Thomas taught, it's in the nature of things for God to be the primary cause, and for us to be but secondary causes, of all the good that we do. As Jesus said, "Without Me you can do nothing." It's true that not many people work this way, not consciously, particularly when it comes to technical work. But H most certainly did, as did eventually those of us who lived under his direction. He made working in this spirit an intrinsic and necessary part of our formation.

H liked to build things, mechanical devices made of Mecanno, high-fi assembly kits put together transistor by transistor, wire by wire, and so on. He had me work with him this way for the first five years that I lived

with him, at night after coming home from my job, or in the early morning and on weekends. We worked as monks, keeping recollected even as we focused completely on the task at hand. No anxiety about the work was ever allowed to mar the peace of these hours, sometimes almost through the night. If a difficulty arose, which it often did, the routine was to quietly review the work up to that point, go over the steps, break the problem down, whatever, always believing that it would turn out right, never allowing the imagination to cloud a relentless objectivity, never allowing anything to destroy the peace.

Once, I recall, we were making a model gearbox with three forward speeds and one reverse speed. Some problem arose in getting it to shift gears smoothly that seemed to stump us. We were working early in the morning and as it became time for Mass, we put our tools down and went off to church. After communion H went into contemplation as was his custom. This time, when he came out of it, he looked at me and announced that Mary had given him the solution to our gearbox problem. We went straight home and indeed the problem was taken care of. Now, that sort of thing just amazed me at the time, that Our Blessed Mother would take an interest in something so trivial as a model gearbox, and that she even knew anything about gearboxes (though of course that's silly, but I was a recent convert and Mary was new to me).

This is not just a "cute" story because a real formation was taking place in connection with this work. H believed that God is involved in the rightness of everything we do. I lived and worked along side of him for a number of years and came to believe the same thing, that whenever I undertook some piece of work, I was never on my own, never doing it alone. Any task given to me to do, however trivial, held God's interest every bit as much as my own, and could be done with his help, or to put it more accurately, would be done with me as his instrument. My job was to keep myself open and recollected. That was how all of us worked in the early days of Logos when all the employees were products of this spiritual formation. To be sure, it didn't mean you became passive—we had to apply ourselves to do the work much as anyone, but we believed we were never doing it alone, working out of our own resources. It was not that you necessarily thought about God when you worked or consciously prayed. Generally you couldn't, not if the work was intricate or demanding, which it usually was. But when a difficulty arose, it made all the difference in the world what you did next. You could get quiet and

turn to God expecting the answer, or you could become anxious and try to force one by yourself. It made all the difference in the world which.

I don't mean to suggest here that little lights were always popping off in our heads. Sometimes, perhaps, but most of the time it had to do with the way you went about a task. In my own personal experience, whenever a problem arose, my first reaction would be to try to force a solution. It would usually take the direction of increased complication and usually was never really satisfactory. When this happened, sometimes a red light would go on in your head, causing you to back off and open your mind to other possibilities. That's when you'd get a little light, an instinct to do it another way. The answers God gave like that were always simple and worked just right. You didn't come to this way of working first off. You generally had to be driven to it by your own mistakes. Mistakes taught you what not to do. In once sense mistakes were your friend. But after a while, as you learned the right way to work, the mistakes didn't have to be so egregious, although they were always there and always useful. A professor of industrial management science was brought in by an investment group once to study the way we went about our work. In the end he expressed amazement at the extent to which the company's work was driven by what he called "counter-factual evidence." He said this was unique in his experience. He said the disposition of most people when they work is to see where what they are doing is right. At Logos, he said we had almost a lust to see where it was wrong, so that we could make it better. That way of working came directly from H.

Some years before Logos came along, H and I, working in this spirit, built an electrically driven power train for a model automobile that comprised a three-speed gear box, an operable clutch and a working rear-wheel differential that did all the things that real automobiles do when they turned tight corners. It was rather neat, actually, and H suggested I take it to my place of work and show it around, which I did. I happened to be employed at that time as a systems analyst for a nonprofit think tank that was designing command and control systems for the Strategic Air Command (SAC). I showed the model around, including to some of the higher ups. In a way it seemed like a naive thing to do at the time, and I would never have done it on my own initiative. But as it happened, some years later one of those higher-ups who had been impressed with this model far more than I realized, became the catalyst to a major investment in the

early days of Logos, just in time to take over when that first loan by the nun was running out.

