I. BACKGROUND

LET ME START BY TAKING YOU BACK -- BACK TO THE SUMMER OF 1934, TO A FAMILY FARM NEAR RED CLOUD, NEBRASKA. NEBRASKA WAS IN THE THROES OF THE MOST DEVASTATING DROUGHT EVER TO SWEEP THE GREAT PLAINS. THE FATHER AT THIS FARM HAD DIED TWO YEARS EARLIER. THE MOTHER, THE SON AND TWO DAUGHTERS HAD ONLY THEIR HEREFORD CATTLE AND MAYBE FIVE DOLLARS IN CASH. THEY WERE ON THE VERGE OF LOSING THE HERD -- EITHER TO THE ROCK BOTTOM PRICES OF A GLUTTED MARKET OR BY STARVATION WHEN WINTER CAME. LOSING THE HERD MEANT LOSING THE FARM, SO A WAY HAD TO BE FOUND TO FEED THEM OVER THE WINTER.

THE PROBLEM THERE WAS THAT THE ONLY THING THRIVING THAT YEAR AMID THE SEARED AND SHRIVELED CORN WERE RUSSIAN THISTLES -- A LUSH GREEN WEED UNIVERSALLY DESPISED BY NEBRASKANS. SOME OF YOU MAY KNOW IT BY ANOTHER COMMON NAME: THE TUMBLEWEED. ONE
HOT SUMMER AFTERNOON THE YOUNG MAN REMEMBERED THAT AS A SMALL
BOY HE HAD SEEN SOME OF THE COWS CHOOSING TO EAT AN IMMATURE
THISTLE RATHER THAN SOME OF THE GREEN ALFALFA IN THE FEED
TROUGH.

SO HE DECIDED TO CUT AND STACK THE THISTLES BEFORE THEY
MATURED. NEIGHBORS THOUGHT HE WAS CRAZY — HE EVEN HAD
DIFFICULTY HIRING PEOPLE TO HELP WITH THE LABOR — THEY DIDN'T
WANT TO RISK BEING LAUGHED AT.

BUT THE THISTLES WERE CUT. THEY WERE STACKED AND STORED. AND
THAT WINTER THEY WERE FED TO THE CATTLE. THE HEREFORDS MADE IT
THROUGH THE WINTER. AND IT WAS MORE THAN 40 YEARS BEFORE
CONVENTIONAL WISDOM CAUGHT UP WITH THAT PRAGMATIC INNOVATION OF
SURVIVAL WHEN RESEARCHERS AT NEW MEXICO STATE UNIVERSITY IN THE
LATE 1970S STUDIED THE THISTLE AND REPORTED THAT IN EARLY
GROWTH STAGES IT CONTAINS UP TO 22 PERCENT PROTEIN AND COULD BE
USED AS CATTLE FEED.

SOME 21 YEARS AFTER THAT NEBRASKA STORY OF SURVIVAL, ANOTHER
STORY BEGAN. IN THE SUMMER OF 1957, WHEN CONTROL DATA WAS
LAUNCHED BY A GROUP OF YOUNG ENGINEERS, THEY FACED QUITE
DIFFERENT PROBLEMS OF SURVIVAL. BUT THEIR APPROACH WAS EQUALLY
PRAGMATIC.
AS AN EMBRYONIC COMPANY IN THAT SUMMER OF 1957, CONTROL DATA FACED AN INDUSTRY DOMINATED BY A GIANT. THE ONLY PRACTICAL STRATEGY WAS TO FIND A NICHE — A SEGMENT OF THE MARKET LEAST DOMINATED BY IBM. AND SO IT WAS DECIDED TO CONCENTRATE ON LARGE-SCALE SCIENTIFIC AND ENGINEERING COMPUTATION.

CONTROL DATA'S INITIAL MARKETING STRATEGY WAS TO SELL A BAREBONES LARGE-SCALE COMPUTER — ESSENTIALLY AN EMPHASIS ON HARDWARE, WITH VERY LITTLE SOFTWARE. THIS APPROACH, HOWEVER, LIMITED SALES TO THOSE ORGANIZATIONS LARGE ENOUGH TO HAVE AN EXPERIENCED PROGRAMMING STAFF AND ENOUGH NEED FOR SCIENTIFIC COMPUTING TO WARRANT THE OWNERSHIP OF A LARGE COMPUTER. IT DID NOT MEET THE NEEDS OF THE MANY SMALLER ORGANIZATIONS WHO HAD SCIENTIFIC OR ENGINEERING PROBLEMS WHICH COULD BE MORE EFFICIENTLY SOLVED IF ACCESS TO A LARGE COMPUTER WERE AVAILABLE AS AND WHEN THEY NEEDED IT. SO, IN 1961, COMPUTER SALES WERE AUGMENTED WITH THE ADDITION OF SERVICES PROVIDED BY OUR LARGEST SCIENTIFIC COMPUTER. THUS WAS BORN ANOTHER MAJOR PRODUCT LINE: COMPUTER SERVICES. AND FROM THIS SEED HAS GROWN THE DIVERSE SET OF KNOWLEDGE SERVICES BASED ON COMPUTER TECHNOLOGY THAT UNDERPINS A MAJOR CORPORATION'S STRATEGY.

