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                              Interoffice Memo

TO: see "TO" DISTRIBUTION   DATE: MON 23 SEP 1985 10:18 AM EDT
                                   FROM: WIN HINDLE
                                   DEPT: CORPORATE OPERATIONS
                                   EXT: 223-2338
                                   LOC/MAIL STOP: ML10-2/A53

                                   MESSAGE ID: 5286162852

SUBJECT: VISIT BY RESEARCH BOARD

Most of you have met Naomi Seligman and Ernie von Simson who run
the Research Board (which is comprised of some 40 MIS Directors
from Fortune 100 companies.) They have visited DEC several times
and are generally friendly and helpful to us.

They would like to visit DEC once again to understand our current
operations and strategies, and have asked to discuss your area of
responsibility. They can visit November 4, 5, 13, 14 or 15. My
secretary will be in touch with your office to see if we can
decide which days we should invite them to visit.

A copy of the Research Board Membership List is being sent to you
under separate cover.

WH:da

WH1:S4.23

"TO" DISTRIBUTION:

DON BUSIEK   SAM FULLER   ROSE ANN GIORDANO
BOB GLORIOSO   BILL HANSON   BILL HEFFNER
*BILL JOHNSON   JIM OSTERHOFF   PETER SMITH
JACK SMITH   BILL STRECKER   DONALD ZERESKI
```

*Faith I met with them. Dorothy want to do it again - if so booked.*

*Yes*

*Nov 5th*
*3:15 - 4:30*

# THE RESEARCH BOARD

INCORPORATED

220 EAST 61st STREET · NEW YORK, N.Y. 10021 · (212) 486-9240

## RESEARCH BOARD MEMBERS

## AND ASSOCIATES

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Vice President
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Aetna Life & Casualty

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Systems Technology
Aluminum Company of America

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Vice President, Data Processing
  and Communications Services
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Vice President
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  and Data Processing
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Vice President
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   Insurance Company

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Mellon Bank

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   Information Services
Milliken & Company

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General Manager, Systems and
   Computer Services Department
Mobil Oil Corporation

Gerald L. Bratsch
Director of MISD
Monsanto Company

A. Fendrock
Vice President, Corporate
   Information Technology
Nabisco Brands Inc.

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President, GENIX Corporation
National Intergroup Inc.

J.L. Jones
Executive Vice President
Norfolk Southern Corporation

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Executive Vice President
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Vice President, Systems
   and Data Processing
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Allan B. Deering
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   of America

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Executive Vice President
Seattle First National Bank

Charles B. McQuade
President and Chief Executive Officer
Securities Industry Automation
   Corporation

Norman L. Vincent
Vice President, Data Processing
State Farm Mutual Insurance

John E. Parady
Senior Vice President
Corporate Information Services
TICOR

John L. Jorgensen
Vice President
Union Pacific Railroad Company

8/85

THE RESEARCH BOARD

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Interoffice   Memo

TO: see "TO" DISTRIBUTION

DATE: THU 26 SEP 1985  10:53 AM EDT
FROM: CHERYL DAIGLE
DEPT: CORPORATE OPERATIONS
EXT:  223-2276
LOC/MAIL STOP: ML10-2/A53

MESSAGE ID: 5286464884

SUBJECT: RESEARCH BOARD SCHEDULE

Naomi Seligman and Ernie von Simson from the Reseach Board will
be visiting Digital on Tuesday, November 5th and Wednesday,
November 13th.

The meetings will take place in Win's sitting room, ML10-2.  The
schedule is as follows:

### November 5th

| | |
|---|---|
| 8:45 – 10:00 a.m. | Jim Osterhoff |
| 10:00 – 11:15 a.m. | Bill Strecker |
| 11:15 – 12:30 p.m. | Don Zereski |
| 12:30 – 2:00 p.m. | Lunch with Bob Glorioso |
| 2:00 – 3:15 p.m. | Bill Hanson |
| 3:15 – 4:30 p.m. | Bill Johnson |

### November 13th

| | |
|---|---|
| 8:45 – 10:00 a.m. | Sam Fuller |
| 10:00 – 11:15 a.m. | Don Busiek |
| 11:15 – 12:30 p.m. | Jack Smith |
| 12:30 – 2:00 p.m. | Rose Ann Giordano |
| 2:00 – 3:15 p.m. | Bill Heffner |
| 3:15 – 4:30 p.m. | Pete Smith |

WH1:SO.15

"TO" DISTRIBUTION:

DON BUSIEK          SAM FULLER          ROSE ANN GIORDANO
BOB GLORIOSO        BILL HANSON         BILL HEFFNER
*BILL JOHNSON       JIM OSTERHOFF       PETER SMITH
JACK SMITH          BILL STRECKER       DON ZERESKI

# THE RESEARCH BOARD

INCORPORATED

220 EAST 61st STREET · NEW YORK, N.Y. 10021 · (212) 486-9240

May 23, 1988

Dear David:

The members of the Policy Board have asked me to thank
you for joining us last Wednesday.  Needless to say,
you made an unusually favorable impression on this often
prickly group of veteran pragmatists.  Your provocative
efforts to reexamine basic industry preconceptions,
and position seriously for 1992 (while avoiding crystal
ball gazing) was gratifying to us all.  Any unease
reflected the difficulty of grappling with the unknown.
But no whining dogs here!

All of us hope to see more of you in the future in the
Big Apple, Geneva, Maynard ... wherever.  And our friends
will surely be most interested in how your ideas and
programs progress.  Thanks again for your participation.

                              Sincerely,

                              Naomi

                              Naomi O. Seligman

Mr. David Stone
Vice President, International Engineering
  and Strategic Planning
Digital Equipment Corporation International
12 Avenue de Morgines
Case Postale 176
CH-1213 Petit-Lancy 1 Geneva
Switzerland

digital

# INTEROFFICE MEMORANDUM

|  |  |
|---|---|
| Date: | 25-May-1988 02:18pm CET |
| From: | David L. STONE @GEC |
| | STONE |
| Dept: | Int'l. Engineering |
| Tel No: | DTN 821-4956 |
| Doc No: | 000437 |

TO:  ~Remote Addressee~          ( JACK SHIELDS @CORE )
TO:  ~Remote Addressee~          ( JACK SMITH @CORE )
TO:  ~Remote Addressee~          ( WIN HINDLE @CORE )

CC:  ~Remote Addressee~          ( PIER CARLO FALOTTI @GEO )

Subject: RECENT ISSUES FROM THE RESEARCH BOARD, FYI

At Win's request, I did a presentation recently to the Research Board in the UK focusing on 1992 and its impact on major companies and their MIS strategies.

The following is a list of particular concerns which they brought up :

1 - Global pricing

   We had about 15 minutes discussion on how global pricing would work. In the end, we agreed that a single price by account worldwide was essentially what people wanted for any given product.This included products and services.
   All of those present (about 15) were in favor of such an policy.

2 - There was a substantial interest in software development environment standards such as for example IPSE and PCTE.

3 - There was a substantial interest in organizational consulting skills and our ability as a company to help them with the "implementability" issues they all faced in their companies.

4 - They expressed some concern about the process of sharing openly their mission and objectives with two competing companies: IBM and Digital. They  knew that they had to do it. They confirmed their unanimous dislike of IBM's excessive account control techniques and "box selling" orientation.

5 - There was a very substantial interest in UNIX and portability standards. This was just prior to the Open Systems Foundation announcement, and they all seemed to be well briefed on our participation in OSF.
These were the most significant issues on which there was basically unanimous opinion. If I can provide more information please let me know.

Regards,
DLS/cm

# THE RESEARCH BOARD

INCORPORATED

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## RESEARCH BOARD

## AND ASSOCIATE MEMBERS

*[handwritten top right: CRxxx E.C.  NOV 17 1988 ... See updated list dated 5/89.]*

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Corporate Administration
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Senior Vice President
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Information & Telecommunications
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Chief Information Officer
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Dean O. Allen
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   & Administrative Services
Lockheed Corporation

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# THE RESEARCH BOARD

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220 EAST 61st STREET · NEW YORK, N.Y. 10021 · (212) 486-9240

## RESEARCH BOARD ASSOCIATES

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  Personnel Systems
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Dow Chemical U.S.A.

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  & Chief Information Officer
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First Vice President
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Applied Technologies
Trinova Corporation

THE RESEARCH BOARD

RECEIVED

NOV 0  1988

BILL JOHNSON

October 31, 1988

Dear B.J.:

First, we'd like to thank you and your colleagues for
the time you spent with us during our research on network
management.  As you'll see from the enclosed extract,
Digital wins our admiration for EMA architecture - perhaps
the most comprehensive (and realistic) scheme encountered
during our travels.  So we're particularly delighted that
you will be joining the Associate Board in New York on
December 8th.  You probably know that this Board has two
constituencies: Senior IS executives of 20-plus major
corporations; and a smaller number of key managers reporting
directly to RB sponsors in the largest member companies.
(A list is enclosed.)  Membership is highly selective and
stable; we never permit substitutes, and nearly everyone
plans to attend.

*Well go down the night before if possible.*

We have scheduled your session for 9:15 a.m. to 10:30 a.m.,
split about equally between formal remarks and informal
exchange with the group.  I know the members will value
your perspective on EMA's five key objectives, and planned
capabilities - notably multiple access modules, generic
functional modules, and a global repository to untangle
everyone's messages and alarms.  The Report may provide
some ideas for your remarks: in addition to the Digital
"snapshot," we've included relevant bits and pieces to
indicate overall scope and thrust.  However, you can
certainly choose to ignore the specifics and proceed on
the general track.

The meeting will be held in the Wall Street area, at
India House (1 Hanover Square).  The prior evening, we'd
love to have you join the group for dinner at Fraunces Tavern,
54 Pearl Street, at around 7:00 p.m.  The members are staying
nearby at the Vista International Hotel, 3 World Trade Center;
we'd be happy to reserve accommodations for you, if you wish.
Sarah Piper, our Director of Client Services, can assist your
office with visual aid requirements and any other logistics.

Please call if you have questions, or would like to discuss
your presentation in more detail.  The Associate Board
members very much look forward to your participation; it is
extraordinarily timely.  And all of us hope the discussion
will be worthwhile for you as well.

Sincerely,

Catherine E. Loup

Mr. William R. Johnson, Jr.
Vice President, Distributed Systems
Digital Equipment Corporation
146 Main Street
Maynard, Massachusetts  01754-2571

THE  RESEARCH  BOARD

```
From:    CURIE::MCINNIS    "Secretary = Jay Healy @ 297-3201   22-Nov-1988 1209"  22-
NOV-1988 12:15
To:      SACMAN::JOHNSON,DON
Subj:    THE RESEARCH BOARD
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This is info from
Bryan Marler

THE RESEARCH BOARD

I had lunch today with Gerhard Friedrich, Manager of the Executive Marketing Group (works for Jim Higgins). These are my notes from that conversation:

o TRB is a leading edge thinker in the high technology communications business. They have been compared, in their approach to business, with "Lifestyles of the Rich and Famous". They have 40-50 members, all blue ribbon companies, i.e., Pepsi, Mobil, Aetna.

o The actual member is the Chief Information Officer (CIO). Membership is via selection and approval and sponsorship by other members. It is not done by application of the company or the individual who wants to join.

o TRB is a very independent company that provides evaluation of vendors. No vendors belong. No vendors are permitted to belong. No funding or fees are accepted from vendors.

o Naomi Seligman is their Vice President. Her relationship is with Win Hindle and Jack Shields. Jack Shields guards this relationship jealously and does not permit anyone else in DEC to contact TRB (except Win, I assume)

o The actual research work of the TRB is managed by Ernst (Ernie) Von Simpson. Ernie is also the President of this company.

o Gerhard feels that TRB strikes a good balance between vendor recommendations. They are not a true blue shop. They frequently recommend Digital solutions. The image of TRB being a big blue shop is because the majority of their members are typically IBM houses.

o Win Hindle's office has a list of the current members and I will ask for this from Win.

o In terms of OSF membership, Gerhard feels that we should definitely support TRB. They are a very influential group and increase the likelihood of their members becoming members of OSF.

o Just heard back from Win Hindle's office (Donna Knowlton). He is very supportive of TRB becoming a sponsor of OSF. Have not heard back from Jack Shields office yet.

RESEARCH BOARD INC
220 E 61st St
NEW YORK, NY 10021
TELEPHONE: 212-486-9240
DUNS NUMBER: 03-821-3039
PRIMARY SIC: 7392 (MANAGMNT CONSLTNG & PUB RELATN SERV)
YEAR STARTED: 1979
EMPLOYEES TOTAL:
INDUSTRY ASSETS: OVER $1 MILLION REGION: NORTHEAST

HISTORY:

ERNEST M VON SIMSON, PRES NAOMI SELIGMAN, V PRES
Incorporated New York Nov 13 1979. Authorized capital
consists of 1,000 shares common stock, $.01 par value.
Business started 1979 by officers. 98% of capital stock is
owned by parent.   2% of stock is owned by officers and key
employees.