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I do not mean to suggest that secondary causes do not have a vital role to play in the God-man nexus. I said earlier that I was never particularly interested in languages, but I was good at them and doubtless Logos would never have been formed had this not been the case. Once while I was studying Greek at Hunter College one summer, the professor put a long Greek sentence on the blackboard and proceeded to lecture us about its grammatical properties for twenty minutes. When she was through, she asked if there were any questions. I raised my hand from the last row and said that I was unable to explain why, but I felt that the sentence was ungrammatical. Naturally all eyes turned to look at this weird character in the back of the room, but the professor, bless her, turned to the sentence and studied it. It happened that I was right, and for the rest of the summer this professor (she was chairperson of the Classics department) never ceased thanking me and encouraging me to study language. There was another incident like that at Logos. We had just finished translating our first military manual, an Air Force instructional book on instrument flying. It had been translated by machine, post-edited by one of our Vietnamese engineers, and finally reviewed by our top linguist, Binh. It was all set to be delivered to the Air Force and I was just browsing through it when something struck my eye. I could not understand the Vietnamese actually but a sentence, rather long, in the middle of this thick manual jumped out at me as ungrammatical. I showed it to Binh and I was right. So there's some kind of curious gift I was born with that allows me to tune into languages at a structural level, a gift that probably has no conceivable utility outside of the use I would eventually put it to. I was flying with a friend once on a Lufthansa flight and had spent the last half hour absorbed in a German newspaper. "What's it say?" my friend wanted to know. "I have no idea," I replied. "I've been reading the syntax."

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Although I was subsequently trained in Vietnamese, my original language training in the Air Force was in Russian. For a short time in my Air Force career I used to listen to Russian pilots converse over their

radios and would try to glean intelligence from their chatter. It required a solid foundation in Russian to be able to do something like that, and to this end the Air Force conducted an intense Russian language training program that went on six hours a day for 18 months, where the students heard and spoke nothing but Russian. I heard about the program before getting into the Air Force and conceived the notion that this was for me. This was at a time when the Korean War had just started and young American youth were being drafted and sent as green troops into Korea. That prospect didn't particularly appeal and so when my draft notice arrived, I enlisted in the Air Force, hoping against hope that I might get into this language school. I loved Russian literature with a deep passion and the prospect of reading these authors in their own language seemed too good to be true. During Air Force basic training I found out that there was indeed a slight possibility of getting into that school, but the odds were not especially good. By now I wanted this schooling so badly that I made a deal with God. If he would get me into that school, I promised I would use these language skills for his honor and glory. That prayer was uttered from the heart, for I faced the prospect of spending my four-year enlistment doing something I cared nothing about. But my prayer was heard and soon I received word of my assignment to language school. I thanked God from my heart and worked hard at mastering the language. After completing the Russian program and working for a while listening to these pilots, I received another assignment, this time to study Vietnamese, which I undertook with considerably less passion. But a deal is a deal (I doubt that I would be writing this story today were it not for that prayer) and God held me to it, or so it seems to me now. At the time this story begins, though, the deal was surely more in his mind than in mine.

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Now I must tell you something that occurred to me when I was only four or five years old when the seed of this technology was planted in my mind, when (as I believe) the finger of God touched my mind in a special way and prepared me for this undertaking later in my life. I do not expect all my readers to accept this, but as far as I am concerned I have no doubts that this is the true beginning of the Logos story as told above. It is this childhood event that accounts for the fact that I could appear before a government board in a moment of crisis and announce,

with deepest conviction, that I could solve the seemingly unsolvable problem facing the government, even while not yet knowing quite how I was going to be able to do that. And also for that fact that someone such as I could convince so many financiers through the years that Logos had something very special indeed.

