

# DSS90 Presentation

## May 22, 1990<sup>©</sup>

by

Arthur M. Schneiderman

Presentation date:	Venue:	Text:
May 22, 1990	DSS-90 Conference, Institute of Management Sciences	Current

One of my earliest lessons learned was to avoid creating the appearance of competition between traditional financial measures and their new non-financial siblings. It therefore seemed logical to integrate the scorecard into Analog's existing financial reporting system. This took on two forms: inclusion in the "Red Book" and Analog's online Executive Information System (EIS) called "IMAGE." The Red Book was the quarterly financial report (in a red binder, of course) that was prepared principally for the Board of Directors. IMAGE was a mainframe based data warehouse and graphics system, used principally by headquarters personnel, which could only be accessed in graphics form through hardwired remote color terminals.

Starting in February 1988, we included in the Red Book and IMAGE our corporate and divisional scorecards as well as our delivery performance metrics, which had already been included in IMAGE since late 1986. Because of inadequacies in the IMAGE system, we soon purchased Pilot Executive Software's Executive Information System. PILOT maintained all data on the mainframe (to assure its integrity) but the bulk of the graphics were done on local PC's that could connect to the mainframe using modems over local phone lines. By the end of 1988, we had completed the transition from the IMAGE to the PILOT delivery platform. To the user, the transition was transparent with regard to content and the various displays. However, navigation was now by mouse click and hardcopy could be generated at the PC's local printer.

Plans for expansion of the IMAGE/PILOT system included drilldown to lower level scorecards (the system only drilled down one level below the corporate scorecard), which would be inputted and maintained by its owner. We also planned to link PILOT to Lotus Notes for further expansion of the scorecard commentaries and integration into our meeting agendas and agenda item preparation materials.

In a February 1990 interview that appeared in ComputerWorld, I described our adaptation of a traditional financial EIS to non-financial metrics and the balanced scorecard and my expectation that it would eventually replace our traditional financial-only management system. Shortly after that, I was invited to be a plenary speaker at the Institute of Management Sciences DSS-90 Conference. What follows are the materials that I used in that presentation.

One of the other speakers at DSS-90, Jack Rockart, the Director of MIT's renowned Center for Information Systems Research (CISR), came to visit me on June 21, 1990 for a first-hand demo of PILOT. Jack was often referred to as the "father of EIS" so his visit and compliments were much appreciated. Jack invited me to speak at a CISR seminar held in December 1990. A month earlier, I had made a similar presentation at a seminar sponsored by Decision Support Technology, Inc. In both of these later presentations I uses updated versions of the relevant materials shown here.

PILOT's final tribute came in the fall of 1991 with Bob Kaplan's acceptance of my offer to set up a full working version of our system on the Harvard Business School's computer so that students could use it in conjunction with the Analog Devices case that he had recently written. David Friend, CEO of Pilot Executive Software, agreed to provide support and a free copy of his software. The three-way team of ADI-HBS-PES personnel did a masterful job of creating a working demo (much like the one on this website), which from all reports added significant value to the student's learning experience.

The first part of this presentation provides an overview of ADI and a description of the key elements of our QIP efforts. You can skip ahead to slide 20 where the description of the PILOT system starts.

## **(E) IS... THE FUEL FOR CONTINUOUS IMPROVEMENT**

Art Schneiderman  
Analog Devices

- Analog Devices at a Glance
- The Quality Improvement Process (TQM)
- Linking Performance Measurements to Corporate Goals
- The "Half-Life" Concept
- ADI's 1992 QIP Goals
- The Quarterly "Scorecard"
- ADI's Executive Information System
- An Example: Customer Service
- Lessons Learned

May 22, 1990

©1985, 2000 Arthur M. Schneiderman All Rights Reserved.

Slide 1

5/22/90-05220-7

## Analog Devices at a Glance

- Headquartered in Norwood Massachusetts
- Publicly Held (NYSE Symbol ADI)
- \$453 Million in Sales (FY1989)
- 48% of Sales Outside United States
- 5200 Employees Worldwide

## ANALOG DEVICES AT A GLANCE

(cont)

- Products: ICs, assembled products, subsystems
- Applications: precision measurement & control
- Markets: data acquisition
  - 40% industrial/instrumentation
  - 30% military/avionics
  - 13% computer
  - 17% other
- Integrated supplier
  - design
  - manufacturing (8 locations)
  - direct sales (100 locations)