VON SIMSON born 1938. Graduated from Brown University BA
degree 1959. 1959-1966 systems analyst for U S Life Insurance
Co, New York, NY. 1966-1969 Associate Director of Research
for Diebold Group Inc, New York, NY. 1969-present officer in
Mc Caffery, Seligman & Von Simson Inc, New York, NY.

SELIGMAN born 1933. Graduated from Vassar College BA degree
1955.   1957-1959 active with American Society of Mechanical
Engineers and attended London School of Economics.   1959-1966
systems engineer for IBM Corp New York, NY.   1966-1969
employed by Diebold Group Inc, New York, NY.   Vice President
there until 1969.   1969 resigned owning no interest.
1969-present officer in Mc Caffery, Seligman & Von Simson Inc,
New York, NY.

OPERATION:
Subsidiary of Mc Caffery, Seligman & Von Simson Inc, New York,
NY started 1969 which operates as management consultants.
Parent company owns 98% of capital stock. Parent company has
no other subsidiaries. Intercompany relations: none.
Management consultants specializing in forward technological
and economic research on the computing and communications
industries. Terms are on annual fee basis billed net 30 days.
Sells to commercial firms. Territory :United States, Britain
and Australia. Nonseasonal. EMPLOYEES: 25 including
officers. FACILITIES: Operates premises in a multi story
brick building. Operates from two buildings which are owned
by parent, Mc Caffery, Seligman & Von Simson Inc.

ARTICLES

Cashing In On Computer Confusion.
Computer industry market researchers are entering the business
of helping companies make computer buying decisions.
According to International Data Group chairman PJ McGovern,
his firm can tell clients how their computer investments per

dollar of sales or assets compare with others in the same industry. Market research firms are also helping companies keep up with the increasing complexity of computer technology and the vast array of available products. For example, PepsiCo retained Gartner Group (Stamford, Connecticut) to access information it would otherwise spend a long time obtaining. IDC and Gartner have had more success than Dataquest (San Jose, California) the largest market researcher, in providing services to computer buyers. Demand for such information is growing, primarily because of increased use by corporate computer buyers and financial customers. These two groups provide 70% of Gartner's business and 60% of IDC's. But IDC is increasing the number of services it offers, and is enlarging its sales force by 40%/yr vs 30% for Gartner. Dataquest and a number of smaller companies like Yankee Group (Cambridge, Massachusetts) and Diebold Group and the Research Board (both New York) are increasing their services to corporate customers.
Business Week Industrial Edition April 20, 1987 p. 85,86

Calling On The Research Board.
The Research Board, an elite club of MIS chieftans, offers in-depth research on the latest in computer technology. The 39 full members, along with 15 associate members who are granted fewer privileges, are the execs in charge of charting the technology paths for major corporations whose appetite for computer products collectively runs in the billions of dollars. Living legends in the MIS field such as M Hopper and MD MacKinnon are members. These pioneers and the other members of the Research Board are a powerful group of MIS directors that represents many Fortune 100 companies. The group's membership is kept small so that meetings can be conducted in an intimate atmosphere.
InformationWEEK September 1, 1986

Companies with big telecommunications networks do not want the Bell System deregulated.
The companies fear the formation of one or more deregulated AT&T subsids will lead to dispersal of responsibility, delays in processing of service orders and poorer quality maintenance, according to S Gordon, dir of telecommunications policy research for The Research Board (New York, NY), a consulting organization.
Computerworld June 8, 1981 p. 1,10

Calling on the Research Board.
Research Board provides members with latest information on technology and markets
The Research Board is an elite, high-powered group of MIS industry leaders located in a low profile four-story townhouse on the Upper East Side of Manhattan, New York and the group's 39 full members pay an annual membership fee of $40,000 and the 15 associate members pay $30,000. The workings of the group, surrounded as they are in an aura of secrecy, are criticized by some as snobbish, presumptuous or elitist, but the vendors in the computer industry, all of which are

automatically excluded from membership, take the research
results of the group with great seriousness. It is, in fact,
the excluded vendors and their product and marketing
strategies that are frequently the topics of the Research
Board's three annual reports and meetings, and the
organization is headed by Naomi O. Seligman and Ernest von
Simson, who conceived the idea and do most of the research
that provides the substance ofthe meetings. The only vendor
presence is in the form of invited responses to the in-depth
reports produced and discussed by the Board, and the process
is crucial for vendors who realize the quiet clout of the
organization comprised of some of the most influential
computer users in a variety of industries. Vendors who become
the topic of study must manufacture quality products, have
efficient sales organizations and high-powered research and
development teams, and offer extensive field service options
like remote-diagnostics.

How to keep customers happy captives: equip them with
computers they can use to keep their books, get advice and
buy what you sell. (channel systems)
IN THEIR FEROCIOUS marketing wars, the world's biggest
corporations have opened battle on a new front: their
customers' desktops. Companies as diverse as Inland Steel,
Eastman Kodak, and First Boston are trying to increase sales
and ace out the competition by placing terminals hooked to
their own computers in customers' offices. Such a strategy is
tricky and expensive to execute. A company can win or lose by
many times what the computer systems cost--and they don't come
cheap. But companies are betting heavily on the systems.
Naomi Seligman, co-founder of the New York-based Research
Board, an organization of top computing executives from 50 of
the largest U.S. corporations, explains the systems' appeal:
"They destory your customers' interest in competitors'
products."

They are called channel systems because they're meant to cure
headaches for people in a company's distribution
channels--commercial customers and key middlemen. Some
channel systems enable customers to order instantly and better
manage their inventories. Customers use others to analyze
costs, control quality, lay marketing plans, and
electronically seek advice. In all cases, by helping the
customer solve a problem the company supplying the computer
system stands to increase sales or otherwise benefit. Though
the systems have been around for years, they've recently begun
to multiply. Last year the Research Board's members decided
channel systems were the strategic issue they most urgently
needed to learn more about.

When the systems work well, they are enough to make a
marketing manager's mouth water, as the example of a pioneer
channel system illustrates. In 1974 American Hospital Supply
installed the industry's first order-taking terminals in the
stockrooms of large hospitals. Accustomed to ordering

supplies from salesmen making regular rounds, hospitals at first planned to use the system only in emergencies. But stock clerks preferred the terminals to salesmen and turned to American Hospital with routine orders for everything from tongue depressors to blood analyzers. Rival distributors filed an antitrust suit (which they lost on appeal) to keep the company from establishing exclusive supply agreements with major hospitals. Now a $3.4-billion-a-year operation, American Hospital recently agreed to be acquired for $3.8 billion by drug maker Baxter Travenol.

Only a few of the channel systems tie customers to a single supplier. Says James Bradley, a channel system executive at Aetna Life & Casualty, "You can't dictate to your users. If you try, they turn on you, and all the money you've invested goes down the tube." Instead, Aetna, like most channel system marketers, hopes to get business by spending heavily to pamper the system's users with versatile software, friendly telephone hot lines, and artful customer training.

At costs ranging into the hundreds of millions of dollars, channel systems are the highest-staks game a computer executive can play. Though there's a lot that isn't known about running them, a few fundamentals of the game have become apparent. The first system to appear in a market often becomes the runaway winner. Once entrenched, it is nearly impossible to displace; it can also set a pace of innovation that keeps competitors reeling. All channel systems try to incline the user toward buying more from the supplier of the system and less from competitors, through the Research Board has trouble agreeing about how brazenly this ought to be done. Some systems, such as American Hospital Supply's, simply black the competition out, listing only the supplier's products. In Research Board parlance, such systems exhibit heavy tilt. Others use light tilt: they let customers do business with the competition, employing subtler means to boost the supplier's share.

D—
Please ask BJ
for a copy of the Research
Board report on Network
Management.

12-28 Win,
Network Management
report is attached.
I Need to return this
to B.J. after your review.
or do you Need your own copy?
cc: Dostabb

THE RESEARCH BOARD

INCORPORATED

220 EAST 61st STREET · NEW YORK, N.Y. 10021 · (212) 486-9240

December 13, 1988

Dear Bill:

Naomi, Cathy and I would like to thank you for taking time to
join us at last week's Board meeting. As you surely know, you
were a great success. The combination of Digital's architectural
strength and your personal candor framed the network management
issues and opportunities more forcefully than our other guests
were able to do. Of course, we expected nothing less. Still,
it was nice to hear the members confirm our assessment.

In substantive terms, you drew high marks for product structure.
Balanced by a few gripes: Digital's position on interoperability
with IBM was not fully understood. And there was considerable
frustration about the pace of introduction. After all, this
scale installation lived with the network management gap long
before the vendor community began to grasp the nettle. Making
EMA architecture and scope doubly important. But no more cheers
from these tough customers until the product reaches the market.
Even then, they'll grouse if customization requires more highly
skilled systems software experts.

Anyway, that was the group's consensus after the session. None
of which detracts from the excellence of your presentation. For
us at the Research Board, it was a pleasure to see you again.
And we look forward to an early repeat next week.

Sincerely,

Ernest M. von Simson

Mr. William R. Johnson, Jr.
Vice President, Distributed Systems
Digital Equipment Corporation
146 Main Street
Maunard, Massachusetts 01754-2571

RECEIVED

DEC 14 1988

BILL JOHNSON

CAT'S CRADLE

Network Management

Naomi O. Seligman

Win —

As always, thanks
for your wisdom

N.

```
+---------------------------------+
|   |   |   |   |   |   |   |   |  |
| d | i | g | i | t | a | l |   |  |      INTEROFFICE MEMORANDUM
|   |   |   |   |   |   |   |   |  |
+---------------------------------+
```

TO: Bill Johnson   DATE: January 4, 1989
                                    FROM: Win Hindle WH bc
                                    DEPT: Corporate Operations
                                    EXT : 223-2338
                                    LOC : MLO12-1/A53

SUBJECT: THE RESEARCH BOARD

1.   Is this a fair view of the network management business?

2.   Are they right that Netview is the system to meet? That its
     "entrenched position is unassailable?" Those are strong
     words!

WRH:BC

Attachment

```
                INTEROFFICE   MEMORANDUM

           CORMTS  ALL-IN-1  SYSTEM

                        Date:    12-Jan-1989 01:12pm EST
                        From:    Bill Johnson
                                 JOHNSON.BILL
                        Dept:    Distributed Systems
                        Tel No:  223-3982

TO:  Win Hindle                    ( HINDLE.WIN )

CC:  Bill Johnson                  ( JOHNSON.BILL )

Subject: RE:  THE RESEARCH BOARD
```

WIN;

THEY HAVE MADE A REASONABLY ACCURATE ASSESSMENT OF OUR CAPABILITY. IT'S NOT
CLEAR THEY HAVE SCOPED THE MAGNITUDE OF NETWORK MANAGEMENT AS IT EVOLVES TO
ENTERPRISE MANAGEMENT AND SYSTEMS MANAGEMENT (OLYP, OFFICE, CIM).

IBM IS CERTAINLY IN A STRONG POSITION (FIRST TO MARKET, LOW COST ENTRY, NAME),
BUT THEY ARE ASSAILABLE. THE FEEDBACK FROM CUSTOMERS IS THAT OUR VISION IS
CORRECT, BUT THEY'RE NOT ABLE TO WAIT. I VIEW THE NETWORK MANAGEMENT SOLUTIONS
WILL BE THE FIGHTING GROUND IN THE 90'S AS O/S WERE IN THE 80'S.

B.J.

/fs

3/21- Karen found a copy of front pg & note sent
        to Win Hindle.
        She will ask B.J

4/11/91- Recd copy of Cat's Cradle from TKB-
        We will keep copy in this office

Al Crawford –
    Garland Cupp – Am Express

"Losing customers focus"   (NO) Alcoa OK
"On the wrong track"   (NO)
"Headed into some trouble"

    – Is Ken active
    – Some product problems
    – shields in a lot of trouble
No formal presentations made on

Clients disturbed # talked to RB
    – Atmosphere at DEC #
    – Gap between what top says and what our people do –
    – If it's a process problem, they don't think they can fix it
            by telling us –
    –

I asked why customers won't tell us –

```
INTEROFFICE   MEMORANDUM

CORMTS   ALL-IN-1   SYSTEM
```

```
                          Date:    13-Mar-1989 01:07pm EST
                          From:    Win Hindle
                                   HINDLE.WIN
                          Dept:    Corporate Operations
                          Tel No:  223-2338
```

TO: See Below

Subject: RESEARCH BOARD

```
*****************************************************************
        COMPANY CONFIDENTIAL        RESTRICTED DISTRIBUTION
*****************************************************************
```

We recently received some third-hand information that the
Research Board was saying some disturbing things about Digital.
Bel Cross heard it from one of our close friends whose boss is a
Research Board member. The message being conveyed was that
Digital is "losing customer focus" and "headed into some
trouble."