THE ESSENCE OF ENTREPRENEURSHIP IS MARVELOUSLY CAPTURED IN THESE TWO WIDELY SEPARATE BUT RELATED STORIES. THE COMMON THREAD IS, OF COURSE, WILLIAM C. NORRIS — THE YOUNG NEBRASKAN
WITH A HERD TO FEED AND 20 YEARS LATER LEADER OF A HUNGRY HERD OF ENGINEERS. RE-AWAKENING THE ENTREPRENEURIAL SPIRIT IN OUR COUNTRY IS A STRAIGHTFORWARD — WHICH IS NOT TO SAY EASY — MATTER OF CHANGING FOUR BASIC CHARACTERISTICS COMMON TO LARGE ORGANIZATIONS. THESE CHARACTERISTICS — RISK AVOIDANCE, LACK OF ENTREPRENEURIAL MANAGEMENT, LARGE VESTED INTERESTS, AND LITTLE, IF ANY, TECHNOLOGICAL COOPERATION — ALMOST BY THE VERY NATURE OF THINGS, DO NOT TROUBLE SMALL INNOVATIVE ORGANIZATIONS.

II. BASIC FACTORS OF INNOVATION AND GROWTH RISK

RISK

FIRST OF ALL, TAKE RISK. A SMALL COMPANY MUST TAKE RISKS SIMPLY TO SURVIVE. WHEN YOU CONSIDER THE COST OF DEVELOPING A NEW COMPUTER LINE WAS WELL IN EXCESS OF $100 MILLION, CONTROL DATA WAS LITERALLY BETTING ITS EXISTENCE EVERY FOUR YEARS OR SO FROM INCEPTION UNTIL THE EARLY 1970'S. LARGE COMPANIES SIMPLY DON'T NORMALLY TAKE THOSE KINDS OF RISKS. MOREOVER FOR MUCH OF THE PAST QUARTER CENTURY, CONVENTIONAL BUSINESS SCHOOL WISDOM HAMMERED SO HARD AT RISK RETURN HURDLE RATES THAT RISK INCLINATION IN WOULD-BE MANAGERS WAS THOROUGHLY SCRUBBED OUT. IN RECENT YEARS, A PROLIFERATION OF ARTICLES HAS APPEARED ON THE "RISKLESS SOCIETY" AND THE ALARMING IMPLICATION THAT HAS FOR OUR LONG-TERM ECONOMIC AND SOCIAL WELL-BEING.
FOR EXAMPLE, TAKE THIS EXCERPT FROM AN ARTICLE IN BUSINESS WEEK A YEAR OR SO AGO: "TODAY'S EMPHASIS [BY BIG BUSINESS] IS ON IMMEDIATE PAYOFFS....BUT BIG BUSINESS IS NOT ALONE. IT SHARES ITS APATHETIC, RISK-AVOIDING, SELFISH, AND REACTIONARY PROFILE WITH OTHER SECTORS, INCLUDING ACADEMIA, ORGANIZED LABOR, PRIVATE FOUNDATIONS, THE CHURCHES AND GOVERNMENT."

"THE EDUCATION ESTABLISHMENT RESISTS THE CHANGES REQUIRED BY A DECLINING STUDENT POPULATION, RISING COSTS, AND AN INCREASINGLY OBVIOUS INABILITY TO MEET THE INDIVIDUAL NEEDS OF MANY STUDENTS.....MANY FOUNDATIONS SUPPLY MONEY TO ALLEVIATE SOCIAL ILLS. IRONICALLY, HOWEVER, THEY INVEST THEIR ASSETS IN AN ULTRACONSERVATIVE MANNER, FAVORING SAFE SECURITIES OVER HIGHER-RISK INVESTMENTS. THIS IS PARTICULARLY IRONIC IN THAT MOST FOUNDATIONS OWE THEIR WEALTH TO SOME ENTREPRENEUR'S WILLINGNESS TO TAKE RISKS A FEW DECADES BEFORE."

ALL OF YOU NO DOUBT HAVE READ SIMILAR MATERIAL, WHICH IN ONE WAY OR ANOTHER POINTS OUT THAT LARGE ORGANIZATIONS TYPICALLY ARE THE MOST RISK AVOIDING. THE NATURE OF THINGS IS THEN THAT THOSE WHO CAN LEAST AFFORD TO DO SO ARE MOST INCLINED TO INNOVATE WHILE THOSE WHO CAN MOST AFFORD TO DO SO ARE LEAST INCLINED. A SITUATION SO PERVERSE SIMPLY CRIES OUT FOR HELP. I'LL COME BACK TO WHAT CAN BE DONE IN A MOMENT.
BUT NOW LET'S LOOK AT THE SECOND CHARACTERISTIC -- THE SECOND BASIC DIFFERENCE BETWEEN LARGE AND SMALL COMPANIES.

THAT IS THE MATTER OF MANAGEMENT. FUNDAMENTAL TO INNOVATION ARE MANAGERS WHO CAN MAKE BUSINESS DECISIONS AS OPPOSED TO TECHNICAL OR TECHNOCRATIC DECISIONS. THE EXECUTIVES IN SMALL BUSINESSES LIVE EVERY ASPECT OF THE BUSINESS: FROM SELLING THE STOCK TO FINANCE THE BUSINESS, TO MAKING THE PRODUCT DECISIONS, TO SELLING THE PRODUCTS THEMSELVES. THESE MANAGERS ARE DEEPLY INVOLVED WITH THE PROJECTS AND WITH THE TECHNICAL PEOPLE WHO ARE DIFFERENCE IN SUCCESS AND FAILURE. AND THEY LIVE WITH THEIR MISTAKES.