For a period of perhaps a month, when I was four or five years old, before starting kindergarten, every morning after my father had dressed, had breakfast and then disappeared down the cellar stairs to the garage for the trip to his office, I would go straight to my parents' bedroom and look in the wastepaper basket for something I urgently needed. The Pilgrim laundry service that did my father's shirts in those days had the practice of folding up its ironed, starchy white handiwork around a piece of cardboard and of holding it all together with a light blue paper band. Every morning my father would take out a fresh shirt, break open the band, and dump it and this all-important piece of cardboard into the wastepaper basket by his bureau. There, unbeknownst to anyone else, I would come on my mission to rescue this critical item the moment the path was clear. This all took place at the height of the depression in 1933 or 1934. I still can see the dark blue and white Pilgrim delivery wagon that once a week delivered my father's freshly laundered white shirts. The wagon had an electric motor and tires of solid rubber and would creep up to our curb without a sound like some huge feline animal. To me the wagon was delivering raw material vital to my first real undertaking in life.

One side of the cardboard was glossy white, and very inviting to the eye of a little boy. I had been collecting these cardboard pieces every day for some weeks until by now I had a pile of about twenty of them all neatly stacked. Then began an unusual project that in retrospect seems unlikely for a boy that age. I took these cardboards and proceeded to design an abstract system with about 20 interacting components, each cardboard piece representing an important part of the whole. On one cardboard I would draw a graph (an actual two-dimensional matrix of some sort, with a suggestion of plots), on another something that looked like a complex tic-tac-toe construction, with certain boxes blackened and others left white. On other charts I drew what to memory seems like strings of number groupings with boxes drawn around them. On still others I drew networks of lines and circles. Each of these cardboards had a unique, specific function in my mind, but a function that was entirely abstract, unrelated to anything real.

I still vividly recall sitting against the wall in my parents' bedroom one morning in particular, the sun streaming in on me through the windows, making some new entry on one of the cardboards, perhaps a new number, or a new line somewhere, and then having to adjust two or three other cardboards to reflect this change elsewhere in this system. It was serious work and I would sit this way, morning after morning, shuffling through this stack of cardboards as if I were maintaining a system of real importance. It was a purely formal work in the sense that the system did not relate to anything real, not even in my mind. The system was entirely self-referencing where each chart seemed to have intricate connections with one or more of the others, but where the system as a whole had nothing to do with anything beyond it in the real world. What held my fascination was simply these interrelationships and interdependencies among the various components, the fact that what happened on one chart had implications for other charts. This activity forms one of the most vivid experiences of my childhood. Everything was done with great deliberation and intensity. I still recall the pleasure and deep satisfaction over what I had done, and this sense that I had discovered something very special, something no one else knew, something terribly important though I could never have explained why it was important or even what it was exactly. I don't recall how it ended. Probably I ran out of ideas as to how to make those components interact. At any rate I soon lost interest in it.

I never thought again about that childhood adventure until years later during the early days of the Vietnamese project. We were trying to raise some money at a point where the funds from that nun were running out. I had been in contact with one of the higher ups at that think tank I had worked for ten years previously, a person who had been especially impressed by the power train I had shown around the office, the one H and I had built together. This individual liked what he heard about Logos and put together a group of thirty financiers each of whom was asked to throw in $10,000 as a "crap shoot." But first there had to be a technical evaluation. They sent a computer specialist and I proceeded to demonstrate our system. I put in an English sentence and moments later out came the Vietnamese. I could see at once that the translation was wrong. This computer specialist would never have known the difference, of course, and I could have passed it off as perfect. But it isn't in my nature to do that, so I told him it was wrong, but that I knew why and could fix

it. I went into a table in the computer memory and changed a single number and then ran the sentence again. This time it came out quite different, and quite correct. The individual was stunned that a single change in a single table could produce such a different effect and he reported back that we had something at Logos that looked very good. Shortly after we got the funds. It was then that I myself realized the connection between the system we were building and that childhood game I used to play where a single change in one table affected all the other tables in my set of cardboards. In subsequent years I often reflected on this connection—and the feeling I have today about the present Logos system is exactly that feeling I had when I was five, of something special, of something given.