I called Naomi Seligman to ask what they are saying about
Digital. She said they had said nothing in any formal meeting of
the Research Board. However, they talk with individual members
of the Research Board, some of whom express concern about
Digital. She said one member asked whether Ken is still active
in the company; she said he is. Others have said the
"atmosphere" of dealing with Digital is different than it used to
be. One client said he has been dealing with Digital for 20
years and, for the first time, is looking seriously at IBM
products. I pressed her to name the sources but would not give
me any names because it would breach their confidential
relationship with Research Board members.

Naomi said that the Research Board staff would not have said the
things we heard. She said we have done a first-rate job
correcting the problems at Alcoa since she mentioned these
problems to Grant Saviers and Hans Gyllstrom. She believes we
have good customer focus when it is called to top management's
attention. She did say that there is a gap between the messages
from senior management at Digital and what our people do on the
front lines. Her belief is that we are not practicing our
message of customer satisfaction as customers perceive it.

There is a belief at the Research Board that we have "product
problems." I think this means that our commercial software does
not meet all the requirements as seen by our customers. We need
to pursue this in great detail, and Naomi is very willing to meet
with us in New York to discuss this. Dennis Roberson is

arranging that meeting.

ps
CM.2789

Distribution:

TO:	Ken Olsen	(OLSEN.KEN)
TO:	Jim Osterhoff	(OSTERHOFF.JIM)
TO:	John Sims	(SIMS.JOHN)
TO:	Jack Shields	(SHIELDS.JACK)
TO:	Jack Smith	(SMITH.JACK)
TO:	Abbott Weiss	(WEISS.ABBOTT)
TO:	Bel Cross	(CROSS.BEL)
TO:	Bob Glorioso	(GLORIOSO.BOB)
TO:	Remote Addressee	(DENNIS ROBERSON @MRO)
TO:	Grant Saviers	(SAVIERS.GRANT)
TO:	Dave Grainger	(GRAINGER.DAVE)
TO:	Remote Addressee	(GYLLSTROM @DBSVAX @VMSMAIL)

```
              INTEROFFICE   MEMORANDUM

              CORMTS   ALL-IN-1   SYSTEM

                              Date:      20-Mar-1989 04:02pm EST
                              From:      JAN E JONES @PTO
                                         JONES.JAN AT A1 AT CSOA1 AT
RDC

TO:  GRANT SAVIERS @MLO

CC:  BOB BURKE @OHF
CC:  NEAL HOUTZ @OHF

Subject: Oracle at the Research Board


Larry Bagwell, Alcoa's Research Board member, stated that Oracle
was presented to the RB by an officer of the company.  They made
2:1 performance claims, and touted a new era where software is
selected independent of the hardware vendor.

Mike Reidenbaugh, who is Larry Bagwell's key Technical resource,
is a supporter of Digital and Rdb.  Mike was ecstatic when I gave
him a technical write-up which described Oracle's inability to
cluster.  I believe that Alcoa can be a entry point for flowing
information back to the RB.  Additionally, you will probably want
to present directly to the RB.  How can we help?

Grant, is it possible to perform an Rdb presentation before the
Research Board?  I would welcome you discussing this with Larry
Bagwell, (412)766-7420.
```

Dept: Corporate Accounts
Tel No: 422-7470

INTEROFFICE MEMORANDUM
CORMTS ALL-IN-1 SYSTEM

Date:	24-Mar-1989 03:08pm EST
From:	Grant Saviers
	SAVIERS.GRANT AT A1 at CORA
Dept:	Storage & Info. Mgmt.
Tel No:	223-9765

at CORE

TO: WIN HINDLE @CORE

Subject: RE: Oracle presentation to Research Board, attached.

This surprises me, as I did not think they had companies present. I'd like a shot at presenting Digital's "Information Management Strategy" in response to Oracle.

By the way, my impression of the RB is slipping badly from this and other inputs.

Win,

I advised Grant you are on vacation until april 3 and will not be able to respond to this until then. I also let him know of your meeting with the Research Board on may 1.

3/27

Defensiveness –
    Fear of being wrong –

DEC looks bureaucratic compared to IBM
    – 8 levels down to Account Mgr.
    – Corp. Software Agreement (3 pgs. with IBM, books with DEC)
    – Fix top 100 accounts – all industries have this problem w/ DEC.
    – Early ships not well run – no support – no manuals –
        IBM perceived to do it better than DEC.

"Nickle & dime" support of "DEC's problems."
Instead of "good old Digital", we tell them ~~it has to~~ we have to charge to say good morning"
    Lost a big one because of this in process industry (not chemical)

Alcoa – turned it around – too much emphasis on Grant personally
        solving it –

World / International Accounts – Group Mgr. reports to Jack Shields –
    Top 20 accounts should be 4th level –
*   Worse in Europe –

Fix large accounts – use Cust. Satisfaction Execs frequently
    This is bizarre for co. that has no commissions –

Products # Everyone is in integration business —
OEC message not getting thru the smoke —
Visible & doing keeps people from getting the message —

30 MIP Mainframe not perceived to be important
Sequent is coming in more
Need a really big winner —
Need || machine — Need more TPS —

New thought — Clusters not economic —

Honest, technical, good salesforce image —

Measure power in TPS

Data Base

Who are the next leaders #
What is the next generation of technical leaders —
Is the processor line going anywhere —

Where is the self-confident 45-year-old group?

Give Sam's & BJ new bigger roles.

Data Base — why not let them all run on a OEC platform
of choice — OEC perceived as over-selling —

Naomi   * Need to inst for ½ day
                         Rescheduled to
                         (May 31) @ 4:30

Research Board - Wants to help -
Rejected ideas :
        - Subset of RB with Ken -
        - Poll of members -

(Good)   BJ did very well
          Midland Bank guy said it was "breath of fresh air"

     - Process problems - Naomi + Ernie will sit down
                    with me -

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| d | i | g | i | t | a | l |  |        INTEROFFICE MEMORANDUM
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TO: Jack Smith

DATE: June 15, 1989
FROM: Win Hindle *WH*
DEPT: Corporate Operations
EXT : 223-2338
LOC : MLO12-1/A53

SUBJECT: RESEARCH BOARD OBSERVATIONS

****
            VERY CONFIDENTIAL   --   DO NOT COPY
****

This is a bit more detailed feedback than I gave the entire
Executive Committee. Here it is simply:

1. The Digital message is not clear. How are you
    differentiating yourselves from all the rest?

2. Measure power in the commercial area by TPS, not MPS. You
    are coming from behind here and need to recognize it. Some
    feel you are arrogant.

3. Bob Glorioso oversells. He is not regarded highly in your
    major account base. (Note: I am meeting with Bob to give
    specific feedback to him.) His 30 MIP processor is not a
    significant product outside Digital.

4. Your two best managers from the customer perspective are BJ
    and Grant. They listen, they are enthusiastic, and they do
    not oversell. Grant has personally turned the Alcoa account
    from negative to positive.

5. You need a big product "win" soon. Aquarius/Aridus will not
    do it. It would be powerful to know Digital is working on a
    powerful parallel processing system.

ps

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| d | i | g | i | t | a | l |   |       INTEROFFICE MEMORANDUM
|   |   |   |   |   |   |   |   |
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TO: Jack Shields   DATE: June 15, 1989
     Dave Grainger   FROM: Win Hindle
                                      DEPT: Corporate Operations
                                      EXT : 223-2338
                                      LOC : MLO12-1/A53

SUBJECT: RESEARCH BOARD OBSERVATIONS

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*******************************************************************
         VERY CONFIDENTIAL    ---    DO NOT COPY
*******************************************************************
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My memo on The Research Board observations was quite general.
They did give me some more specific input that I will send to you
but not to the entire Executive Committee. Here it is:

Major account managers must be closer to the top of the company
to have the clout they need to fix problems. One customer
observed his account manager is eight levels from Ken. The
levels are not significant--it is their ability to get Digital to
perform effectively that they need.

Our Corporate Software Agreement is a pain to them--far more
complicated than IBM's. It takes three pages of text with IBM
and an "entire book" with Digital. We must simplify our software
licensing terms.

Use the EPPs more to relieve tension when it occurs. Let the
EPPs listen to problems and then work with the account managers
to fix them.

Customers want an honest, technical, experienced account manager
who knows his/her way around Digital to get things done. Above
all, fix the broken relationships with your top 20 accounts, like
Dupont.

ps

June 28, 1989

Carol Gault stopped by to say that Jack Smith has passed
this memo on to Frank McCabe.

ps

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| d | i | g | i | t | a | l |       INTEROFFICE MEMORANDUM
|   |   |   |   |   |   |   |
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Frank McCabe is the MEM representative

TO: Jack Smith   DATE: June 15, 1989
      Jack Shields *Ron Busiek is the* FROM: Win Hindle
                    SSMI representative DEPT: Corporate Operations
                                    EXT : 223-2338
                                    LOC : MLO12-1/A53

SUBJECT: RESEARCH BOARD

****
                    COMPANY CONFIDENTIAL
****

One issue that The Research Board brought up needs work in both
engineering and service. A number of our customers have
complained that we are not properly managing and supporting test
sites for new products. We do not have the right people there to
support the new product and receive proper customer feedback. I
recommend that you appoint two people (one from each group) to
look into our process for test-site support and see why some
customers are upset.

ps

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| d | i | g | i | t | a | l |          INTEROFFICE MEMORANDUM
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TO: Ken Olsen   DATE: June 15, 1989
      Marty Hoffmann   FROM: Win Hindle
      Jim Osterhoff   DEPT: Corporate Operations
      Jack Shields   EXT : 223-2338
      John Sims   LOC : MLO12-1/A53
      Jack Smith
      Dave Grainger
      Abbott Weiss

SUBJECT: RESEARCH BOARD COMMENTS

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******************************************************************
                      VERY CONFIDENTIAL
******************************************************************
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Recently, I visited Naomi Seligman and Ernie von Simson of The
Research Board at their office in New York to follow up on their
concerns about Digital. None of their remarks were very
specific, but it gives us flavor of what they are hearing from
their members. I have attached a current list of members, and
most of them are good customers of ours. Following are their
comments:

Our customers find us bureaucratic, even compared to IBM. We are
not easy to do business with. Digital's major account managers
do not have the ability to fix obvious problems. Digital has a
"nickel and dime" approach to support. Our customers and The
Research Board want us to go back to being "good old Digital"
that keeps customers as "number one" and fixes our own problems
without charging for our services. They recommend that we put
senior people on large accounts and give them the resources to
fix problems.

Our message about why Digital is unique is not getting across.
It sounds like every other systems integrator. What
distinguishes Digital from the others must be made clear, and
today it is not. Our products are great, and our networks in
particular are outstanding. We must put our products together in
a way that our customers can understand and support. They want
to buy from Digital because they do not want to be hostage to
IBM. Today we are not giving them the messages they need to sell
internally.

We appear to hype our products more today than we have
historically. Digital's data-base products and transaction-
processing products are good but not industry leaders. We are
promoting them as though we are the industry leaders, and our
customers feel we are over selling. This is also true with
Aquarius/Aridus which appears to be a fine 30 MIP processor, but

it will not be an industry leader when introduced. PMAX was a
leadership product when it was introduced, and Digital needs
another leadership product soon.

Digital should give customers the sense that that there is a
strong group of middle managers who will carry on the Digital
tradition after Ken and the current Executive Committee are gone.
Customers want to feel the presence of strong leaders in the 35-
to 45-year old age bracket who will continue to build excellent
products and carry on the Digital tradition of service and
concern for the users.

All of The Research Board input was presented from the point of
view of wanting Digital to succeed. The customers need us, and
Naomi and Ernie want to Digital to be a viable competitor for
IBM. They are friends wanting to be constructive, and I believe
we should listen carefully.

ps

Attachment

THE RESEARCH BOARD

INCORPORATED

220 EAST 61st STREET · NEW YORK, N.Y. 10021 · (212) 486-9240

RESEARCH BOARD MEMBERS

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Aetna Life & Casualty

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Vice President
Management Information Services
Air Products & Chemicals Inc.

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  and Information Services
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   & Computer Services
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Gerald C. Durand
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   of Systems and Data Processing
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Information Systems
Rockwell International Corporation

Charles B. McQuade
President & Chief Executive Officer
Securities Industry Automation
   Corporation

Dr. Norman L. Vincent
Vice President - Data Processing
State Farm Mutual Insurance Company

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Information Management
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Dusseldorf, West Germany

3/89

THE RESEARCH BOARD

INCORPORATED

220 EAST 61st STREET · NEW YORK, N.Y. 10021 · (212) 486-9240

ASSOCIATE BOARD PRINCIPALS

3/89

your memo attached

```
I N T E R O F F I C E   M E M O R A N D U M

                    Doc. No:  009330
                    Date:     11-Jul-1989 02:13pm EDT
                    From:     Frank McCabe
                              MCCABE.FRANK AT A1 at CORA @ C
                    Dept:
                    Tel No:   223-4597

TO:  WIN HINDLE @CORE


Subject: Research Board


Win, Jack has requested that I be the MEM representative to look into
the system issues to insure that we appropriately manage the test
sites for new products.  As soon as I find out who the service rep is,
I will set up a meeting with you to get the process moving.


(7/11, dictated but
not read.)
```

Will you want to attend
the meeting? Y – N ✗

D – Please ask Jack Shields' office if
he has appointed someone –

⊛ W – Don Busiek is the
SSMI representative.