CONTRAST THAT WITH THE TYPICAL LARGE COMPANY WHERE MANAGERS RISE THROUGH THEIR FUNCTIONAL SPECIALTY -- NOT SO MUCH LEADING THE BUSINESS AS THEY ARE RESPONDING -- RESPONDING TO ORDERS, TO PLANS, AND TO QUESTIONS OF MANAGERS IN OTHER FUNCTIONAL SPECIALTIES. AS A RESULT, NOT ENOUGH SENIOR EXECUTIVES ARE REALLY GOOD AT FUNDAMENTAL JUDGEMENTS OF THE KIND INVOLVED IN INNOVATION. MOST RELATIVELY SENIOR EXECUTIVES HAVE GROWN UP IN THIS HIGHLY STRUCTURED AND SYSTEMATIZED ENVIRONMENT WHERE THEY DON'T REALLY RUN THE BUSINESS. THERE ARE TOO MANY CONSTRAINTS AND TOO MUCH STRUCTURE SO THEY NEVER DEVELOP SKILL AT
INNOVATION. THIS DOES NOT HAVE TO BE -- JUDGEMENT IN SUCH MATTERS DOES IMPROVE OVER A LONG CAREER IF YOU HAVE THE INITIAL APTITUDE AND GET TO PRACTICE. BUT YOU HAVE TO HAVE A CHANCE TO LEARN. AND ALL TOO OFTEN IF MANAGERS GET A CHANCE -- IT'S ONLY ONE -- IF THEY FAIL, THAT'S IT -- THEY NEVER GET A SECOND CHANCE. WHILE THEIR COMPANY CAN AND MOST OFTEN DOES INVEST ENORMOUS AMOUNTS OF MONEY AND TIME IN IMPROVING THEIR BASIC SKILLS, IT INVESTS PRACTICALLY NOTHING IN PROVIDING THE OPPORTUNITY TO BECOME AN INNOVATING EXECUTIVE. THE MAJOR CONTRIBUTING FACTOR TO THE LOW RATE OF INNOVATION IN LARGE BUSINESS IS POOR MANAGEMENT.

THE REVERSE SIDE OF ALL THIS IS THAT THE MANAGERS IN MOST SMALL ENTERPRISES ARE POORLY TRAINED IN BASIC MANAGERIAL SKILLS -- FINANCE, PEOPLE, MARKETING AND SO ON. SO WHILE THEY HAVE THE OPPORTUNITY TO BECOME COMPLETE EXECUTIVES, THEY AND THEIR COMPANIES CAN ILL AFFORD THE COST -- AND MORE IMPORTANT, THE TIME -- TO LEARN BASIC SKILLS. AS A RESULT, THE MAJOR CONTRIBUTING FACTOR TO THE HIGH RATE OF FAILURE IN SMALL BUSINESS IS POOR MANAGEMENT.

PERVERSITY, IT SEEMS, CLOSES IN ON ALL SIDES. BUT LET'S LOOK AT THE THIRD KEY DIFFERENCE IN THE APPROACH TO BUSINESS BETWEEN LARGE AND SMALL ORGANIZATIONS.
VESTED INTERESTS

THAT'S THE MATTER OF VESTED INTERESTS. ACTUALLY THERE ARE TWO ASPECTS OF THIS. ONE IS EXTERNAL AND ONE IS INTERNAL. THE EXTERNAL FACTOR IS THE CUSTOMER BASE. HAVING GROWN SUCCESSFULLY, THE LARGE ORGANIZATION HAS A LARGE BASE OF SATISFIED CUSTOMERS. SO ITS ENERGIES ARE NATURALLY DIRECTED TOWARD THESE CUSTOMERS. THIS LEADS TO COSMETIC INNOVATION — THAT IS, MINOR VARIATIONS OF OLD PRODUCTS FOR WHICH THERE WILL BE MAXIMUM PAYBACK.

THE INTERNAL VESTED INTERESTS ARE THE EXISTING DEPARTMENTS OR DIVISIONS WHICH VIE FOR RESOURCES AND SEEK TO PERPETUATE THEMSELVES. NEW IDEAS AND NEW ORGANIZATIONS WHICH THREATEN THEM ARE REJECTED OR CO-OPTED AND IMMASCULATED. THE RESULT IS MASSIVE RESOURCES WHICH PRODUCE PRECIOUS LITTLE INNOVATION.

A SMALL ORGANIZATION HAS NONE OF THESE ANCHORS AND SO IS FREE TO ROAM AT WILL IN SEARCH OF A NEW MARKET NICHE. AND THE FULL ATTENTION OF THE CEO -- AND THUS THE ENTIRE ORGANIZATION -- IS RIVETED ON EXPLOITING THAT NICHE. UNFORTUNATELY, THE MORE INNOVATIVE THE CEO, THE MORE OPPORTUNITY HE/SHE WILL FIND IN THIS FREEDOM FROM VESTED INTERESTS. I SAY "UNFORTUNATELY" BECAUSE CLEARLY THE ALMOST IRRESISTIBLE PITFALL IS TO UNDERTAKE
TOO MANY NEW THINGS. AND THE RESULT IS MEAGRE RESOURCES SPREAD TOO THIN. PERVERSITY SEEMS INESCAPABLE. BUT I MENTIONED RESOURCES AND THAT LEADS US TO THE MATTER OF TECHNOLOGICAL COOPERATION.

RESOURCES/TECHNOLOGICAL COOPERATION

THE RESOURCE DIFFERENCE BETWEEN LARGE AND SMALL ENTREPRENEURS EXISTS IN ALL DIMENSIONS: CAPITAL, PEOPLE, AND TECHNOLOGY. MOST TECHNOLOGY, FOR EXAMPLE, RESTS IN THE DEVELOPMENT GROUPS OF LARGE CORPORATIONS, GOVERNMENT LABORATORIES, AND UNIVERSITIES -- AND IT IS LARGELY UNUSED AND UNPRODUCTIVE. WHAT IS WORSE IS THAT THE PRESENCE OF THESE LARGE RESOURCES BREEDS ARROGANCE.

