OVER THE COURSE OF THE PAST TWO DAYS

YOU'VE HEARD AND SEEN A LOT ABOUT CONTROL DATA.

BUT I HOPE YOU HAVE "FELT" SOMETHING AS WELL.

FROM IT'S INCEPTION 21 YEARS AGO,

CONTROL DATA HAS BEEN AN EXCITING COMPANY

BUT IT SEEMS TO ME

THAT NEVER HAS THE LEVEL OF EXCITEMENT BEEN HIGHER THAN IT IS TODAY,

NOT ONLY IS THERE THE CONTINUING PROFUSION OF NEW IDEAS,

NEW PRODUCTS AND SERVICES

BUT THERE IS A CONFIDENCE AND CERTAINTY

THAT COMES WITH HAVING MATURER SO MUCH.

FIVE YEARS AGO

OUR MAIN LINE COMPUTER SYSTEMS WHICH HAS BEEN THE CENTRAL THREAD OF CONTROL DATA'S HISTORY

WE HAVE ALWAYS BEEN LEADERS AND INNOVATORS

YET 5 YEARS AGO

THERE WERE SEEDS OF DOUBT - DID WE LOSE THE TOUCH?

THE SUCCESS OF THE CYBER 170 HAS CHANGED THAT DRAMATICALLY

AND TODAY WE SEE A CLEAR PATH FOR THE NEXT 7 - 10 YEARS.

THERE ALWAYS IS A CONSIDERABLE WHIRL AND BABBLE

THAT SURROUNDS THE WAVES OF CHANGE IN THE COMPUTER INDUSTRY.

CURRENTLY, THAT CHANGE

IS THE SO-CALLED MINI-COMPUTER REVOLUTION.
HOWEVER, IT IS NOT TO THAT POINT I WISH TO SPEAK
BUT RATHER TO THE FACT
THAT IN THE MIDST OF ALL THAT
IT IS CLEAR THE CURRENT AND FUTURE NEED FOR VERY LARGE COMPUTERS
HAS NEVER BEEN GREATER.
SO WE ARE NOT DISTRACTED.
MOREOVER AND THE YEARS OF EFFORT
AND MILLIONS OF DOLLARS PUT INTO STAR NOW BEING ARE REWARDED.
THERE IS A QUIET BUT DEEP EXCITEMENT ABOUT THE FUTURE OUTLOOK IN THE CURRENT SUCCESS OF STAR THAT EXCEEDS ANYTHING WE HAVE KNOWN BEFORE.
YOU HAD TO HAVE BEEN THERE THROUGH ALL THE YEARS OF DOUBT, OF HOPE, AND PERSERVERANCE,
IN THE FACE OF LOUSY FINANCIAL PERFORMANCE TO FULLY APPRECIATE WHAT A LETTER LIKE THE ONE I AM ABOUT TO READ CAN MEAN.
"CAL TECH LETTER"
CONTROL DATA OWES ITS VERY START

TO THE U.S. GOVERNMENT'S

AND PARTICULARLY TO THE U.S. MILITARY's

NEED AND DESIRE FOR THE MOST ADVANCED COMPUTING POSSIBLE.

SO WITH ALL THE GROWTH AND CHANGE AND DIVERSIFICATION

WE FEEL A DEEP ALLIANCE WITH YOU AND YOUR COLLEAGUES

OF THE COMPUTING WORLD

WHO MANAGE THIS PART OF OUR COUNTRY'S BUSINESS.

AT THE SAME TIME,

WE SENSE A "CATCH 22" IN PRESENT PROCUREMENT POLICY

WHICH ULTIMATELY WILL DEPRIVE THE U.S.

OF NOT ONLY ITS CAPACITY TO PRODUCE VERY ADVANCED COMPUTERS

OF ITS LEAD IN COMPUTING AND INFORMATION SYSTEMS

IN GENERAL.

WE MUST UNDERSTAND THAT TIMES ARE CHANGING

AND THE BUSINESS PRACTICES

WHICH WORKED IN THE 50's AND 60's

IN ESTABLISHING THE U.S. LEAD IN SCIENTIFIC COMPUTATION

WILL PROBABLY NOT WORK IN THE EIGHTIES TO MAINTAIN IT.

INSOFAR AS THIS LEAD IS IMPORTANT TO THE U.S.

WE MUST FIND A MORE EFFICIENT

AND EFFECTIVE WAY TO STAY AHEAD.
IN THE LATER 50's AND EARLY 60's,

WHICH WAS A SORT OF ADOLESCENCE

FOR THE INFORMATION PROCESSING INDUSTRY,

WE FOUND THE FOLLOWING SITUATION:

CIRCUIT TECHNOLOGY WAS EVOLVING RAPIDLY;

A 4 TIMES IMPROVEMENT IN SYSTEM SPEED

COULD BE OBTAINED

FROM THE CIRCUIT COMPONENT SUPPLIERS ALMOST ALONE

JUST ABOUT EVERY FOUR YEARS.