D – Have you given Don's name to Frank?

(yes) Don has assigned
Vince Chickillo,
special Project Manager,
to meet w/ Frank.

```
From:   TPS::ROBERSON      13-JUL-1989 08:41
To:     HYEND::GLORIOSO,ROBERSON
Subj:   RESEARCH BOARD
```

Bob,

As you know I finally connected with Ernest VonSimpson and Anne
Seligman from the Research Board and closed on their TP/DB concerns.
In net they have two concerns:

1)   At our current DebitCredit TPS performance level we still
     don't have the capability to cover the commercial performance
     requirements of the largest US Customers (the Research Board's
     primary clients/members). Note: Aquarius will finally enable
     us to penetrate this exclusive club.

2)   The Board felt that we had not been totally open and upfront
     with them on the stability of Rdb 3.0 at its first ship last
     fall. Several of the member companies had experienced
     significant difficulties and we didn't acknowledge these
     difficulties when they visited us. The heavy effort's Han's
     team have been applying are turning the tide to enhance Rdb
     3.0's reliability.

The Board would very much like to see us again, but probably not until
we have announced Aquarius and can describe its performance attributes
in detail. This sounds like a late October or November session in New
York. At the session they'd also like to see our long term plans, both
hardware and software, and how they relate to the solution of high end
customers needs. They would also like to see our Office System
Strategy and how it relates to the rest of our High End Strategy.

The phone conversation was a very positive one with Ernest emphasizing
the Research Board's strong support for us and they desire to see us
succeed. I'll schedule the session with Anne Seligman to fit with our
Aquarius plans and your calendar.

Dennis

INTEROFFICE MEMORANDUM

Doc. No: 009402
Date: 17-Jul-1989 02:50pm EDT
From: Bob Glorioso
          GLORIOSO.BOB
Dept: High Performance Systems
Tel No: 297-5915

TO: Win Hindle   (HINDLE.WIN)

Subject: Research Board

Win,

Dennis was finally able to contact the Research Board with respect to
the TP issues they had. It looks like the key issue was the feeling
that we could not cover a broad range of TP user needs unless we had an
Aquarius class product. This is true to some extent if people don't
buy a distributed solution or understand the advantages of the DEC
Distributed Transaction Architecture. So it looks like we have two
problems both of which may be solved when we announce Aquarius and they
then look seriously at our distributed capabilities and realize that
they do not need Aquarius in all high performance TP applications. Of
course there are classes of problems and customers who cannot use a
distributed solution so Aquarius is very much needed by them.

See Dennis' memo on the conversation with Ernest attached for more
detail.

/Bob

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INTEROFFICE MEMORANDUM

TO: Henry Ancona
     Bob Glorioso
     Norm Goldberg
     Hans Gyllstrom
     Gene Hodges
     Jackie Kahle
     Bob Hughes
     Grant Saviers
     Bill Steul
     Dennis Roberson
     Howard Woolf

DATE: December 11, 1989
FROM: Win Hindle
DEPT: Corporate Operations
EXT : 223-2338
LOC : MLO12-1/A53

SUBJECT: RESEARCH BOARD MEETING

Ernie von Simsen and Ann Seligman (Naomi Seligman's daughter) of
the Research Board will visit on December 18 and 19 to discuss a
number of topics with us. The meetings will be held in the
Sitting Room at the Mill in building 10 to make it convenient for
them. Under separate cover, I am sending a list of the current
members of the Research Board.

As you know, the Research Board staff prefers a "conversational"
approach rather than a "marketing pitch." The last time they
were here, they felt that we were trying too hard to "sell" them.
They want to know that we are realistic in assessing our
competitive position. Of course, they hear from their members
all the time and already know how our customers evaluate us.

They do not sign non-disclosures, but I encourage you to talk
about future directions as you would to any close friend of the
company. They are in fact very supportive of Digital and want us
to do well because they do not want IBM to be sole supplier to
any of their members.

Thanks for taking part.

ps

Attachment

THE RESEARCH BOARD

INCORPORATED

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PARTIAL

CAT'S CRADLE

Network Management

THE RESEARCH BOARD

FOREWORD

This report was prepared solely for the use
of the Research Board, which financed its
completion. It contains information and
attitudes expressed by individual companies
that may be considered sensitive.

For this reason, and for proprietary reasons
of our own, we would not want this document to
be circulated so widely within Research Board
organizations as to raise the possibility
that it would be distributed outside these
companies, in whole or in part.

EvS/CEL

October 1988

CONTENTS

I. Topologies

Network management is a research nightmare! Vast in scope,
yet clogged with endless nitty-gritty. And zillions of
vendors. Most making slow progress behind marketing
hyperbole intended to disguise can't with cant. As everyone
slows down to match the glacial pace of standards. Which
aren't the whole answer.

A warm-up exercise: What's a network? Not so long ago, voice
networks were WATS. While data trickled over point-to-point
analog lines at 4800 baud. That's quickly changing. Today
voice and data share a backbone of T1 circuits arrayed in rings
or figure eights; dotted with intelligent multiplexors that
break down those 1,544,000 bits per second to usable gulps.
And forward the gulps to data controllers or voice PBXs. Then
down the pipeline to LAN communications servers, minis or
mainframes. Each LAN a constellation of workstations, each
processor with baskets of software. Complex relationships among
components that might have originated on different planets when
it comes to coherent management.

And what's coherent network management? Ideally, a system
that collects alarms and performance statistics from each
and every network denizen mentioned above. Then filters and
integrates those alarms to diagnose the real failure. Routes
the diagnosis to the appropriate point-of-correction. Accepts
corrective commands through a single "manager-of-managers"
console, not one per vendor. Plus immensely useful ancillary
functions: network-wide component inventory control, trouble
ticket tracking, security, perhaps accounting.

All critical to RB companies building ever more complex
global networks. For ever more crucial applications like
CIM and EDI. When your customer's order entry port remains
inactive for two weeks, should you send a salesman or a
repairman? And if the downed system downs company revenues,
can it ever be forgiven? Indeed, the primitive state of
network management will soon stifle user innovation, if it
hasn't already. Unfortunately, vendors expect that
implementing the ideal system described above will take at
least ten years.

For us, each supplier interview starts on a high
conceptual plane: comfortable and managementy, but
irrelevant. To understand the problem's impact, visit
a user's network operations center. To appreciate the
solution's complexity, probe the vendors about alarm
formats and message routing conventions. Humdrum stuff.
But vital to gauging industry progress on several
deceptively simple user requirements:

1. Outage Alarms - So the right person is notified when
    your customer's order entry terminal fails. Before
    he complains. Or worse, reroutes the business.

2. Performance Monitoring - So an incubating outage
    can be pre-empted by replacing the unit registering
    soft fails. Or by adding capacity to the network
    route nearing saturation.

3. Diagnosis and Repair Assistance - So the root cause
    of related outages or performance bottlenecks is
    correctly identified. And so fixes can be initiated
    through a single console, regardless of the
    troublemaker's logo.

4. Configuration Management - So Operations can
    monitor and control the entire network from a
    single terminal. Maybe through a topology map.
    With nodal subviews (LANs and their workstations)
    available at the click of a mouse.

5. Equipment Inventory - So the network boss knows
    the location and status of every device and spare.

6. Trouble Ticket Tracking - So the appropriate
    service supplier is automatically alerted of a
    mission critical defect. And so the anxious user
    can monitor its resolution.

7. Security Alerts - So a node or session can be
    temporarily quarantined, until keyboard stumbler
    is incontrovertibly distinguished from potential
    pirate. The capability farthest from implementation.

Eminently reasonable requirements. But meeting them raises
a host of many-faceted issues. Which we discuss in four
separate frameworks:

-   The Real World: Chapter II looks at network management in
    practice at several member companies: American Airlines,
    Bank of America, Citicorp, Federal Express, J.C. Penney,
    Northern Trust, Rockwell and Seafirst.

-   Alliances and "Aliences": Chapter III chases consensus
    on standard message formats and protocols. Introduces
    OSI front-runners CMIP and CMIS. Plus a bevy of sometimes
    overlapping, often competitive consortia like Corporation
    for Open Systems, Forum and Alliance.

-   Physical Networks: Some think voice networks less
    troublesome than data networks, because voice users
    can easily sidestep problems by redialing. Others call
    traditional voice/data distinctions obsolete. Better
    to characterize physical versus logical facilities. In
    which physical includes every box and wire between
    communicating end points. While logical adds the com-
    plexity of dueling computers and sinfully incompatible
    software. In Chapter IV we check out network physique,
    beginning with private network switches and multiplexors;
    then go public with MCI, Northern Telecom and Nynex.

-   Logical Networks: A messy world. Chapter V visits
    LAN fans Microsoft, 3Com and Ungermann-Bass; plus Retix
    and Touch, two unsung heroes of a recent standards bash.
    Chapter VI questions network management fundamentals at
    Tandem, Hewlett-Packard and three hopeful middlemen.
    While Chapter VII takes on four heavy hitters: IBM, Wang,
    AT&T. And Digital, who wins our award for best
    architecture.

Several legs of this uphill trek may be arduous. But the
view from the summit (Chapter VIII) will be inspiring.

II.   THE REAL WORLD

A. User Environments

For RB company telecom operations, unavailability of coherent
network management sometimes means several monitoring stations,
fragmented problem reports, dueling repair conventions, and
gaping blind spots. Challenges increase exponentially with
network complexity.

1. <u>Company A</u>

Bank branches are connected to a statewide T1 backbone.
A mix of Stratacom multiplexors, Doelz data switches
and Northern Telecom voice switches delivers the goods.
But that mix complicates network management. The
company's control center has a separate monitor for each
supplier's components. And a separate mini watching
local modems. A Tandem computer tracks branch data
connectivity. While a telephone company system oversees
transmission trunks.

A single physical outage can trigger alarms from all.
Requiring a team of human operators to isolate its
precise location. If every ATM in a region signals
failure, the fault must lie in the transmission
network. But where? If voice traffic dies too, the
culprit could be a T1 break. Or a switch. Or a branch
channel bank. But which? Absent collaborative
diagnosis from the autonomous component monitors, the
control center is left to "micro manage the pieces,"
observes a bank executive. Fortunately, the Stratacom
devices reroute traffic around a failed component so
fast that neither voice calls nor SNA sessions are
noticeably disrupted.

"But we're far from managing overall availability:
viewing all these network components the way customers
do, as a single window on all our services." True,
downed branch circuits, crashed central data bases and
cash-strapped ATMs require different responses from
individuals with different skills. Yet they all affect
the "availability" of customer service, a much broader
perspective than today's provincial component management
products can provide.

2.   Company B

Voice management might seem inconsequential to some.
But the company's use of communications gives the
task a different weight. After all, fourteen service
centers field 250,000 customer calls a day. And
network availability is critical to company-wide
service levels. Voice facilities are monitored
constantly by a mix of management systems:

-   A DEC based system generates near real-time
    performance statistics on Automatic Call
    Distributors, plus trouble reports and potential
    overflow warnings. Traffic rebalancing requires
    manual intervention, however.

-   NET supplies T1 multiplexors, and their monitor.
    With nice graphics for fault detection. But two
    holes in performance tracking. First, getting
    throughput statistics only on request inhibits
    detection of deteriorating circuit quality until
    it's too late. Second, NET's highly automated
    rerouting capability can degrade throughput.
    So the customer's technicians must analyze and
    reoptimize the network map daily, but would
    prefer that NET software absorb the chore.

-   An AT&T system monitors T1 circuits span by span.
    Office PBXs (administrative traffic only) are
    tracked box by box. Another system manages
    Paradyne modems. All of which leaves network
    operators sifting through blizzards of confusing,
    even conflicting alarms and statistics. Until
    calls from users become the only reliable and
    actionable indicators of an outage. "We need to
    integrate these systems, then automate as many
    network management functions as possible. You can't
    expect an operator left dozing before the screens
    all week, to handle a real crisis when every alarm
    goes crazy."

B. Missing Links

In Chapter I, we listed seven commonly acknowledged (certainly reasonable) user requirements for network management. Yet these experiences from members with leading edge operations show that only the first two - outage alarms and performance monitoring - are usually served. And those only in part. Console alerts are often less reliable trouble indicators than telephone calls from disrupted users. Performance measurements never reflect response times users actually experience. And end-to-end troubleshooting is impossible: today's management systems exclude key network components. "There are so many potential failure points between us and the user," observes one executive. "Problem diagnosis would improve if operators' consoles could mirror user sessions. Instead, we rely on groping over the telephone."