NO SMALL COMPANY CAN AFFORD ARROGANCE. IT MUST SEEK TO SURVIVE -- TO FURTHER ITS PURPOSE -- BY COOPERATING WITH OTHERS, BY LEVERAGING OFF THE RESOURCES OF OTHERS. THERE IS ONLY THE PRIDE IN ITS BASIC BUSINESS IDEA AND NO FALSE BELIEF IN ITS OWN INVINCIBILITY.

COUPLED WITH AN OUTDATED VIEW OF WHAT IS INVOLVED IN MAINTAINING A PROPRIETARY POSITION, THE ARROGANCE OF LARGE COMPANIES IS AT THE ROOT OF THE DECLINING PRE-EMINENCE OF U.S. INDUSTRY. ARROGANCE PRECLUDES THE ESSENTIAL INGREDIENT OF
SURVIVAL IN THE WORLD OF TODAY -- AND THAT IS TECHNOLOGICAL COOPERATION. THE PROBLEMS TO BE SOLVED IN INDUSTRY TODAY -- AND CERTAINLY IN THE HIGH TECHNOLOGY INDUSTRIES THAT ARE LOOKED UPON FOR ECONOMIC LEADERSHIP -- ARE VERY SIMPLY BEYOND THE REACH OF MOST COMPANIES.

THERE IS NO PERVERSITY AT WORK HERE -- JUST A LACK OF PLAIN OLD COMMON SENSE IN DEALING WITH A CHANGED WORLD.

(PAUSE)

III. CONTROL DATA EXPERIENCES IN COOPERATION

WELL, WHAT ARE WE TO DO? IS THERE ANYTHING WE CAN DO -- CORRALLED AS WE ARE BY PERVERSITY AND EMPLOYING OUTDATED CONVENTIONAL WISDOM IN OUR SEARCH FOR ECONOMIC GROWTH? YES, THERE IS. AND IT IS THIS: WE CAN CREATE IN OUR COMPANIES AND IN OUR COUNTRY TO A MUCH LARGER DEGREE THAN EXISTS TODAY THESE FOUR PREREQUISITES FOR INNOVATION. AND NOT SO INCIDENTALLY WE CAN AT THE SAME TIME USE THE RESOURCES OF LARGE COMPANIES TO IMPROVE THE CHANCES OF SURVIVAL FOR SMALL BUSINESSES. CONTROL DATA ADOPTED SUCH A APPROACH MANY YEARS AGO AND IT HAS BEEN PROVEN SOUND.

TIME DOESN'T PERMIT ME TO SHARE WITH YOU ALL OUR EXPERIENCES IN THIS REGARD, BUT LET ME GIVE YOU A FEW EXAMPLES:
AS NOTED, IMPROVING THE CHANCES FOR SMALL BUSINESS START-UP AND SURVIVAL WOULD DO MUCH TO INCREASE THE RATE OF INNOVATION AND JOB CREATION. YET THE CLIMATE FOR SMALL BUSINESS HAS BECOME INCREASINGLY WORSE DURING THE PAST DECADE. IN MINNESOTA, WE'VE HELPED BUILD AN EXAMPLE OF WHAT CAN BE DONE TO REVERSE THAT TREND. WE HAVE A NETWORK FOR INNOVATION THAT PROVIDES THE SUPPORT NEEDED FOR EACH MAJOR LINK IN THE CHAIN OF SUCCESS FOR SMALL ENTERPRISE: ACCESS TO TECHNOLOGY, FINANCE, MANAGEMENT ASSISTANCE, EDUCATION AND TRAINING, MARKETING, AND EFFICIENT ACCESS TO SERVICES.

FORGING THE LINKS IN THE CHAIN HAS BEEN A COOPERATIVE UNDERTAKING OF INDUSTRY, GOVERNMENT AND ACADEMIA. HERE ARE A FEW OF THESE LINKS.

FIRST, THE MINNESOTA COOPERATION OFFICE. CREATED UNDER THE AUSPICES OF THE MINNESOTA BUSINESS PARTNERSHIP, THE MCO IS A NON-PROFIT CORPORATION BEING FINANCED DURING ITS EARLY YEARS BY CONTRIBUTIONS AND GRANTS; EVENTUALLY IT WILL BECOME SELF-SUPPORTING THROUGH CLIENT FEES AND FUNDS GENERATED BY INVESTMENTS IN CLIENT COMPANIES.

THE MCO'S BOARD OF DIRECTORS CONSISTS OF LEADERS FROM ALL MAJOR SECTORS OF SOCIETY. THE APPROACH IS SIMPLE: AN ENTREPRENEUR HAS AN IDEA FOR A NEW PRODUCT OR SERVICE AND WANTS TO START A
COMPANY -- THE MCO HELPS DEVELOP A BUSINESS PLAN AND OBTAIN FINANCING. THE PERMANENT STAFF IS SMALL, BUT THE MCO DRAWS ON A VOLUNTEER ADVISORY PANEL OF ENGINEERS, SCIENTISTS AND EXECUTIVES FOR THE SPECIFIC EXPERTISE REQUIRED TO EVALUATE AND HELP PREPARE THE BUSINESS PLANS. BECAUSE THE PLANS ARE EXPERTLY CONCEIVED, THE CHANCES OF RECEIVING ADEQUATE FINANCING AND ACHIEVING ECONOMIC VIABILITY ARE SUBSTANTIALLY INCREASED.