DATA PROCESSING PRACTICES

WERE QUITE FUID AND RECEPTIVE TO CHANGE.

THERE WAS ONLY A FORMATIVE "ESTABLISHMENT"

OF FILE FORMATS, INTERCHANGE CODES, COMPILER METHODS, ETC.

THE NUMERICAL ANALYSIS APPROACHES

WERE GENERALLY ADEQUATE

FOR ALMOST ANY Viable MACHINE ARCHITECTURE;

GIVEN THE AVAILABLE CIRCUIT TECHNOLOGY.
FLEDGLING COMPANIES SUCH AS CONTROL DATA

HAD NO LARGE BASE OF "PROVEN CUSTOMERS"

WHOSE INVESTMENTS HAD TO BE PROTECTED FROM CHANGE.

IN FACT, IBM GOT AWAY WITH THE CHANGE TO THE 360

(ALTHOUGH JUST BARELY)

WITH A LARGE 7090 CUSTOMER BASE.

THE UNITED STATES GOVERNMENT

IN THE EARLY DAYS

WAS POURING TREMENDOUS AMOUNTS OF MONEY INTO DEVELOPMENT OF COMPUTERS

THROUGH UNIVERSITY RESEARCH PROGRAMS

AND MILITARY PROGRAMS.

IN 1978, THE INDUSTRY IS MUCH MORE MATURE;

AND WE FACE AN ENTIRELY DIFFERENT ENVIRONMENT.

MACHINE SPEEDS

ARE INCREASINGLY DETERMINED BY INTERCONNECT DISTANCES

SO THAT A 4X CIRCUIT SPEED IMPROVEMENT

TRANSLATES AT BEST TO A 2X MACHINE SPEED.
TO ACHIEVE SIGNIFICANT INCREASES IN COMPUTATION SPEED

(SUCH AS THE MAJOR APPLICATIONS REQUIRE)

WE MUST CHANGE THE ARCHITECTURE,

AND THEREFORE THE PROGRAMMING AND SOLUTION STRUCTURE.

DEVELOPMENT WILL REQUIRE A LONG PERIOD

OF CLOSE WORKING RELATIONSHIP WITH THE FINAL USER,

ESPECIALLY EARLY IN THE CONCEPTUAL

AND DEVELOPMENT STAGE.

IN PARTICULAR,

IMPROVEMENT REQUIRES MUCH MORE RESEARCH

IN MATHEMATICAL MODELING AND NUMERIC ANALYSIS TECHNIQUES

WORKING IN TANDEM WITH HARDWARE ARCHITECTURE AND DESIGN.

BECAUSE OF CIRCUIT COMPLEXITIES,

COORDINATION PROBLEMS

AND SOPHISTICATED DESIGN CONTROL METHODS

THE COST WILL BE VERY HIGH.

AND THE INCENTIVES

WILL BE LESS FOR PRIVATE ENTERPRISE

TO INVEST LARGE SUMS OF MONEY

BECAUSE OF THE GREATER RISKS

OF ACHIEVING CARRY-OVER TO THE GENERAL MARKETPLACE.
• YET IN THE FACE OF ALL THIS

• THE PROCUREMENT APPROACH HAS MOVED MORE AND MORE

• TO AN OFF-THE-SHELF,

• FULL-PERFORMANCE,

• DEMONSTRATION QUALIFYING METHOD

• THAT PUTS TOTAL RISK ON THE VENDOR.

• TO GET THERE HE COULD EASILY SPEND 50 MILLION DOLLARS.

• TODAY, THIS IS STILL SOMEWHAT OBSCURED

• BECAUSE WE ARE STILL LIVING OFF THE WORK DONE IN THE 1960’s.

• AND ONLY TWO COMPANIES REMAIN --

• CONTROL DATA AND CRAY RESEARCH.

• THE COSTS AND RISKS OF SUPER COMPUTER DEVELOPMENT

• COUPLED WITH THE DEVELOPMENT

• OF A LARGE COMMERCIAL MARKETPLACE 

• HAVE ONLY ONE POSSIBLE OUTCOME: IN THE FACE OF ALL THIS,

• DEVELOPMENT OF THE MOST ADVANCED COMPUTERS WILL CEASE

• AND BY THE TURN OF THE CENTURY

• THE LEAD IN COMPUTERS WILL PASS TO OTHER COUNTRIES.
• THERE IS TO THIS THREAT AN ANSWER.

• AND THIS ANSWER STILL PERMITS

• THE VERY JUSTIFIABLE DESIRE

• TO "KICK THE TIRES" BEFORE BUYING.