Slide 4

## 1989 Top Customers Worldwide

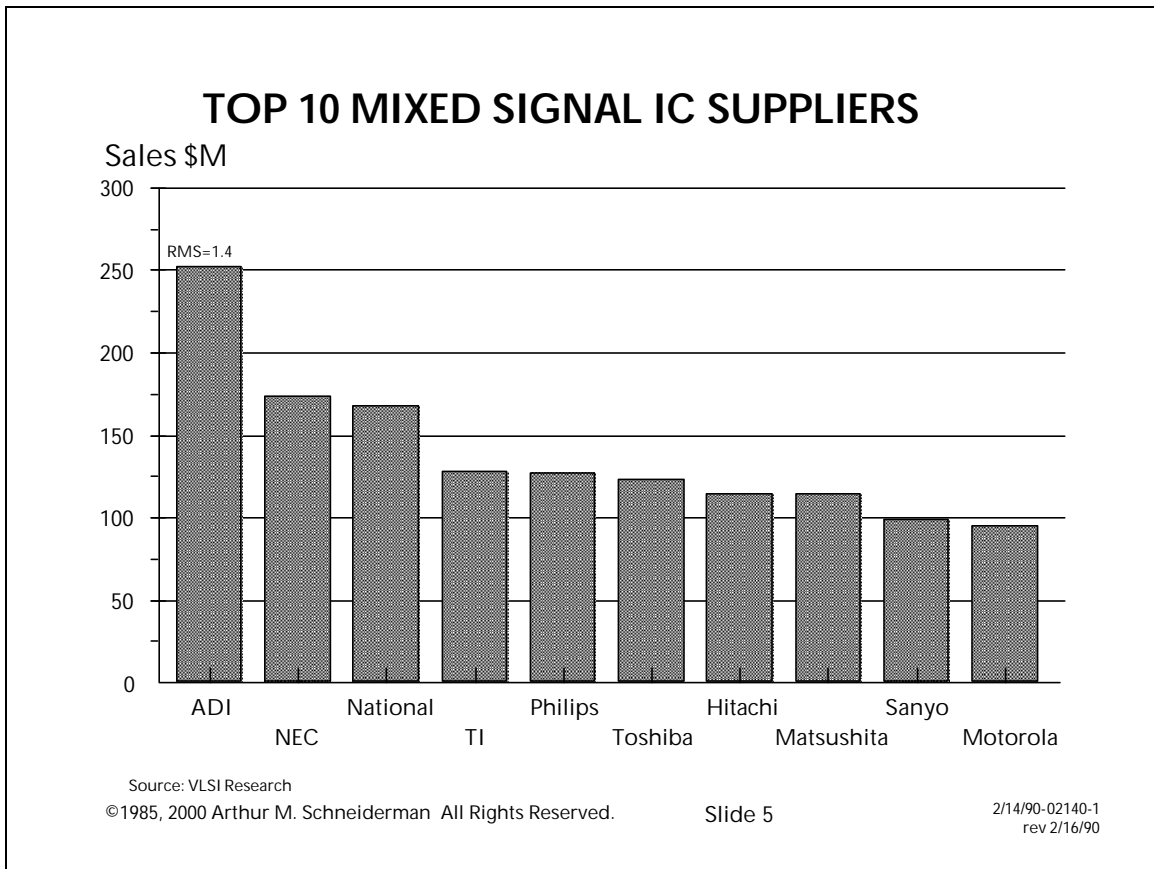
<i>Customer</i>	<i>Bookings</i>	<i>Cumulative</i>
	<i>\$M</i>	<i>%</i>
IBM (US, Japan & France)	26.8	6.0
GE/RCA	10.5	8.3
Fuji (Japan)	10.3	10.6
HP (US, UK & Germany)	9.1	12.6
Honeywell (US, Germany)	7.4	14.2
General Dynamics (US)	5.4	15.5
Raytheon (US)	5.1	16.6
Siemens (US, Germany)	5.1	17.7
TI (US)	4.1	18.6
Mitsubishi (Japan)	4.0	19.5
Fujitsu (Japan)	4.0	20.4
Toshiba (Japan)	3.7	21.1
Marconi (US, UK)	3.6	22.0
Hughes (US)	3.4	22.8
Rockwell (US)	3.3	23.5
Hitachi (Japan)	3.3	24.3
Westinghouse (US)	3.1	25.0
Philips (US, Europe)	3.1	25.6
Motorola (US)	3.0	26.3
DCASR (US)	2.7	26.9

©1985, 2000 Arthur M. Schneiderman All Rights Reserved.

Slide 4

c. 1990-PREZ-11

Slide 5



This slide was used to demonstrate the changing nature of Analog's competition. In previous years, our major competitors were much smaller companies (Burr-Brown, Precision Monolithics, Crystal, Linear Technology, etc.), but as the technology changed, so did the competition. Now it included the powerhouse global semiconductor companies.