The other five requirements aren't addressed at all. Message consolidation and routing are left to home-grown code and third party software packages. Topology maps - when provided - show only the vendor's own components. Customers who want cross-vendor control of equipment inventories and trouble tracking must develop their own applications.

And several are. Federal is building a trouble ticket system to help operators dispatch the right technician; respond to user inquiries; and track problems from initial report to final resolution. Rockwell is developing a configuration data base, interfaced with equipment inventory systems in its decentralized user divisions. Everyone agrees such a data base is critical to effective network management. "That's the key to integrating various subsystem monitors," notes one executive.

III. STANDARDS MANAGEMENT

A.   You Say Tomato, and I Say...

Coherent network management would obviously benefit from
inter-vendor standards.   Just as connecting two unlike devices
requires prior treaties on physical terrain: (i) transmission
medium; (ii) network addressing; (iii) routing protocols;
and (iv) handshake conventions.   And just as actual message
exchange requires consensus on logical environments:
(v) dialogue structure; (vi) presentation format; (vii) file
transfer and message handling.   Those seven layers celebrated
in story and song.   And in countless meetings of the
International Standards Organization (ISO).   Not to mention
ISO hangers-on like COS, OSF, X-Open, SPAG, CCITT, etc.   Many
acknowledged in last winter's Report, <u>Until the Next Millennium</u>.

Are those muffled yawns and muttered threats from our
gentle readers?   Sure, vendors proclaim OSI (Open Systems
Interconnection) the most important invention since the
transistor.   And cite customer demand as their primary
motive for abandoning hallowed individuality.   Yet member
IS Executives seem unexcited about standards (reserving
applause until the curtain rises).   And suspicious that
pious vendor palaver about standards minutiae is actually a
ploy to delay OSI and extend the life of proprietary goodies.
Are standards just a game for insiders and politicians?

B.   Framing the Framework

Enough carping. Better proceed to a description of network management standards, notably the OSI Management Framework. Work's begun, with some progress. Particularly on the concepts for multi-vendor data access and message exchange. The Framework envisions that each of those seven ISO layers will participate. And seeks to provide common conventions governing communications: both vertically - within a single device's layers. And horizontally - among peer layers in different devices. Recognizing that most networks include equipment and software from more than one vendor. A messy, inherently counter-systemic world.

Next, Framework folks target six capabilities: fault management, performance management, configuration and name management, security, accounting, and directory services. The first three correlate pretty closely to the priorities raised by member companies we visit. Security also draws considerable user concern, particularly as LANs broadcast every message to every station. Standards work here is in its infancy, however. Ditto accounting, but who cares? A vocal ISO constituency of commercial service providers, no doubt. But it's difficult to imagine RB companies pricing network services on any basis besides standard charge per session minute or processing unit.

Directory services are part of a larger issue: a standard data base or repository for multi-vendor management data crossing the draft stage as X.500. But there is still disagreement on "registration" or how to identify and categorize various management domains, says the VP Engineering at Corporation for Open Systems. Elsewhere, we hear of debates over how repository entries should be structured: for each "object" represented, like a counter that gathers performance statistics, what's the appropriate format (e.g., integer versus floating point)? And how does it operate (can it trigger an alarm whenever a threshold value is exceeded)? If the ISO bees don't keep buzzing, de facto standards from IBM, AT&T and DEC could pollinate the farm.

Working out the critical definitions for every conceivable
component and situation falls under the rubric of SMI,
or Structure of Management Information. The effort is
nowhere near complete: the number of unique SMIs keeps
growing. As does their complexity. One example of the
definitional rat's nest (offered by a 3Com developer) is
the oscillating counter: Consider an SMI describing a
counter that triggers an alarm when a preset threshold
is exceeded - e.g., more than 26 concurrent users on a
LAN. Sounds straightforward. But say User 27 logs on,
then another user logs off, then another logs on, etc.
Should the counter oscillate around its threshold value
repeatedly, sounding an endless (useless) volley of
alarms? Or should there be another SMI describing
how to turn the damn thing off? Amidst this confusion,
one hopeful sign: a new generic category for conditions
like "retransmission error" that apply to many SMIs.
Reducing the agenda of discussion items. Much remains
to be done, however.

Enter CMIP and CMIS, the building blocks of OSI
management applications: two hooks where all vendors
plan to hang their hats. At least, that's the pitch
for mollifying network management-hungry customers.
Scratch the topic at any supplier session for a reflexive
oath of eternal fealty to CMIP and CMIS "as soon as the
standards are set." Which could take several years.

CMIP (Common Management Information Protocol) will
allow systems from different vendors to exchange data.
CMIS (Common...Services) specifies three basic types of
exchange: report an event (e.g., send an alarm); request
information (read a performance counter); invoke an
action (set a threshold, run a test). So far, so good.
But many publicly committed participants privately defer
CMIP/CMIS until the SMI issues are resolved: They want
concurrence on what the data is before deciding how to
exchange and apply it. Sounds reasonable, though hardly
ASAP. Meanwhile, CMIP/CMIS are "nothing more than an
empty envelope with a stamp," says one insider.

CMIP/CMIS are just a corner of OSI network management. Which creates a dilemma for would-be implementors. The full "stack" of layer-by-layer protocols will require 500-plus kilobytes of memory, and commensurate compute capacity. (As a harbinger, see overleaf for HP's Express OSI board.) No problem for heavy-duty communications servers. But what about lesser net denizens like modems, muxes, even workstation LAN adapters? That's one concern of still another standards club, NetMan: a crew of LAN makers. NetMan champions OSI-style network management, but won't wait for full OSI. Instead, they propose two extensions to TCP/IP, a popular de facto standard: a "proxy" technique to let puny network components send simple "I'm alives" up the big pipe to the glass house. And OSI-sympathetic presentation and directory services, to facilitate eventual migration once OSI settles. A prototype is being rushed to demo as we scribble.

Not everyone believes NetMan boosts OSI goals. A ruse to prolong TCP/IP? Which backs into a storm brewing over whether formal network management standards should be compatible with pervasive in-place network protocols like MAP. Raising the remote spectre of expensive retrofits. And plenty of controversy.

Where are the users in all this? we ask COS chief Lincoln Faurer. Still lagging in participation, he replies. Thirty percent of COS members are users, up from 25 percent a year ago; but still far from Faurer's goal of 50 percent. Moreover, he knows existing user members are frustrated by their limited influence. A COS executive is on the road discussing possible remedies. But the real problem is us. The users. With few exceptions, says Faurer forthrightly, they don't take the initiative, don't work together, don't have the requisite patience to work out thorny details. "Our users are great counterpunchers - give them a proposal, and they'll react and criticize. But they're slow to take the lead. And few realize they have interests in common with users representing other industries." Something for the Research Board to discuss?

THE RESEARCH BOARD

IV. PHYSICAL NETWORK MANAGEMENT

A.   Nomenclature

In networking, the traditional voice/data split is replaced by a physical/logical differentiation. Where physical refers to transport components like circuits, concentrators, multiplexors, modems and switches. While logical refers to software-based network architectures like SNA, DECnet, and OSI. This new perspective also spells <u>basta</u> to old tussles over whether network "intelligence" would reside within common carrier facilities or on customer premises. Vendor aspirations notwithstanding, it's a draw. Logical networks thread through both realms. So do physical networks. But they don't map precisely: the same logical session needn't retrace the same physical path. A productive snarl which makes heterogeneous network management even messier.

In this chapter, we get physical. And consider network management for several layers. At the lowest, raw circuits - notably digital T1, a 1.544 megabits-per-second pipe. At the next, multiplexors and concentrators.

Semantic distinctions are fuzzy here. But concentrators (like Doelz) generally funnel several low speed data streams into a higher speed channel. While multiplexors ("muxes") do the reverse: scale T1's fire hose streams down to kitchen tap trickles. Consider that common carriers carve T1 into 23 voice channels, operating at 64 kilobits per second. Independent muxers get more - through two techniques: speech interpolation, which fits a second conversation into the natural pauses left by the first. And speech compression, which squeezes conversational bandwidth from 64 kilobits down to 32. Interpolation effectively doubles the virtual channels on a T1 line; compression doubles them again. Timeplex and Infotron muxes use interpolation to get 46 voice channels per T1. While Stratacom and NET piggyback both techniques to crank out 90 plus. For nice gains in cost and capacity over common carrier offerings. Improved reliability, too; muxes automatically reroute traffic around downed nodes or congested circuits. But not without certain pains in network management, as we discover.

VI. LOGICAL NETWORK MANAGEMENT

A. Logical Conundrum

We already agreed the voice community will have network
management facilities years before that sweet suite is
available in private data networks. But why? Maybe
it's the difference between oligopsony and oligopoly
(i.e., few buyers vs. few sellers). Telcos and inter-
exchange carriers forced voice network suppliers to
discover the wisdom of working together. So coordinating
network management isn't an unnatural act. Whereas in
the data market, the feisty few exercise almost as much
clout in setting international network directions as the
ever-bickering standards organizations. Which they join
and effectively dominate. Oligopolists still buffered
from any real interference by the fragmented, generally
uninformed customer base. But perhaps any standard is
better than none.

Another obvious reason for the pokier pace in data
network management is that problems are more complex
and far-reaching. Failed voice conversation? Hang
up and try again. With a broken data connection,
no such easy sidestep. And one break can disrupt
business operations, require revalidation of financial
controls, even necessitate reconstruction of compromised
data bases.

Finally, the intricate inter-relationships of the data
network. With the world of physical transmission.
Between LANs and WANs, though that linkage is not yet
porous to management. And between communications
software (SNA, DECnet, OSI) and all the other software
(computer vendor, third party or homegrown) whose
failure could back into data networks. All apparent as
we discuss the subject with several leading edge data
communications participants.

VII. HEAVY HITTERS

A. Casting Their Nets

NetView is the system every network supplier
has to meet - or beat with something much,
much better. Its entrenched position appears
unassailable: many times the installed base of
nearest competitor Cincom. Controlling huge
logical networks that utilize a wide diversity
of physical communications devices, as well.
NetView primacy derives partly from time-to-
market; partly from IBM clout. When NetView
debuted (1986), other potential contenders had
barely scented the opportunity. So NetView
got the gateway to the Fortune 500 market.
Certainly, that's the perception of network
insiders large and small. Unless one of them
can hammer together a credible alternative.

In this chapter, we size up the challenge with
a deeper look at IBM - which intends to hold
its lead through an aggressive development
program. Then consider competitive strategies
at Wang, AT&T and Digital. That ordering
isn't casual. Digital has the most open and
realistic architecture, assimilating network
components physical and logical, standard and
proprietary, large and small, old and new.
Could become a leader.

Three buttons to watch: (1) Does the vendor
offer an architecture functionally attuned
with the requirements described in Chapter I?
(2) Can the architecture's repository handle
the incredibly diverse array of network devices,
services, protocols, alarms etc. that populate
large customer networks? (3) Does the network
management system filter and integrate alarms
and statistics from the various devices to
power effective diagnosis and response?

E.   Digital Equipment

Flash: Digital pops span man plan. Amidst our labors,
DEC finally announces the architecture mulled for three
years, at least. (See 1987 RB Report Charting the Gyre.)
At a preview with VP Distributed Systems Bill Johnson
and chief engineer Gary Gottschalk, we learn that
Enterprise Management Architecture (EMA) targets five
market requirements:

- Scope must accommodate DECless protocols: whether
  standard or proprietary, physical or logical. After all,
  CMIP/CMIS, the great leveler, may arrive late. Retrofits
  to everyone's hardware and software products, even later.
  Hence multiple "access modules" as discussed below.

- Functionality must include configuration management,
  fault management, performance management, security and
  accounting. But those applications must be independent
  of what's being managed: a command like "display percent
  utilization" should be applicable across CPUs, circuits,
  switches etc. Full function also implies full life cycle
  support: network evaluation, planning, implementation
  and maintenance. Plus inclusion of whatever tools the
  customer chooses.

- Integration through a repository containing extensive
  information about every network component, including its
  alarms and performance counters. Driving functional
  modules that correlate, filter and route diverse messages.

- Scale must accommodate networks small and large. And
  network operations centralized, decentralized and
  distributed. "We will not dictate management philosophy."

- Modularity, in the sense of protective isolation. So
  a change in incoming alarm formats won't rock the
  repository. While functional enrichments (e.g., expert
  systems) slide transparently beneath the consistent
  user interface. Very prudent. And a better structure
  for mapping the messy real world than anyone else
  provides.