FINANCING IS ANOTHER IMPORTANT LINK IN THE CHAIN OF SUCCESS. CAPITAL FROM MORE CONVENTIONAL SOURCES SUCH AS VENTURE CAPITAL COMPANIES AND BANKS IS OFTEN NOT AVAILABLE FOR NEW HIGH TECHNOLOGY COMPANIES DURING THEIR FORMATION AND EARLY DEVELOPMENT STAGES. BECAUSE OF THIS, THE MINNESOTA SEED CAPITAL FUND HAS BEEN CREATED. THE FUND, ALONG WITH MORE CONVENTIONAL SOURCES PROVIDES ENTREPRENEURS THE TOTAL ARRAY OF FINANCING POSSIBILITIES NECESSARY FOR BOTH START-UP AND EXPANSION.

THE TECHNOLOGY LINK IN THE CHAIN OF SUCCESS IS PROVIDED BY BOTH PUBLIC AND PRIVATE ORGANIZATIONS SUCH AS THE MANAGEMENT AND TECHNICAL ASSISTANCE CENTER OFFICE AT THE UNIVERSITY OF MINNESOTA OR CONTROL DATA'S WORLDTECH SERVICES.

EDUCATION AND TRAINING, MARKETING, MANAGEMENT ASSISTANCE AND OTHER SERVICES ARE ALL AVAILABLE AND THROUGH THE MCO MADE READILY ACCESSIBLE TO THE SMALL BUSINESS PERSON.
IN ADDITION TO HELPING TO CREATE NEW COMPANIES, THE NETWORK HAS PROVIDED THE OPPORTUNITY FOR LARGE CORPORATIONS TO CREATE NEW SERVICES -- TO ASSIST SMALL BUSINESSES. AT CONTROL DATA, FOR EXAMPLE, WE HAVE STARTED, IN ADDITION TO THE TECHNOLOGY TRANSFER SERVICE WORLDTECH, WHICH I MENTIONED, VENTURE CAPITAL, DATA PROCESSING, TRAINING AND MANAGEMENT ASSISTANCE SERVICES. TIME DOESN'T PERMIT A DESCRIPTION OF ALL THESE SERVICES EITHER, BUT I WOULD LIKE TO DESCRIBE ONE OF THEM.

CONTROL DATA BUSINESS ADVISORS, INC. WAS ESTABLISHED IN 1980. USING COMPUTER-BASED TECHNOLOGY AND BETTER ORGANIZED DELIVERY SYSTEMS, BUSINESS ADVISORS IS ABLE TO FURNISH SMALL BUSINESS CLIENTS A LEVEL OF PROFESSIONAL MANAGEMENT CONSULTING WHICH HAS HERETOFORE BEEN AFFORDABLE BY ONLY LARGE COMPANIES.

ONE WAY OF ACHIEVING SIGNIFICANT COST REDUCTIONS WITHOUT SACRIFICE OF QUALITY, HAS BEEN TO CREATE A TALENT POOL OF CONTROL DATA EMPLOYEES. EMPLOYEES LIST THEMSELVES IN A RESOURCE DATA BANK AND COMPANY POLICY MAKES THEM AVAILABLE FOR CONSULTING ON A PART-TIME BASIS. THE PROGRAM IS BASED ON THE FACT THAT MANY INDIVIDUALS WITH TALENTS BEYOND THOSE CALLED FOR IN THEIR CURRENT JOBS FREQUENTLY GROW STALE DOING THE SAME TASK DAY-AFTER-DAY. THUS TEMPORARY CONSULTING ASSIGNMENTS NOT ONLY MAKE MORE PRODUCTIVE USE OF SUCH INDIVIDUALS, BUT ALSO PROVIDE
STIMULATION THROUGH THE CHALLENGE OF VARIED ASSIGNMENTS.
MOREOVER, IT IS AN EXCELLENT MEANS OF GAINING ADDITIONAL
EXPERIENCE. THIS TALENT POOL CONCEPT WAS FORMALLY PUT INTO
ACTION IN AUGUST 1980. TODAY IT INCLUDES SOME 1,450 PEOPLE.

THERE HAS BEEN ANOTHER INTERESTING OUTGROWTH OF OUR STRATEGY OF
BUILDING SMALL BUSINESS SERVICES. THIS IS AN INTERNAL SERVICE
FOR EMPLOYEES CALLED EEAO. ANY EMPLOYEE WHO THINKS THEY WOULD
LIKE TO GO INTO BUSINESS FOR THEMSELVES CAN CONTACT THE EEAO ON
A COMPLETELY CONFIDENTIAL BASIS AND GET ADVICE AS WELL AS
PRELIMINARY ASSISTANCE WITH REGARD TO A BUSINESS PLAN. IN THE
LITTLE MORE THAN TWO YEARS OF ITS EXISTENCE, EEAO HAS SERVED
MORE THAN 400 EMPLOYEES. ONLY ABOUT 10 PERCENT OF THOSE WHO
MAKE CONTACT ACTUALLY END UP GOING INTO BUSINESS -- BUT THEY DO
SO BETTER PREPARED AND WITH A POSITIVE RELATIONSHIP TO CONTROL
DATA. THE OTHER 90 PERCENT GO BACK TO THEIR JOBS MORE
POSITIVE, MORE PRODUCTIVE EMPLOYEES.

THERE ARE MANY OTHER ASPECTS OF THE MINNESOTA NETWORK AND
CONTROL DATA'S VARIOUS INITIATIVES. BUT THE POINT IS, THAT BY
WORKING TOGETHER, BUSINESS AND GOVERNMENT HAVE CREATED A
CLIMATE WHERE THE BARRIERS HAVE BEEN REMOVED AND TECHNOLOGICAL
INNOVATION CAN OCCUR MORE FREELY. EQUALLY IMPORTANT, IN DOING
SO WE HAVE SIMULTANEOUSLY CREATED OPPORTUNITIES FOR LARGE
COMPANIES SUCH AS CONTROL DATA TO BE MORE INNOVATIVE AND TO
OFFER NEW PRODUCTS AND SERVICES. LET ME LEAVE THIS SUBJECT BY CITING JUST ONE STATISTIC. IN TWO YEARS THE MCO PROGRAM AND CONTROL DATA PROGRAMS TOGETHER HAVE CREATED 285 NEW COMPANIES AND SOME 1,700 NEW JOBS.