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My reader, the account of Logos Corporation that I've given here may seem rather odd and perhaps greatly overblown to you; but as you know by now, I am given to seeing God's hand in everything that happens. And if I have seemed to toot a human horn in this account, it was never my intent. It is God's work I wish to celebrate. The Tower of Babel and the multiplication of languages arose as a consequence of mankind tooting its own horn, of man thinking he could do great things on his own, without God. The Tower of Babel was to reach to the high heavens as a monument to human greatness. God saw it as an act of pride and prevented them from completing it by confusing their language, leading to the so-called Babel of languages that we have today. It's interesting, though, that God was not against the Tower as such, only against their wanting to build it without Him. The 18th Century German mystic, Anne Catherine Emmerich, received a revelation to that very effect:

> "The building of the Tower of Babel was the work of pride. The builders aimed at constructing something according to their own ideas, and thus resisted the guidance of God… They thought not of God, they sought only their own glory. Had it been otherwise, as I was distinctly told, God would have allowed their undertaking to succeed." (From *The Visions of the Venerable Anne Catherine Emmerich, as recorded in the journals of Clemens Brentano*.)

I do not know if Logos will ever one day become a great oak tree of a company or whether instead it will be cut up into lumber boards and used by others. Whatever the case regarding the company itself, the fact remains that its technology is gifted. God brought it into being and has never ceased to bless it. Just the other day we received two visitors from France. One was a professor in the field of "artificial intelligence" at the premier French *École polytechnique*, the other the president of a small Paris-based firm specializing in natural language processing, an individual with a Ph.D. in both computer science and linguistics. After being presented with an overview of the Logos technology, the professor commented it was rather remarkable that a system begun so many years ago should have such a contemporary look about it. To which the other visitor replied, "Yes, and truly, this approach ought to become the standard for the whole world."

So it seems that what was begun so long ago belongs as yet to a future time, and that only then can the full Logos story be told. I expect it will always remain an interesting story, given the hands in which this future rests.

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Postscript 2007

The foregoing account was written in 1997, three years before the sudden demise of Logos Corporation in 2000. After 30 years this little company was obliged to close its doors. Although many large companies here and abroad used this technology to advantage, and some continue to do so to this day, profitability and financial promise never materialized and eventually the investment monies needed to keep this enterprise going dried up. That the promise of financial reward had seemed very real to these investors may be gleaned from the fact that over 85 million investment dollars had been poured into the company by the time it had to cease operations.

In light of its moorings in Divine Providence, the demise of this company is doubly mysterious because a second investment motive for many had been the prospect that this technology might do good in the world. More than one investor said as much. Now this prospect seems unlikely, although this part of the story is not quite finished. When Logos closed it doors in 2000, German interests acquired the Logos translation system

and associated technology, and recently, in 2005, a prestigious German technology institute (DFKI), recognizing its value, has undertaken to offer the Logos system and associated technology over the Internet to universities and translators free-of-charge, especially to those interested in exploiting the system for third-world languages. This so-called "open-source" Logos system is called OpenLogos, and several universities in India are currently using components of OpenLogos to develop an English-Hindi machine translation system. It remains to be seen whether exploitation of Logos technology will increase in the future.

Given its history, we can believe that God's reason for bringing Logos into being and sustaining it all these years had nothing to do with returns on investment. The reason then must have had to do with the people who became involved with Logos, particularly the workers, most of whom in the earlier days of Logos came out of the Catholic kibbutz described earlier. These people, many of them young and right out of college, came to this kibbutz out of a hunger to find God and to be with the like-minded. The community that was formed proved immensely satisfying in both these respects, and among the young more than thirty marriages eventuated, producing large, happy families. Many took jobs at the company that had emerged from their midst, and the salaries this produced provided essential support to the on-going, common life of the community. And then, when the community eventually disbanded, the technological training that these men and women had received at Logos equipped them, by God's Providence, to pursue successful technical careers in situations all over the country.

But there may have been a hidden, deeper benefit for the individuals involved in this work, a benefit that in God's eyes may have been the most important reason for Logos. Many of the workers connected with this undertaking (only the Lord knows for how many this was true) learned to work in a new and more fruitful way, coming to know and rely on a power beyond their own to help accomplish tasks they were asked to do. With that help, a band of fairly ordinary people without special qualifications was able to accomplish what the best universities and most powerful companies around the world tried but could not bring off, at least not nearly as well. Some, even perhaps many, of the workers who achieved this success knew it had not come from their own hands alone. That understanding, that concrete, actual experience of God as the true

author of the good that we do, must be the real inner story of this little enterprise and the deepest reason why it happened in the first place.

— Contributed by the founder (secondary cause) of Logos Corporation

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