ENTERPRISE MANAGEMENT ARCHITECTURE

PRESENTATION MODULES

A   B   Z

FUNCTIONAL MODULES

AA

BB

ZZ

INTERFACE

EXECUTIVE

MGMT. INFO
REPOSITORY

(MIR)

1

2

n

ACCESS MODULES

T1
MUX

LAN

MODEM

DEC   VAX   MINICOMPUTER

MANAGED
THIRD-PARTY
DEVICES

SOURCE: DIGITAL EQUIPMENT

The architecture itself (Exhibit) has four significant segments:

1. Access Modules - as many as necessary. A multiplicity
    that realistically anticipates the persistence of
    proprietary protocols even as international standards
    are implemented. So begin with a module for DECnet;
    add CMIP as it solidifies; encourage other vendors to
    contribute. Accompanying the EMA announcement were
    support commitments from eight component vendors
    including Codex, Stratacom and Timeplex. Modules for
    NetView and UNMA may come from third parties.

2. Functional Modules include generic routines for message
    handling and alarm responses. For example, a system-wide
    utility defines failed-circuit alarm thresholds (and
    rerouting instructions) for any mux-make. Here too,
    different modules that filter and correlate related
    alarms: e.g., suppress DECnet alarms triggered by a
    T1 break.

3. Presentation Modules are the user interface options.
    Fairly simple at first: ASCII terminals for DECnet, 3270
    for SNA. Later on, graphics workstations. Plus third
    parties - like Netmaster?

4. Repository, "the cornerstone of integrated network
    management," will include: (a) component inventory;
    (b) performance trends; (c) device-specific alarms,
    commands etc.; (d) "meta data," or component class
    attributes and inter-relationships. This last
    category is critical to achieving the level of
    integration advocated throughout this report.

On balance, an extremely strong architectural concept made
even sturdier by its flexible, modular structure. And by the
implicit assumption that networks will remain messy tangles of
heterogeneous, hetero-generational bits and boxes for many years.
A world that can't be force-fit to a single protocol, even a
standard one. All of which makes EMA our favorite architecture -
though we've yet to see the building. Muses Bill Johnson,
"This construction effort could approach the scale of our VMS
operating system."

VIII. Closing The Loup

The struggle toward coherent network management is complex
and grinding, thanks to a hostile environment of inter-
dependent but not integrated equipment. In which the
largest vendors dominate standards alliances while looking
for a continuing - and proprietary - competitive advantage.
The mid-scale seek aliences that don't give away the store.
And the smallest hide behind players they trust won't
steal their niche. For all, the technical dificulties
of integrating dissimilar alarms, statistics and command
sequences would be challenging enough. But the task is
compounded by endless supplier wrangles over account control.
Bruising for frustrated customers.

To summarize the critical issues:

- The customer problem is quite straightforward. Few
  network subsystem monitors work together. In fact,
  they often confound one another. And cause such
  confusion that the most reliable (if least desirable)
  alarm is a phone call from an irate user.

- Standards are evolving - but slowly. For the reasons
  suggested above.

- Forceful oligopsonists rule the public, physical
  network. Consequently, it's here that network
  management consensus will emerge first.

- Network management remains blind to LANs. Bridges
  and gateways open connectivity options for diverse
  workstations. But block the view from the top.

- Logical network management systems require solid
  underpinnings: architecture, repository, set of
  standard message protocols. Almost like a basic
  operating system. Little wonder progress is slow.
  Effectively, the lead belongs to IBM and AT&T.
  Artistically, the prizes go to Tandem and Digital.

Recommended reading for now: Popular Mechanics. Management
breakthroughs possible after 1991; management breakfasts before.

ROSES IN THE RAILYARD

FOREWORD

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TABLE OF CONTENTS

THE RESEARCH BOARD

III. THE GREAT AMERICAN HARDWARE BASH

A. A New Order

Until recently, old-fashioned "minicomputers" could be
clearly and unfavorably distinguished from sprightlier
servers on technical grounds. Minicomputers are built
around idiosyncratic instruction sets proprietary to one
supplier, like the Digital VAX. While servers achieve
better cost/performance and capacity from engines licensed
to multiple computer makers. Those engines are usually
supplied by Intel, whose Pentium is now on the near horizon.
But Pentium will meet five RISC contenders who hope to dent
Intel's market share with a design strategy of more-is-less:
RISC gets more throughput than Pentium from one-third less
transistor equivalents. That makes RISC cheaper to design
and fabricate. And leaves each chip with enough vacant "real
estate" to house performance boosting goodies like memory, or
customized logic, or built-in graphics. Streamlined chips
also require less power, a critical characteristic for the
"Personal Digital Assistants" in which many companies are
so interested.

$\alpha \doteq \frac{1}{2} \times$ sistor
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Industry debates over Intel vs. RISC divert attention from a
more striking development. The basic capacity and performance
differences between old minis and new servers will soon end;
minicomputer operating systems will reside on exactly the same
hardware platforms as Unix or NT, their server counterparts.

- Hewlett-Packard already uses its Precision Architecture
  RISC engine in both proprietary minicomputer systems and
  in servers running Unix.

- Tandem is using the same RISC processor (from Mips)
  for both proprietary Guardian systems and Unix-based
  Integrity servers.

- IBM will use its PowerPC RISC engine under AIX, OS/2
  and (in 1995) for its AS/400 family. The same chip,
  also produced by Motorola, will be the engine for
  Apple's new servers.

- Digital's Alpha RISC engine will power both OpenVMS and
  the company's "standard" Unix (OSF/1).

The convergence of minicomputers and servers reflects the
desperate need for volume sales in the microprocessor
business. Enormous volume is needed to justify the huge
cost of designing and tooling a new microprocessor. And
to attract the independent software vendors, whose support
(and packages) can determine whether a hardware platform
flourishes or fizzles. The pressure for volume will elbow
some RISC designs out of the market. It's also Intel's
overwhelming advantage.

5. Digital Equipment

Once the industry's biggest minicomputer company, Steady Grey
may now be its biggest question mark. So it's terrific to
observe a fresh sense of managerial enthusiasm and purpose
under the leadership of new CEO Bob Palmer. Whose three
immediate objectives are:

a. Making the company profitable, through headcount
    reductions and plant closings. One third of the
    company's 135,000 employees have been laid off;
    another 10,000 to 17,000 will go. Half in Europe
    through several actions: merging DEC's acquisitions;
    reducing sales administrators; and reeling in the
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    by Pier Carlo Falotti, former President of DEC Europe
    (now CEO of The ASK Group). Some of these islands
    were as small as 15 persons. Many were unknown to
    engineering management in Maynard.

b. Restructuring the organization around Customer Business
    Units (CBUs) with full profit and loss responsibility.
    Partly to ensure that companywide and worldwide attention
    is focused on customer requirements. (Chapter VI.)
    At this point, the redrawn organization charts are
    still taking shape. Morale is poor among the remaining
    employees, no surprise. Compensation incentives and
    metrics must still be realigned. But these difficult
    issues are being addressed squarely by the executives
    we interview.

c. Rationalizing the confused and fragmented product
    lines that evolved near the end of Ken Olsen's reign.
    Central to that strategy is the Alpha microprocessor,
    Digital's first RISC chip and the first on the market
    with 64-bit addressing. That gives Alpha a momentary (2-3 year)
    edge, but a challenge in finding the right partners.
    Because Digital entered the RISC contest after the
    other contenders already formed alliances around their
    older (32-bit) RISC generations. So currently, Alpha's
    few allies include Cray and MasPar, who can only promise
    small volumes. And Olivetti whose equity DEC bought last
    year, agreeing to take 10.2 percent for $400 million.

Of course, Digital's product strategy would be stronger today had Alpha been introduced before the VAX/VMS market began to seriously erode. But the company was wholly preoccupied by its massive investment in developing a bipolar-based mainframe (the VAX 9000). Until insiders were hesitant to suggest RISC and workstation technology could achieve better throughput at lower cost. Meanwhile, Digital began losing the attention of its customers. And finally felt impelled to announce the DECsystem based on RISC from Mips; another distraction, unfortunately.

*too Early to tell
could win here
also*

Ironically, <u>Alpha's best prospect today is not Unix or VMS, but in large servers with Microsoft NT</u>. In that arena, a tough race is shaping up with Intel, everyone's favorite NT horse in the early betting. Digital hopes Alpha will realize an early edge from the liaison with Microsoft.

Meanwhile, Digital has a determined program to slash the number of distinct products. The roster had grown too large for Engineering and Manufacturing to support economically, or for the field force to understand. Items being "de-emphasized" and "stabilized" are the Mips-based DECsystem and DECstation (in favor of Alpha) and Digital's Ultrix Unix (in favor of the Open Software Foundation's "standard"). In addition, certain software will be spun out for support by independent companies; two office applications will go to a venture in the Negev desert which Digital shares with the Israeli Government, for example.

IV. THE SQUEEZE IN OPERATING SYSTEMS

THE RESEARCH BOARD

C. Traditional Proprietary Systems

As previously noted, most vendors will soon use the same
hardware engines for all the operating systems they support.
At the same time, traditionalists and new breed alike are
bringing their administrative costs to comparable levels.
And both are pushing into each other's distribution channels:
On the one hand, the traditionalists have discovered the lower
costs inherent in indirect distribution; note that 70 percent
of the AS/400 business worldwide was handled by resellers
last year. On the other hand, the new suppliers of depart-
mental servers like Apple and Compaq are discovering they
need direct account presence - though they'll contain overall
sales expenses by continuing to rely on computer stores as
their PC distribution channel. In essence, the basic costs
in the minicomputer business are being slimmed down just as
those in server companies escalate.

To blur the boundaries even more, many proprietary operating
systems are meeting open interface standards promulgated by
the Feds (Posix) or OSF. "NT will be compliant with Posix,"
says Bill Gates. "We'll pass all the tests." So will/can
Digital's VMS, Hewlett-Packard's MPE and Tandem's Guardian.
True, those standards are not inclusive enough today to
guarantee portability between suppliers. But new programs
written to a single vendor's guidelines should be portable
between that vendor's proprietary system and its Unix variant.
And from there to other Unixes. This "latent" portability
gives customers the option of either adopting Unix gradually
or even waiting until (if ever?) it provides the throughput
and reliability of proprietary systems. While computer vendors
get the option of repositioning their proprietary systems as
premium products, offering more functionality than Unix at
the same price. We'll illustrate with examples from several
key players:

3. <u>Digital</u>. The company is engaged in severely pruning its
    product line. In part because current margin assumptions
    leave 20 percent of current offerings without enough
    sales to make them economic for Engineering to design or
    Manufacturing to build. As part of this rationalization,
    the new chief executive has mandated a three-pronged
    operating system strategy:

    - VMS on its new Alpha platform will be priced
      competitively against all comers, says President
      Bob Palmer. That's possible because VMS won't
      need much incremental investment to be ready for
      Alpha unless DEC decides to make 64-bit addressing
      available to user applications. Aggressive pricing
      of VMS will be aimed at two primary audiences:
      existing customers, who will then lose the economic
      incentive for a Unix migration; and downsizers, who
      seek the same robustness on smaller machines they
      enjoy on mainframes.

    - OSF/1, also on Alpha, is heralded as the first
      64-bit version of "standard" Unix. (Ultrix is
      being functionally "stabilized.") Long term,
      DEC senior executives want to embrace whatever
      industrywide version of Unix promises the lowest
      in-house development costs. But meanwhile, the
      pacesetting capabilities of OSF/1 will attract
      applications software developers to Alpha until
      competitors catch up.

    - Microsoft NT, where Alpha power and the company
      expertise in global networking will be Digital's
      value-added differentiator against the mass market
      Intel variant. Steady Grey has high hopes for
      this positioning and for the Microsoft alliance,
      in general.

VI. FEET ON THE STREET

A. Street Smarts

We seem to spend half our interviewing time with the vendors
discussing the proper care of RB accounts. Not surprising,
since so much has changed. A few years ago, computer company
success was assumed to depend on "feet on the street": the
number of direct salespeople engaged in presale problem
definition, closing the contract, and post-sale handholding.
The advent of the personal computer overturned that assumption.
Because PCs could be distributed to customers by retailers,
at far less expense to the manufacturer than a direct sales
force. Or by value-added resellers (VARs) whose business
returns depended on applications expertise.

Recent price pressures on hardware, operating systems and
applications software have simply made the traditional sales/
services model unaffordable. As prices have declined, so
have the gross margins once sufficient to compensate a computer
company for "uncharged" services. These days, presale man-hours
are carefully rationed to targeted industries and applications;
post-sales support is determinedly unbundled.

Today's winners maintain their profits by holding headcount
constant (or even downsizing) while increasing unit volumes
and revenues. That's how successful restructurers Apple and
Compaq are able to achieve over $500,000 in revenue per employee.
True, this can be a misleading metric. Lean headcount masks
the possibly negative impact of bypassing software r&d or
outsourcing manufacturing. These are attractive near-term
tactics, but problematic if they leave the company vulnerable
to competitive countermoves and product commoditization.
Alternatively, bucks-per-back metrics should probably exclude
activities like hardware maintenance whose margins and return
on assets are very high. Though these cash cows are generally
headed to the slaughterhouse.