(PAUSE)

LET'S TURN NOW TO THE NEED FOR MORE TECHNOLOGICAL COOPERATION AMONG LARGE COMPANIES. THIS IS, AS NOTED, DIFFICULT TO ACHIEVE. THE REASONS ARE DEEPLY ROOTED IN THE ATTITUDES OF LARGE U.S. FIRMS AND THE U.S. GOVERNMENT -- ATTITUDES WHICH HAVE BEEN SHAPED BY A HUNDRED YEARS OF HISTORY. THOSE ATTITUDES HAVE BECOME ANACHRONISTIC AS THE WORLD WE LIVE IN -- AND COMPETE IN -- HAS CHANGED FUNDAMENTALLY OVER THE PAST DECADE. IT WILL CHANGE EVEN MORE OVER THE NEXT TWENTY YEARS, NOT ONLY IN TERMS OF THE RATE OF TECHNOLOGICAL CHANGE, BUT ALSO IN TERMS OF EXPLODING CAPITAL INTENSITY AND OF INCREASING INTERNATIONAL COMPETITION.

WITH THE EXAMPLES OF OUR AUTOMOBILE, STEEL, AND CONSUMER ELECTRONICS INDUSTRIES SO VIVIDLY BEFORE US, WE DON'T HAVE TO LOOK VERY FAR FOR PAINFUL REMINDERS OF WHAT HAPPENS WHEN INDUSTRIES BEGIN TO LAG TECHNOLOGICALLY OR IN TERMS OF CAPITAL INVESTMENT COMPARED TO THEIR INTERNATIONAL COMPETITION. BUT THOSE EXAMPLES MAY WELL BE REPEATED EVEN MORE PAINFULLY IN MY OWN INDUSTRY -- THE COMPUTER INDUSTRY -- AND IT'S CLOSELY ASSOCIATED SEMI-CONDUCTOR INDUSTRY.
IN THE BRIEF SPAN OF TWO YEARS, THE U.S. POSITION IN MICRO-ELECTRONICS HAS GONE FROM ONE OF AN UNQUESTIONED AND SEEMINGLY UNASSAILABLE LEADERSHIP TO ONE OF CONSIDERABLE QUESTIONING AND DOUBT. THE EXPERIENCE OF BEING IN SECOND PLACE IN WORLD-WIDE SHIPMENTS OF A PARTICULAR ADVANCED MICRO-ELECTRONIC COMPONENT -- THE 64K RANDOM ACCESS MEMORY CHIP -- OCCURRED FOR THE FIRST TIME; A REPORT BY A GOVERNMENT RESEARCH LAB HAS SERIOUSLY RAISED THE POSSIBILITY OF ITS BEINGDEPENDENT ON JAPAN FOR SUPER COMPUTERS BY THE END OF THIS DECADE; JAPAN SPONSORED AN INTERNATIONAL CONFERENCE TO ANNOUNCE ITS INTENTION TO BECOME THE WORLD LEADER IN COMPUTING BY 1990; MEANWHILE IT ALREADY DOMINATES IN THE AREA OF LOW COST PRINTERS AND THREE INCH MAGNETIC DISK DRIVES, BOTH OF WHICH ARE TIED TO THE EXPLODING PERSONAL COMPUTER MARKET.

WHAT IT NETS DOWN TO IS THAT IN TWO YEARS OR LESS WE HAVE GONE FROM CONFIDENCE BORDERING ON ARROGANCE TO CONCERN BORDERING ON PARANOIA. HOW CAN THAT BE? IT CAN BE BECAUSE OF THE SHOCK THAT HAS COME FROM FINALLY RECOGNIZING TRENDS WHICH HAVE BEEN DEVELOPING FOR THE PAST TEN YEARS. CHANGES HAVE BEEN TAKING PLACE IN EVERY PHASE OF MICROELECTRONICS AND COMPUTERS INCLUDING RESEARCH, HARDWARE, SOFTWARE, MANUFACTURING, AND APPLICATIONS.
1) The industry has become more capital intensive at the very time capital has become scarce and more expensive. You need look no further than the October 25th issue of Business Week. In an article entitled "The pall that lingers over Silicon Valley," the editors say: "For the $9.3 billion industry, the recession started two years ago with crashing prices that devastated profits in such important categories as computer-memory chips." ...."Still, chipmakers have kept up their capital investments -- in part because even the latest production equipment now becomes obsolete in three years or less, and because U.S. cutbacks in 1975 led to widespread shortages that opened the U.S. market to Japanese producers." ...."This need to spend on capital equipment, coupled with the industry's current mired state, could force an industry restructuring."