## Financial Model FY 1987-FY 1992

Sales Growth	20-25 %/yr
Operating Profits	17 %
Profit after Tax	9.4 %
Return on Capital	15.0 %


Slide 7

**ADI CORPORATE QIP COUNCIL**



<b>MEMBERS:</b>	Jerry Fishman	Executive VP
	Kozo Imai	VP, Japanese Operations
	Larry LaFranchi	Operations Controller
	Bill Manning	Division GM
	Doug Newman	VP, Sales and Marketing
	Art Schneiderman, Chairman	VP, Quality/Productivity Improvement
	Ray Stata	Chairman of the Board and President
	Goodloe Suttler	Division GM
	Suzanne Thomson	Director, Training & Development
	Tom Urwin	VP, European Operations

- CHARTER:**
- QIP Organization
  - QIP Goals Deployment  priorities
  - Training  Juran
  - Monitoring  metrics
  - Incenting/Rewarding

Slide 8



## THE QIP CULTURE

- We each have a dual function
  - daily job                       SDCA cycle
  - process improvement        PDCA cycle
- We are committed to improving customer satisfaction
- We are dedicated to continuous improvement (kaizen)
- We are part of a parallel organization: functional and cross-functional
- We are a continuously learning organization

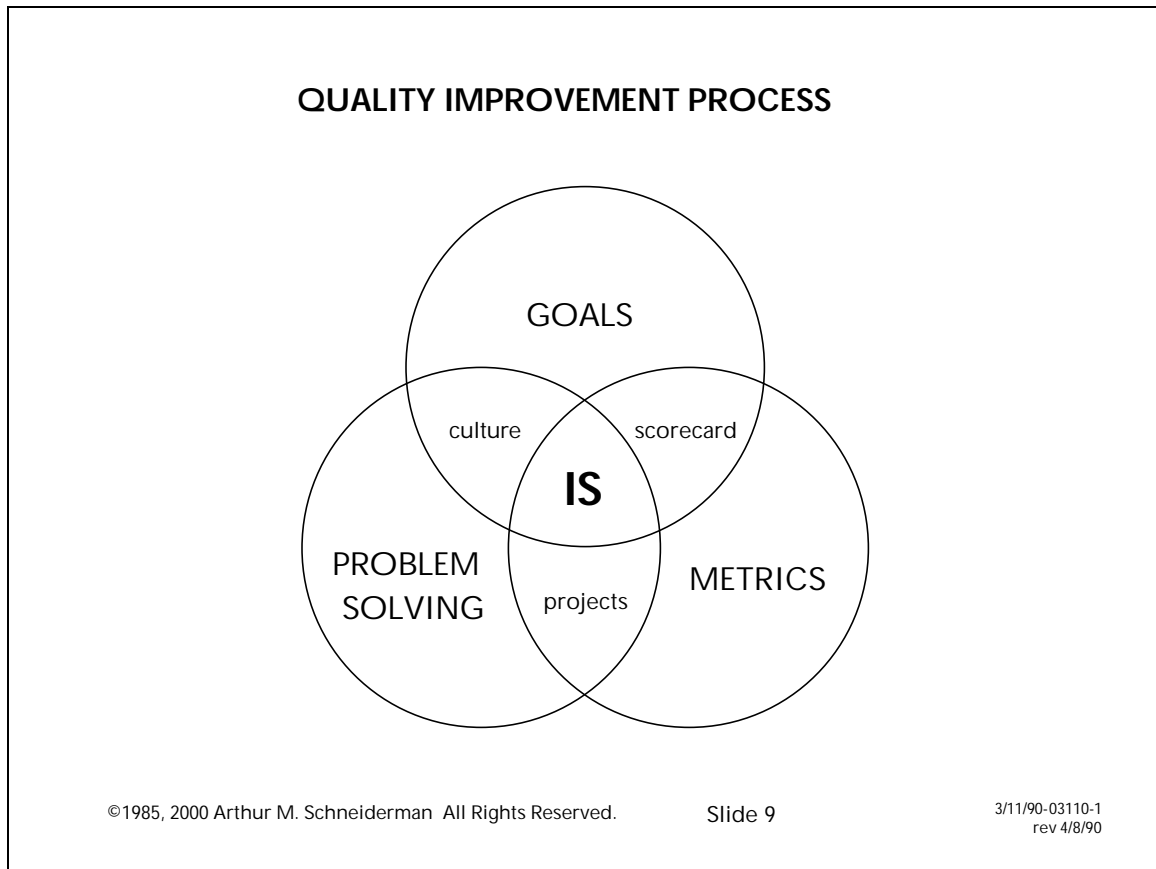
©1985, 2000 Arthur M. Schneiderman All Rights Reserved.