These caveats aside, it's reasonable ? to conclude that any
computer hardware or package software company should be pushing
revenue per employee towards $300,000. (Sun is at $280,000,
Microsoft at $279,000, but body-intensive companies sweat to
reach $150,000.) That goal can be achieved partly by pruning
and targeting the sales force; partly by realizing revenue
from every activity except product demonstration and contract
negotiation. Prompting two survival rules for traditionalists
and new breed alike: Cut headcount! And charge!

4. <u>Digital Equipment</u>'s new organization structure
   (exhibit) merits a full description because it's
   intended to focus the entire corporation around
   specific markets and customer sets. One objective
   is to rationalize the plethora of hardware and
   software offerings; another is to concentrate the
   attentions of the field force on fewer industries
   and accounts. Until some customers will get little
   more than basic information on mainstream offerings,
   emphasizes the new CEO.

   The control towers for this global corporate
   structure are the five "Customer Business Units"
   or CBUs: Financial Industries; Consumer and Process
   Manufacturing; Discrete Manufacturing and Defense
   Industries; Health Industries; and Communications,
   Education and Entertainment. Along with four
   product-oriented business units: Personal Computers,
   Storage Devices, Components and, interestingly,
   "Multivendor Support," or maintenance.

The CBUs are relatively small (250 people), but they
have the ultimate profit and loss responsibility for
every product and every account. They will control
marketing and advertising; they will influence the
activities of Engineering (for new product requirements)
and Manufacturing (for production plans). They'll
also "contract" with the various sales territories
for account representatives, technical support
specialists and consultants. So a Customer Business
Unit can order account support from the territory
manager of one country even though another country
will realize revenue from the transaction. "The new
organization's best feature is its approach to cross-
border customers," enthuses President Palmer. Including
the ability to aggregate an account's profitability
and measure the quality of the relationship for all
products and services; across many different countries
and sales territories. Finally giving teeth to the   _PCF?_
major account program enthusiastically initiated by
Pier Carlo Falotti, former President of DEC Europe.

Worth a separate mention are the four horizontal
functions: Engineering, Manufacturing, Sales and
Systems Integration which provide companywide
support to the nine business units. Engineering
and Manufacturing are both centralized line functions
responsible for end results. While Sales and Systems
Integration are staff functions responsible for
training and practices, but apparently not for the   _[shared_
job performance of individuals in the territories.   _responsibility?_
That responsibility resides with the field organi-
zation, divided into three broad geographies: the
U.S., Europe and the rest of the world including
Canada. Each office within a geography will have
three activities: sales, systems integration and
maintenance. The first two also get guidance from
the horizontal functions; the third reports to a
specific customer business unit.

The new structure is only beginning to take shape when we
visit in January 1993. Many details still await resolution,
everyone acknowledges. Yet we have some immediate questions;
customers may have more.

a. How will individual customer requirements be conveyed
    to the new Digital? Through the sales force which has
    no direct connection to Engineering or Manufacturing?
    Or through the Customer Business Units which have no
    direct presence in the field?

b. Who will lead the sales force? Will it be the CBUs
    whose plans drive the territories? Or the territories
    themselves? Or the corporate sales staff?

c. How will the sales force react as their compensation
    is shifted from straight salary (a time-honored Digital
    tradition) to commissions and other incentives? Bob
    Palmer suggests the change he's going to implement will
    be gradual, but eventually up to half of a salesperson's
    compensation could be tied to performance. Customers will
    want to see how that influences the account rep's behavior.

d. How will these business units, sales and systems
    integration activities mesh in terms of incentives and
    compensation? For example, how will the field people
    in one territory be compensated when their efforts
    produce revenues realized in another? The key is mutual
    dependency, responds Palmer. Each consultancy center
    will both serve a specific territory like Chicago and
    wield a specific competency like manufacturing. So the
    manager of the New York center will gladly supply Chicago
    with banking expertise because he may need manufacturing
    skills tomorrow. We're not totally convinced. Though
    we certainly applaud the heartening signs of greater
    focus in product lines and resource utilization.

VII.   SERVICE RIBBONS

A. The Three Furies

Almost every supplier has a presentation on systems integration and consulting. Complete with foils on the multivendor alliances they'll use to deliver these discretionary services to large corporate accounts. In response, we raise the customer's natural question about quality: Who's responsible for the final results when Systems Integrator A plops Vendor B's application on Vendor C's data base on Vendor D's computer system? Simply pointing at the prime contractor is not enough. The quality of the overall relationship should concern every member of the alliance. How else can these vendors expect discretionary services to restore their faded profit margins?

Indeed, discretionary services should be a win-win for suppliers and customers alike. Vendors from Andersen to HP to Oracle to Microsoft need to sell services either as their primary revenue generator, or to help differentiate a commoditized product. RB members have suffered through five years of recessionary declines and headcount restrictions, leaving many corporate IT organizations seriously understaffed or with outdated skills. So this should be a splendid opportunity for the consultancy and contract software businesses. Yet these folks remain mired in problems they've wrestled for 25 years.

1. The calibre of their professional resources: how to attract, train and motivate the right number and level of employees as the company expands. Then how to deploy them, matching employee skills and availability with client location and project schedule. While minimizing idle time between billable assignments. For nothing chews up profits faster than time spent "on the beach."

2. More important, how to ensure customer satisfaction. Both to maximize project profitability and to increase the prospect of follow-on assignments and referenceable accounts. Thus dampening sales costs while improving staff utilization. To guarantee project quality, however, vendors need consistent and meaningful quality metrics. A subject that suppliers give barely a glimmer - beyond boasting those "Customer Satisfaction Surveys," proving only how few people will express anything hostile in writing. Unfortunately, the lack of metrics becomes even more troublesome when projects involving several "allies" have no vendor willing to take end-to-end responsibility for the results. While the customer stands frothing and frustrated in the middle.

<u>Metrics aside, the customer's best hope of getting a useable
and reliable system is project replicability</u>. This means that
a systems integrator has mechanisms in place to draw on the
experience, designs and even programming of prior assignments.
And that a project "alliance" comprises a stable grouping of
partners expert in implementing a specific set of applications
for a specific industry segment - again and again. Replicability
allows the lead supplier to take full responsibility for the
output quality of the other participants, precisely because
the same team has delivered measurably satisfactory results
in the past. At least that's the dream. In reality, we found
no vendor with any notion of performance metrics spanning an
entire alliance. Nor any plans and incentives to promote
replicability. Perhaps it's time the industry began devoting
as much attention to benchmarking project performance as it
does to benchmarking hardware performance.

Hardware vendors have long been interested in the systems
integration business, of course. But we're starting to
discern a difference from the trivial pursuits of the past.
Digital's Chief Technology Officer Bill Strecker positions
the company strategy on a spectrum between the wholly
replicable and the scarcely replicable. Where the wholly
replicable refers to mass market solutions represented by
the idiot-proof systems Microsoft and Apple want to load
into PC and TV alike. And scarcely replicable refers to
the heterogeneous components programmed or integrated by
Andersen or EDS into a customer-unique system. In between
is "mass customization," where Digital plans to play with
standardized components its field personnel could snap
together on a replicable basis to meet the requirements
of many customers. In essence, the profitable systems
integrator will have technology that permits its project
teams to "deliver complex solutions more routinely."
Sounds sensible.

How should Research Board members react to the changes in sales and service? A few suggestions:

1. First and foremost, recognize that all these marketing alliances are both a necessity for the vendors and a mixed blessing for the customer.

2. Refuse to allow vendors to escape their basic responsibility for quality through alliance waffles. The lead vendor should be held fully accountable for any failure to deliver excellent products and services.

3. Require suppliers to demonstrate their relevant experience or (even better) "replicability" when you're evaluating sources for applications development and systems implementation. Have the specific individuals proposed from this particular combination of suppliers achieved excellent results on similar projects? Check references, of course.

4. Ignore those "customer satisfaction" surveys every vendor proffers. Unless they were conducted by an independent party, and the vendor wasn't identified to the respondents as the sponsor.

5. Pressure the vendors to develop, and release, fathomable and credible gauges of their service quality. Both for the projects they conduct by themselves and those they undertake with their allies. Is this a pipe dream, given the infancy of the systems integration business? Perhaps. But end-to-end service quality is the most important issue of the day. And service quality can't be improved without metrics to serve as the signposts and traffic directions.

6. Do not rely on the "buddy system" as a mechanism for transferring skills and technology from outside vendors to in-house IT staff.

7. Do not contract out applications development or integration assignments that demand skills the IT organization will need for the future. To the contrary, the best activities to outsource are those requiring skills already at a dead end.

VIII.   FUTURE HOPES AND HYPES

A.   Towards the Next Millennium

Slouching toward the millennium, the dogged RB researchers also prospect for intriguing technologies that could radicalize the use of computing. And thus stimulate an industry renaissance comparable to those occasioned by the programmable <u>mainframe (circa 1960)</u>, the <u>minicomputer (1970)</u> and, of course, the <u>microprocessor (1980)</u>. Four promising areas surfaced repeatedly as the locus of industry r&d investment: parallel processing; object technology, with a bow to multimedia; computer miniaturization; and client/server reliability and security.

All four draw new funds because they're relevant to present needs, not a stretch towards any new conceptual frontier. Commercial parallelism is needed to record, store and correlate business transactions because their volumes grow tenfold each decade. Client/server robustness will reduce the burdensome care and feeding that distributed networks demand today. Object technology will address the need for better productivity in building and maintaining software components. And miniaturization will let our increasingly office-less office workers carry their knowledge tools like lunch pails.

Such new horizons are particularly important at a moment when the software market seems saturated by Microsoft; the hardware market by Intel. And when <u>new offerings are too often fettered by ossified rules of engagement in existing sales channels, or by the constraints of protecting everyone's embedded product base or old code.</u>

So investors are ready for a "relevant" prize. Though it's not clear how these four technologies will impact customer usage patterns. Will they merely increase usage, like cellular telephones? Or also attract business from competing media? Just as facsimile battered the U.S. mails, courier delivery services, image processing, intercompany e-mail, telephone, even altered the routine of ordering sandwiches from the corner delicatessen. Moreover, can these technologies open new avenues for computing - in education, information and entertainment? We'll speculate momentarily.

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Of course, Digital's product strategy would be stronger today had Alpha been introduced before the VAX/VMS market began to seriously erode. But the company was wholly preoccupied by its massive investment in developing a bipolar-based mainframe (the VAX 9000). Until insiders were hesitant to suggest RISC and workstation technology could achieve better throughput at lower cost. Meanwhile, Digital began losing the attention of its customers. And finally felt impelled to announce the DECsystem based on RISC from Mips; another distraction, unfortunately.

Ironically, Alpha's best prospect today is not Unix or VMS, but in large servers with Microsoft NT. In that arena, a tough race is shaping up with Intel, everyone's favorite NT horse in the early betting. Digital hopes Alpha will realize an early edge from the liaison with Microsoft.

Meanwhile, Digital has a determined program to slash the number of distinct products. The roster had grown too large for Engineering and Manufacturing to support economically, or for the field force to understand. Items being "de-emphasized" and "stabilized" are the Mips-based DECsystem and DECstation (in favor of Alpha) and Digital's Ultrix Unix (in favor of the Open Software Foundation's "standard"). In addition, certain software will be spun out for support by independent companies; two office applications will go to a venture in the Negev desert which Digital shares with the Israeli Government, for example.

IV.   THE SQUEEZE IN OPERATING SYSTEMS

C. Traditional Proprietary Systems

As previously noted, most vendors will soon use the same
hardware engines for all the operating systems they support.
At the same time, traditionalists and new breed alike are
bringing their administrative costs to comparable levels.
And both are pushing into each other's distribution channels:
On the one hand, the traditionalists have discovered the lower
costs inherent in indirect distribution; note that 70 percent
of the AS/400 business worldwide was handled by resellers
last year. On the other hand, the new suppliers of depart-
mental servers like Apple and Compaq are discovering they
need direct account presence - though they'll contain overall
sales expenses by continuing to rely on computer stores as
their PC distribution channel. In essence, the basic costs
in the minicomputer business are being slimmed down just as
those in server companies escalate.