2) Software technology is more pervasive and more critical to advances in microelectronics technology and certainly in applying it. For example, the November/December 1982 edition of High Technology Magazine in an article on artificial intelligence states, "These systems....will profoundly alter the way people work, live and think about themselves. Key....is a radically new style of computer programming....methods for efficiently representing facts and ideas on a computer."
3) **EVEN MORE FUNDAMENTAL IS THE GREAT SHORTAGE OF TECHNICALLY TRAINED PERSONNEL.**

TO COPE WITH THESE MASSIVE PROBLEMS, THE MAJOR CHANGE WHICH MUST OCCUR IN U.S. INDUSTRY IS THAT OF PRACTICING TECHNOLOGICAL COOPERATION. CONTROL DATA'S EXPERIENCE IN TECHNOLOGICAL COOPERATION OVER THE PAST 10 TO 15 YEARS HAS DEMONSTRATED THAT SUCH AN APPROACH NOT ONLY WILL WORK -- BUT THAT IT IS ESSENTIAL TO THE MAINTENANCE OF A VIGOROUS COMPETITIVE ENVIRONMENT. OUR EXPERIENCE IN THIS REGARD HAS LED TO A CURRENT EFFORT WHICH INVOLVES A DOZEN U.S. SEMICONDUCTOR AND COMPUTER COMPANIES. WE ARE FORMING THE MICROELECTRONICS AND COMPUTER TECHNOLOGY CORPORATION (MCC), A FOR-PROFIT RESEARCH AND DEVELOPMENT COMPANY. MCC WILL UNDERTAKE A NUMBER OF ADVANCED TECHNOLOGY PROJECTS, THE COST AND RISK OF WHICH MAKE THEM IMPractical FOR A SINGLE COMPANY TO UNDERTAKE -- EVEN IF IT HAD ALL THE NECESSARY SKILLED PEOPLE -- WHICH NO ONE DOES. THE INDIVIDUAL COMPANIES WILL BE ABLE TO USE THE TECHNOLOGIES COMING OUT OF MCC IN THEIR OWN UNIQUE VALUE-ADDED PRODUCTS AND SERVICES.

MCC IS ONLY OUR MOST RECENT COOPERATIVE UNDERTAKING, BUT OUR EXPERIENCE IN TECHNOLOGICAL COOPERATION GOES BACK MANY YEARS AND COVERS ALL ASPECTS OF OUR BUSINESS. THE PROBLEM OF ENGINEERING EDUCATION IS BEING ATTACKED BY A CONSORTIUM TO APPLY COMPUTER-BASED EDUCATION AND OTHER ELECTRONIC MEDIA TO
THE COMPLETE LOWER DIVISION ENGINEERING PROGRAM. ANOTHER EXAMPLE IS CONTROL DATA'S BILLION DOLLAR OEM PERIPHERALS BUSINESS -- AN OUTGROWTH OF A COOPERATION BEGUN IN 1972. AND I COULD GO ON.

IV. WHAT TO DO – LESSONS FROM EXPERIENCE

BUT LET ME CONCLUDE BY SUMMARIZING WHAT WE HAVE LEARNED FROM THESE YEARS OF EXPERIENCE -- WHAT MUST BE DONE TO BRING ABOUT A BETTER CLIMATE FOR INNOVATION AND IN PARTICULAR TO BRING ABOUT MORE WIDESPREAD TECHNOLOGICAL COOPERATION.

FIRST, INNOVATION MUST BE FOSTERED NOT ONLY BY TOP OPERATING MANAGEMENT, BUT ALSO BY THE BOARD OF DIRECTORS. IN THAT REGARD, THE BOARD OF EVERY LARGE COMPANY SHOULD ADOPT WHAT I REFER TO AS A POLICY FOR INNOVATION. ONE PART OF THE POLICY REQUIRES SEMI-ANNUAL REVIEWS OF THE COMPANY'S NEED FOR INNOVATION AND THE ACTIONS BEING TAKEN TO ACHIEVE IT. THERE IS A GREAT DIFFERENCE BETWEEN RUN-OF-THE-MILL INNOVATION AIMED AT IMPROVING EXISTING PRODUCTS AND SERVICES AND INNOVATION WHICH ADDRESSES NEW ONES. IT IS THE LATTER THAT IS THE SUBJECT OF THE PROPOSED POLICY. BECAUSE SUCH INNOVATIONS ENTAIL GREATER RISK AND GREATER COST, COMPLETION DATES ARE MUCH MORE DIFFICULT TO ESTIMATE. THEREFORE, THE POLICY MUST PROVIDE FOR A PERIODIC REVIEW AND ADJUSTMENT OF THE BUDGET....AND, SUBJECT TO BOARD APPROVAL, ANNUAL BONUS PLANS AS WELL.
SPECIAL EMPHASIS SHOULD ALSO BE GIVEN TO POLICIES WHICH FOSTER
INNOVATION IN THE AREA OF ACCESS TO KNOWLEDGE BY INDIVIDUALS
AND SMALL COMPANIES. A CREATIVE APPROACH IS POSSIBLE WHICH NOT
ONLY WOULD HELP INDIVIDUALS AND SMALL COMPANIES, BUT CAN ALSO
INCREASE PROFITS. AT THE SAME TIME, THE BIG BUSINESSES
INVOLVED WOULD BE CREATING A FAVORABLE ENVIRONMENT FOR
INNOVATION WITHIN THEIR OWN ORGANIZATIONS. MANY EMPLOYEES
WOULD BE STIMULATED TO THINK ABOUT CHANGE AND WOULD BECOME NOT
ONLY MORE AMENABLE TO IT BUT ALSO WOULD HELP TO ENGENDER IT.

DIRECTORS SHOULD ALSO INSTITUTE POLICIES TO FOSTER COOPERATION
WITH OTHER COMPANIES AND THE GOVERNMENT. PARTICIPATION IN AT
LEAST ONE CONSORTIUM SHOULD BE REQUIRED....FOR EXAMPLE, ONE
SUCH AS MCC. ANOTHER EXAMPLE WOULD BE PARTICIPATION IN A
CONSORTIUM ENGAGED IN PROVIDING INDUSTRY-WIDE TRAINING NEEDS.
THE INVESTMENT WOULD BE MODEST AND THE RISK RELATIVELY SMALL
FOR A LARGE FIRM, BUT THE BENEFITS WOULD BE SUBSTANTIAL.
TRAINING AND RE-TRAINING COSTS PLAGUE EVERY INDUSTRY AND ARE A
ROOT PROBLEM TO BE SOLVED IN INCREASING INNOVATION AND
IMPROVING PRODUCTIVITY. SO COOPERATION RATHER THAN DUPLICATION
HAS OBVIOUS BENEFIT TO ALL.