• THE ANSWER RESTS ON THE ENORMOUS PROGRESS

• THAT HAS BEEN MADE IN THE LAST FIVE YEARS

• IN SIMULATING COMPUTER CIRCUITS.

• IN EFFECT, COMPETING DESIGNS

• CAN BE FULLY EVALUATED

• BEFORE COMMITTING TO PRODUCTION.

• I DON'T MEAN TO OVER SIMPLIFY THIS.

• THE TASK IS STILL VERY LARGE

• AS ARE THE COSTS

• BUT THE RISK IS REDUCED TO A MORE MANAGEABLE NUMBER --

• SEVERAL MILLIONS OF DOLLARS --

• AS OPPOSED TO SEVERAL TEN’s OF MILLIONS.

• WE THINK THERE SHOULD BE THREE PHASES:
PHASE #1 -- DEFINITION

A NUMBER OF STUDY CONTRACTS WOULD BE ISSUED TO QUALIFIED COMPUTER COMPANIES. THE GOAL WOULD BE TO CLARIFY AND DEFINE THE REQUIREMENT THROUGH INTER-ACTIVE DISCUSSION BETWEEN THE WOULD-BE USER AND THE WOULD-BE DESIGNER.

PHASE #2 -- DESIGN CONTRACTS PHASE

DESIGN CONTRACTS ARE ISSUED TO TWO OR MORE COMPANIES FROM PHASE I. DESIGNS ARE SPECIFIED AS COMPLETELY AS TIME AND RESOURCES PERMIT AND THE PROBLEMS TO BE SOLVED ARE SIMILARLY DEFINED MORE EXACTLY, TO MINIMIZE THE RISKS OF THE CONSTRUCTION PHASE. IN THE DESIGN PHASE THE DESIGN MUST BE VERIFIED TO THE GREATEST EXTENT POSSIBLE, USING THE AGREED UPON PERFORMANCE CRITERIA.

CURRENT SIMULATION TECHNIQUES CAN ACHIEVE THIS.
EVEN THOUGH ONLY ONE DESIGN WOULD BE SELECTED

BY THE CONTRACTING AGENCY,

I SUGGEST

THAT THERE COULD INDEED BE TWO WINNERS --

FOR IT MAY BE

THAT THE SO-CALLED LOSER

MAY DECIDE TO INVEST THE NECESSARY FUNDS

TO COMPLETE HIS NEW PRODUCT.

IN ANY EVENT

THERE CERTAINLY WILL BE TWO COMPLETE NEW COMPUTER DESIGNS.

PHASE #3 -- CONSTRUCTION PHASE

A WINNING DESIGN IS SELECTED

AND A CONSTRUCTION CONTRACT IS AWARDED.

THE SELECTED VENDOR

COMPLETES THE ENGINEERING AND BUILD

AND INSTalls THE SYSTEM.

THIS APPROACH IS SIMILAR

TO MILITARY AIRCRAFT PROCESS PROCUREMENT

BUT DIFFERS IN THAT WE PROPOSE

THAT ONLY ONE VENDOR BUILD THE COMPUTER SYSTEM.
TO GIVE BOTH THE CONTRACTOR

AND THE GOVERNMENT

THE HIGHEST ASSURANCE

AND CHANCE FOR A SUCCESSFUL CONSTRUCTION PHASE,

WE PROPOSE AN INTENSIVE DESIGN SIMULATION PROGRAM

AS A PART OF THE DESIGN VERIFICATION.

WE REALIZE THAT RISKS

FOR BOTH THE USER AND THE SUPPLIER

WOULD STILL EXIST.

HOWEVER, BY CONTAINING THE RISKS,

IT REMOVES THE MAIN OBSTACLE

TO ATTRACTING THE KEY INDUSTRY RESOURCES.

OVER THE COURSE OF THE PAST TWO DAYS,

I KNOW YOU HAVE HAD A LOT OF INFORMATION THROWN AT YOU --

I HOPE YOU HAVE FOUND IT ALL STIMULATING,

INTERESTING AND HELPFUL.

BUT THERE IS ONE TOPIC

THAT DESERVES A LITTLE SPECIAL EMPHASIS

AND THAT IS PLATO --

COMPUTER-BASED EDUCATION.
As I travel around the world talking to executives of commercial, government and industrial organizations, the problem of training seems to be the most universal. Economists and businessmen talk about productivity and training and retraining comes up. As soon as they get over discussing capital formation, training in military organizations grows more costly every year. Educators and politicians are presiding over a steadily deteriorating public school system in the U.S. Continuing medical education is the hot topic at any medical convention. As executives, in one way or another, the problem of more effective training is bound to touch your lives. Plato is, in this regard, the most exciting and the most powerful tool to come out of the computer industry in twenty years.
FOUR YEARS AGO

WE FACED A HUGE MANAGEMENT TRAINING PROBLEM IN CONTROL DATA.