To blur the boundaries even more, many proprietary operating
systems are meeting open interface standards promulgated by
the Feds (Posix) or OSF. "NT will be compliant with Posix,"
says Bill Gates. "We'll pass all the tests." So will/can
Digital's VMS, Hewlett-Packard's MPE and Tandem's Guardian.
True, those standards are not inclusive enough today to
guarantee portability between suppliers. But new programs
written to a single vendor's guidelines should be portable
between that vendor's proprietary system and its Unix variant.
And from there to other Unixes. This "latent" portability
gives customers the option of either adopting Unix gradually
or even waiting until (if ever?) it provides the throughput
and reliability of proprietary systems. While computer vendors
get the option of repositioning their proprietary systems as
premium products, offering more functionality than Unix at
the same price. We'll illustrate with examples from several
key players:

3. Digital. The company is engaged in severely pruning its
    product line. In part because current margin assumptions
    leave 20 percent of current offerings without enough
    sales to make them economic for Engineering to design or
    Manufacturing to build. As part of this rationalization,
    the new chief executive has mandated a three-pronged
    operating system strategy:

    -   VMS on its new Alpha platform will be priced
        competitively against all comers, says President
        Bob Palmer. That's possible because VMS won't
        need much incremental investment to be ready for
        Alpha unless DEC decides to make 64-bit addressing
        available to user applications. Aggressive pricing
        of VMS will be aimed at two primary audiences:
        existing customers, who will then lose the economic
        incentive for a Unix migration; and downsizers, who
        seek the same robustness on smaller machines they
        enjoy on mainframes.

    -   OSF/1, also on Alpha, is heralded as the first
        64-bit version of "standard" Unix. (Ultrix is
        being functionally "stabilized.") Long term,
        DEC senior executives want to embrace whatever
        industrywide version of Unix promises the lowest
        in-house development costs. But meanwhile, the
        pacesetting capabilities of OSF/1 will attract
        applications software developers to Alpha until
        competitors catch up.

    -   Microsoft NT, where Alpha power and the company
        expertise in global networking will be Digital's
        value-added differentiator against the mass market
        Intel variant. Steady Grey has high hopes for
        this positioning and for the Microsoft alliance,
        in general.

VI. FEET ON THE STREET

A. Street Smarts

We seem to spend half our interviewing time with the vendors
discussing the proper care of RB accounts. Not surprising,
since so much has changed. A few years ago, computer company
success was assumed to depend on "feet on the street": the
number of direct salespeople engaged in presale problem
definition, closing the contract, and post-sale handholding.
The advent of the personal computer overturned that assumption.
Because PCs could be distributed to customers by retailers,
at far less expense to the manufacturer than a direct sales
force. Or by value-added resellers (VARs) whose business
returns depended on applications expertise.

Recent price pressures on hardware, operating systems and
applications software have simply made the traditional sales/
services model unaffordable. As prices have declined, so
have the gross margins once sufficient to compensate a computer
company for "uncharged" services. These days, presale man-hours
are carefully rationed to targeted industries and applications;
post-sales support is determinedly unbundled.

Today's winners maintain their profits by holding headcount
constant (or even downsizing) while increasing unit volumes
and revenues. That's how successful restructurers Apple and
Compaq are able to achieve over $500,000 in revenue per employee.
True, this can be a misleading metric. Lean headcount masks
the possibly negative impact of bypassing software r&d or
outsourcing manufacturing. These are attractive near-term
tactics, but problematic if they leave the company vulnerable
to competitive countermoves and product commoditization.
Alternatively, bucks-per-back metrics should probably exclude
activities like hardware maintenance whose margins and return
on assets are very high. Though these cash cows are generally
headed to the slaughterhouse.

These caveats aside, it's reasonable to conclude that any
computer hardware or package software company should be pushing
revenue per employee towards $300,000. (Sun is at $280,000,
Microsoft at $279,000, but body-intensive companies sweat to
reach $150,000.) That goal can be achieved partly by pruning
and targeting the sales force; partly by realizing revenue
from every activity except product demonstration and contract
negotiation. Prompting two survival rules for traditionalists
and new breed alike: Cut headcount! And charge!

4. <u>Digital Equipment</u>'s new organization structure
    (exhibit) merits a full description because it's
    intended to focus the entire corporation around
    specific markets and customer sets. One objective
    is to rationalize the plethora of hardware and
    software offerings; another is to concentrate the
    attentions of the field force on fewer industries
    and accounts. Until some customers will get little
    more than basic information on mainstream offerings,
    emphasizes the new CEO.

    The control towers for this global corporate
    structure are the five "Customer Business Units"
    or CBUs: Financial Industries; Consumer and Process
    Manufacturing; Discrete Manufacturing and Defense
    Industries; Health Industries; and Communications,
    Education and Entertainment. Along with four
    product-oriented business units: Personal Computers,
    Storage Devices, Components and, interestingly,
    "Multivendor Support," or maintenance.

The CBUs are relatively small (250 people), but they have the ultimate profit and loss responsibility for every product and every account. They will control marketing and advertising; they will influence the activities of Engineering (for new product requirements) and Manufacturing (for production plans). They'll also "contract" with the various sales territories for account representatives, technical support specialists and consultants. So a Customer Business Unit can order account support from the territory manager of one country even though another country will realize revenue from the transaction. "The new organization's best feature is its approach to cross-border customers," enthuses President Palmer. Including the ability to aggregate an account's profitability and measure the quality of the relationship for all products and services; across many different countries and sales territories. Finally giving teeth to the major account program enthusiastically initiated by Pier Carlo Falotti, former President of DEC Europe.

Worth a separate mention are the four horizontal functions: Engineering, Manufacturing, Sales and Systems Integration which provide companywide support to the nine business units. Engineering and Manufacturing are both centralized line functions responsible for end results. While Sales and Systems Integration are staff functions responsible for training and practices, but apparently not for the job performance of individuals in the territories. That responsibility resides with the field organization, divided into three broad geographies: the U.S., Europe and the rest of the world including Canada. Each office within a geography will have three activities: sales, systems integration and maintenance. The first two also get guidance from the horizontal functions; the third reports to a specific customer business unit.

The new structure is only beginning to take shape when we visit in January 1993. Many details still await resolution, everyone acknowledges. Yet we have some immediate questions; customers may have more.

a. How will individual customer requirements be conveyed to the new Digital? Through the sales force which has no direct connection to Engineering or Manufacturing? Or through the Customer Business Units which have no direct presence in the field?

b. Who will lead the sales force? Will it be the CBUs whose plans drive the territories? Or the territories themselves? Or the corporate sales staff?

c. How will the sales force react as their compensation is shifted from straight salary (a time-honored Digital tradition) to commissions and other incentives? Bob Palmer suggests the change he's going to implement will be gradual, but eventually up to half of a salesperson's compensation could be tied to performance. Customers will want to see how that influences the account rep's behavior.

d. How will these business units, sales and systems integration activities mesh in terms of incentives and compensation? For example, how will the field people in one territory be compensated when their efforts produce revenues realized in another? The key is mutual dependency, responds Palmer. Each consultancy center will both serve a specific territory like Chicago and wield a specific competency like manufacturing. So the manager of the New York center will gladly supply Chicago with banking expertise because he may need manufacturing skills tomorrow. We're not totally convinced. Though we certainly applaud the heartening signs of greater focus in product lines and resource utilization.

VII.   SERVICE RIBBONS

A. The Three Furies

Almost every supplier has a presentation on systems integration and consulting. Complete with foils on the multivendor alliances they'll use to deliver these discretionary services to large corporate accounts. In response, we raise the customer's natural question about quality: Who's responsible for the final results when Systems Integrator A plops Vendor B's application on Vendor C's data base on Vendor D's computer system? Simply pointing at the prime contractor is not enough. The quality of the overall relationship should concern every member of the alliance. How else can these vendors expect discretionary services to restore their faded profit margins?

Indeed, discretionary services should be a win-win for suppliers and customers alike. Vendors from Andersen to HP to Oracle to Microsoft need to sell services either as their primary revenue generator, or to help differentiate a commoditized product. RB members have suffered through five years of recessionary declines and headcount restrictions, leaving many corporate IT organizations seriously understaffed or with outdated skills. So this should be a splendid opportunity for the consultancy and contract software businesses. Yet these folks remain mired in problems they've wrestled for 25 years.

1. The calibre of their professional resources: how to attract, train and motivate the right number and level of employees as the company expands. Then how to deploy them, matching employee skills and availability with client location and project schedule. While minimizing idle time between billable assignments. For nothing chews up profits faster than time spent "on the beach."

2. More important, how to ensure customer satisfaction. Both to maximize project profitability and to increase the prospect of follow-on assignments and referenceable accounts. Thus dampening sales costs while improving staff utilization. To guarantee project quality, however, vendors need consistent and meaningful quality metrics. A subject that suppliers give barely a glimmer - beyond boasting those "Customer Satisfaction Surveys," proving only how few people will express anything hostile in writing. Unfortunately, the lack of metrics becomes even more troublesome when projects involving several "allies" have no vendor willing to take end-to-end responsibility for the results. While the customer stands frothing and frustrated in the middle.

Metrics aside, the customer's best hope of getting a useable and reliable system is project replicability. This means that a systems integrator has mechanisms in place to draw on the experience, designs and even programming of prior assignments. And that a project "alliance" comprises a stable grouping of partners expert in implementing a specific set of applications for a specific industry segment - again and again. Replicability allows the lead supplier to take full responsibility for the output quality of the other participants, precisely because the same team has delivered measurably satisfactory results in the past. At least that's the dream. In reality, we found no vendor with any notion of performance metrics spanning an entire alliance. Nor any plans and incentives to promote replicability. Perhaps it's time the industry began devoting as much attention to benchmarking project performance as it does to benchmarking hardware performance.

Hardware vendors have long been interested in the systems integration business, of course. But we're starting to discern a difference from the trivial pursuits of the past. Digital's Chief Technology Officer Bill Strecker positions the company strategy on a spectrum between the wholly replicable and the scarcely replicable. Where the wholly replicable refers to mass market solutions represented by the idiot-proof systems Microsoft and Apple want to load into PC and TV alike. And scarcely replicable refers to the heterogeneous components programmed or integrated by Andersen or EDS into a customer-unique system. In between is "mass customization," where Digital plans to play with standardized components its field personnel could snap together on a replicable basis to meet the requirements of many customers. In essence, the profitable systems integrator will have technology that permits its project teams to "deliver complex solutions more routinely." Sounds sensible.

How should Research Board members react to the changes in sales and service? A few suggestions:

1. First and foremost, recognize that all these marketing alliances are both a necessity for the vendors and a mixed blessing for the customer.

2. Refuse to allow vendors to escape their basic responsibility for quality through alliance waffles. The lead vendor should be held fully accountable for any failure to deliver excellent products and services.

3. Require suppliers to demonstrate their relevant experience or (even better) "replicability" when you're evaluating sources for applications development and systems implementation. Have the specific individuals proposed from this particular combination of suppliers achieved excellent results on similar projects? Check references, of course.

4. Ignore those "customer satisfaction" surveys every vendor proffers. Unless they were conducted by an independent party, and the vendor wasn't identified to the respondents as the sponsor.

5. Pressure the vendors to develop, and release, fathomable and credible gauges of their service quality. Both for the projects they conduct by themselves and those they undertake with their allies. Is this a pipe dream, given the infancy of the systems integration business? Perhaps. But end-to-end service quality is the most important issue of the day. And service quality can't be improved without metrics to serve as the signposts and traffic directions.

6. Do not rely on the "buddy system" as a mechanism for transferring skills and technology from outside vendors to in-house IT staff.

7. Do not contract out applications development or integration assignments that demand skills the IT organization will need for the future. To the contrary, the best activities to outsource are those requiring skills already at a dead end.

VIII. FUTURE HOPES AND HYPES

A.   Towards the Next Millennium

Slouching toward the millennium, the dogged RB researchers
also prospect for intriguing technologies that could
radicalize the use of computing. And thus stimulate an
industry renaissance comparable to those occasioned by the
programmable mainframe (circa 1960), the minicomputer (1970)
and, of course, the microprocessor (1980). Four promising
areas surfaced repeatedly as the locus of industry r&d
investment: parallel processing; object technology, with
a bow to multimedia; computer miniaturization; and client/
server reliability and security.

All four draw new funds because they're relevant to present
needs, not a stretch towards any new conceptual frontier.
Commercial parallelism is needed to record, store and
correlate business transactions because their volumes grow
tenfold each decade. Client/server robustness will reduce
the burdensome care and feeding that distributed networks
demand today. Object technology will address the need for
better productivity in building and maintaining software
components. And miniaturization will let our increasingly
office-less office workers carry their knowledge tools like
lunch pails.

Such new horizons are particularly important at a moment
when the software market seems saturated by Microsoft; the
hardware market by Intel. And when new offerings are too
often fettered by ossified rules of engagement in existing
sales channels, or by the constraints of protecting everyone's
embedded product base or old code.

So investors are ready for a "relevant" prize. Though it's
not clear how these four technologies will impact customer
usage patterns. Will they merely increase usage, like cellular
telephones? Or also attract business from competing media?
Just as facsimile battered the U.S. mails, courier delivery
services, image processing, intercompany e-mail, telephone,
even altered the routine of ordering sandwiches from the
corner delicatessen. Moreover, can these technologies open
new avenues for computing - in education, information and
entertainment? We'll speculate momentarily.