(PAUSE)
IN ADDITION TO THE REQUIRED CHANGE IN THE U.S. CORPORATE ATTITUDE TOWARD COOPERATION, OR PERHAPS AS A NECESSARY PRELUDE TO SUCH CHANGE, THE RELATIONSHIP BETWEEN GOVERNMENT AND PRIVATE ENTERPRISE MUST LIKewise CHANGE.

IN THE CONTEXT OF COOPERATIVE R & D, THERE ARE SPECIFICALLY THE STRONG DISINCENTIVES TO SUCH ACTIVITY PROVIDED BY THE PRESENT U.S. ANTITRUST LAWS. AS IT HAPPENS, THIS DOES NOT AFFECT MCC -- THE COOPERATIVE EFFORT I DESCRIBED EARLIER. WE ARE KEEPING THE JUSTICE DEPARTMENT INFORMED WITH REGARD TO MCC, WE ARE NOT ASKING FOR A BUSINESS REVIEW LETTER. WE CAN LEGALLY FORM AND OPERATE IT IN SPITE OF THE FACT THAT CURRENT LAWS ARE ARCHAIC AND DISCOURAGE COOPERATION.

BUT WHAT IS NEEDED TO BRING ABOUT WIDESPREAD COOPERATION IS A CHANGE IN THE TENOR OF CURRENT LAWS -- FROM LAWS WHICH SOMETIMES PERMIT TECHNOLOGICAL COOPERATION -- TO LEGISLATION WHICH ENCOURAGES IT. ANTI-TRUST AND JUSTICE DEPARTMENT GUIDELINES ON COMPLIANCE CURRENTLY REQUIRE LENGTHY AND COMPLEX ANALYSES -- AND EVEN THEN, IN VIRTUALLY EVERY SITUATION, LEGAL OPINIONS HAVE VARIOUS DEGREES OF AMBIGUITY. HENCE, MANY CORPORATIONS ARE SCARED OF ANTI-TRUST SUITS.
IT IS ALSO TRUE THAT JUSTICE DEPARTMENT LAWYERS TAKE NARROW, LEGALISTIC VIEWS THAT REFLECT THE STATUS QUO. THEY NEVER ATTEMPT TO LOOK AHEAD TO THINK ABOUT ACCOMMODATIONS TO CHANGE BROUGHT ABOUT BY TECHNOLOGICAL ADVANCE. THEIR USUAL APPROACH IS TO SIT BACK IN A "NOW EXPLAIN IT TO ME" POSTURE.

THE LEGISLATION THAT IS PENDING IN CONGRESS TO ENCOURAGE R & D COOPERATION BY PROVIDING IMMUNITY TO THIRD PARTY SUITS, I.E. HR 6262, S.2717, AND S.2714, REPRESENT A STEP IN THE RIGHT DIRECTION. HOWEVER, THE CERTIFICATION PROCESS SPECIFIED IN THEM IS BURDENSOME AND UNCERTAIN AS TO OUTCOME.

THEREFORE, IN AN ENVIRONMENT WITH TIMID CORPORATIONS AND STATUS QUO JUSTICE DEPARTMENT LAWYERS, NONE OF THE PRESENT PROPOSED BILLS WILL ACCOMPLISH THE NEEDED RESULTS.

LEGISLATION IS NEEDED WHICH DEFINES CERTAIN OBJECTIVE CRITERIA WHICH, IF MET, WOULD IMMUNIZE A VENTURE FROM ANTITRUST ATTACK. WE CALL THIS A "SELF-CERTIFICATION" APPROACH. PARTICIPANTS WOULD THUS BE IN A POSITION TO STRUCTURE EFFECTIVE R & D VENTURES AS UNIQUE CIRCUMSTANCES MAY REQUIRE, IN AN ATMOSPHERE OF CERTAINTY RATHER THAN AMBIGUITY. VENTURES THAT DID NOT MEET THE CRITERIA COULD STILL SEEK JUSTICE DEPARTMENT APPROVAL, WHETHER BY WAY OF A BUSINESS REVIEW LETTER OR A NEW CERTIFICATION PROCESS IMPLEMENTED TO HANDLE SUCH CASES.
IN REALITY, THIS PROPOSAL IS NOT A VERY WIDE DEPARTURE FROM EXISTING ANTITRUST LAW -- THE BIG DIFFERENCE IS THAT IT WOULD SUBSTITUTE CERTAINTY FOR AMBIGUITY IN THE IMPORTANT AREA OF COOPERATIVE R & D.

THERE IS MUCH MORE THAT COULD BE SAID ON THIS MULTIPACETED SUBJECT. BUT THIS MUCH IS CLEAR: COOPERATION IS NECESSARY NOT ONLY TO SUSTAIN THE INTERNATIONAL COMPETITIVENESS OF EXISTING COMPANIES, BUT ALSO TO FOSTER THE GROWTH OF NEW COMPANIES. HOW WE TREAT THIS ISSUE -- MORE THAN ANY OTHER SINGLE FACTOR -- WILL DETERMINE THE ECONOMIC FUTURE OF THIS COUNTRY. AND SINCE OUR POLITICAL FUTURE IS INEXTRICABLY TIED TO OUR ECONOMIC FUTURE, THERE IS A WHOLE LOT MORE AT STAKE HERE THAN MERE PROSPERITY.

THANK YOU.