IN THE PAST TWO YEARS,

SOME MANAGERS

HAVE RECEIVED OVER A HUNDRED HOURS EACH OF MANAGEMENT TRAINING.

THE LOGISTICS MUCH LESS THE COST

WOULD HAVE MADE IT IMPOSSIBLE TO ACCOMPLISH THIS WITH CONSISTENT QUALITY

VIA ORDINARY METHODS.

SO -- IF YOU GO AWAY FROM HERE WITH ANY ONE THOUGHT

THAT THOUGHT SHOULD BE "PLATO CAN HELP."

FINALLY, ALONG WITH THE EXCITEMENT,

CONFIDENCE AND CONCERN,

I HOPE YOU HAVE AS WELL

SENSED THE DEDICATION OF OUR PEOPLE TO SERVICING YOUR NEEDS.

TWO YEARS AGO,

RECOGNIZING THE MULTIPLICITY OF MARKETS, PRODUCTS AND SERVICES

SERVED BY OUR U.S. MARKETING GROUP

WE SAW THE NEED TO REGROUP THE PEOPLE

SERVING THIS IMPORTANT AND TRADITIONAL CONTROL DATA COMMUNITY OF USERS.
THUS IT WAS

THAT GOVERNMENT SYSTEMS MARKETING WAS ESTABLISHED.

AT THE SAME TIME,

THE PROGRAM MARKETING CONCEPT WAS REINFORCED.

WE SEE AS WELL

THAT ANY MAJOR PROGRAM TODAY

HAS A GREATER CHOICE AND FLEXIBILITY

IN MEETING ITS COMPUTING OBJECTIVES --

COMBINATION OF COMMERCIAL AND MILITARIZED PRODUCTS --

OR EVEN VARIANTS OF THESE

OVER A PROGRAM LIFE --

LARGE AND SMALL SYSTEMS,

MULTIPLE SOURCES OF PERIPHERAL EQUIPMENT AND SO ON.

WE ARE CONFIDENT

THAT THROUGH A PROGRAM-ORIENTED MARKETING ORGANIZATION

THAT HAS AT ITS DISPOSAL

ALL OF THE MANY PRODUCTS AND SERVICES OF CONTROL DATA

WE’LL BE ABLE TO BETTER HELP YOU

TAKE ADVANTAGE OF THE OPTIONS AVAILABLE.
THANK YOU AGAIN FOR COMING,

CERTAINLY IT HAS BEEN A PLEASURE FOR US TO HAVE YOU HERE.
I couldn't resist sharing the attached letter with all of you. Dr. Saffman is one of the people at Cal Tech doing work under a research grant using the STAR-100 in the STAR Data Center. While I think his endorsement of STAR in the first paragraph of his letter is of great significance, I think of even greater significance is the fact that he and his associates at Cal Tech, being given an opportunity to switch their activities from the STAR-100 to the CRAY-I at NCAR, can see no significant advantage in computer power in making that switch.

How about that!!

---

**F. C. Laccabue**  
General Manager  
STAR Software, Services, & Marketing Support Division  
FCL/jh  
Attachment  

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Dr. M.J. Kascic, Jr.
Consultant
STAR Operations Division
Control Data Corporation
4290 Fernwood Avenue
St. Paul, MN 55112

Dear Mike,

I am writing to ask informally if CDC can give us some indication whether our contract will be renewed when it expires in November, 1979, or if we shall continue to be given time on STAR and the use of the terminal. As you know, we are now using vector programming extensively and have found it to be a great help in the solution of our problems. We have obtained results using STAR which would have been otherwise completely beyond our capabilities. For example, a whole new class of steady finite amplitude gravity waves has just been discovered, which 150 years of study by many scientists including some high powered pure mathematicians failed to uncover. We are now preparing a manuscript for publication describing the results.

One reason for this request is that having been given the taste of a powerful machine with vector programming, it would be hard for us to return to our old facilities. As you may know, the National Science Foundation wishes to make available to selected Universities the CRAY machine at N.C.A.R.. A few months ago, we had a visit from an N.S.F. representative who was enquiring about the kind of terminal that Caltech might think appropriate for a link to N.C.A.R. to use the CRAY. The time required to submit a proposal to N.S.F. and obtain approval and installation of the equipment is about one year, so we should have to start working on it soon if we are to switch to CRAY from STAR. We are quite happy with STAR and the arrangement with CDC and have no particular desire to change, as according to our present knowledge the CRAY would not offer us significant advantages in computing power although there might be an improvement in the kind of output, in particular graphic, that we could receive. If STAR is not going to be available to us after November, 1979, we need to know fairly soon so that we can plan ahead.
I hope you will be able to give us a favourable response.

Yours sincerely,

Philip

P.G. Saffman
Professor of Applied Mathematics

PGS/djm