Slide 8

4/8/90-04080-4


This slide was used to portray the kind of corporate culture that we were attempting to create. It provided the context for the model of partnership between the IS function as supplier and the QIP function as its customer that I was going to describe.

Slide 9



I had often described Information Systems as the “glue” that held together the three major elements of QIP. I used this slide to describe IS’s central role in dealing with such information based activities as metrics and scorecard management, project management and communications as a driver of the desired culture change.

Slide 10



## PROBLEM SOLVING

**Participants:**  
Cross Functional Problem Solving Teams (QIP Teams)  
Task Forces  
QC Circles  
Individuals

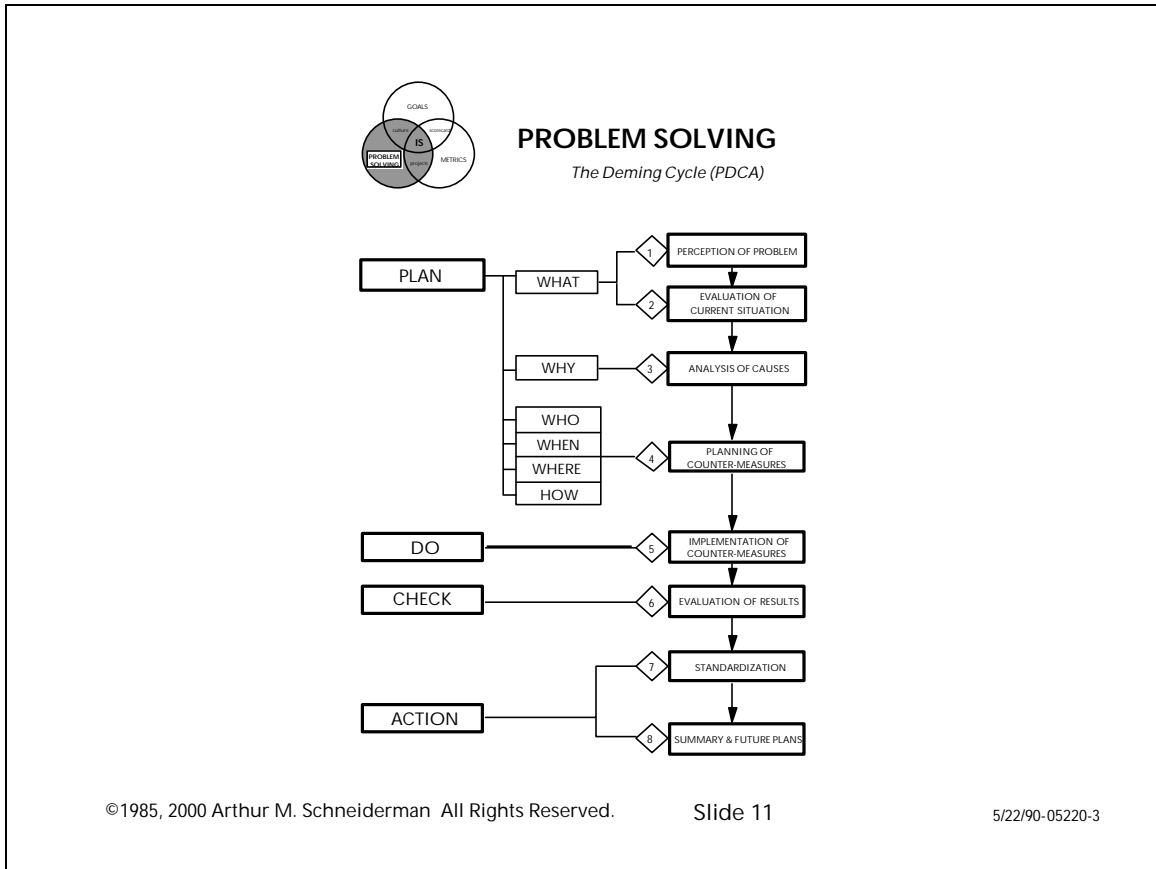
**Systematic Approach:**  
Deming Cycle (PDCA)

**Tools:**  
7 QC Tools (fishbone, histogram, ...)  
7 Management Tools (KJ Method, affinity diagram,...)  
Design of Experiments (Taguchi, etc.)  
SQC (control charts)  
SPC (Cp, Cpk)  
Quality Cost (failure, prevention, appraisal)  
QFD  
Hoshin Kanri  
SMED  
TPM  
EI  
JIT/Kanban (cycle time, WIP reduction)

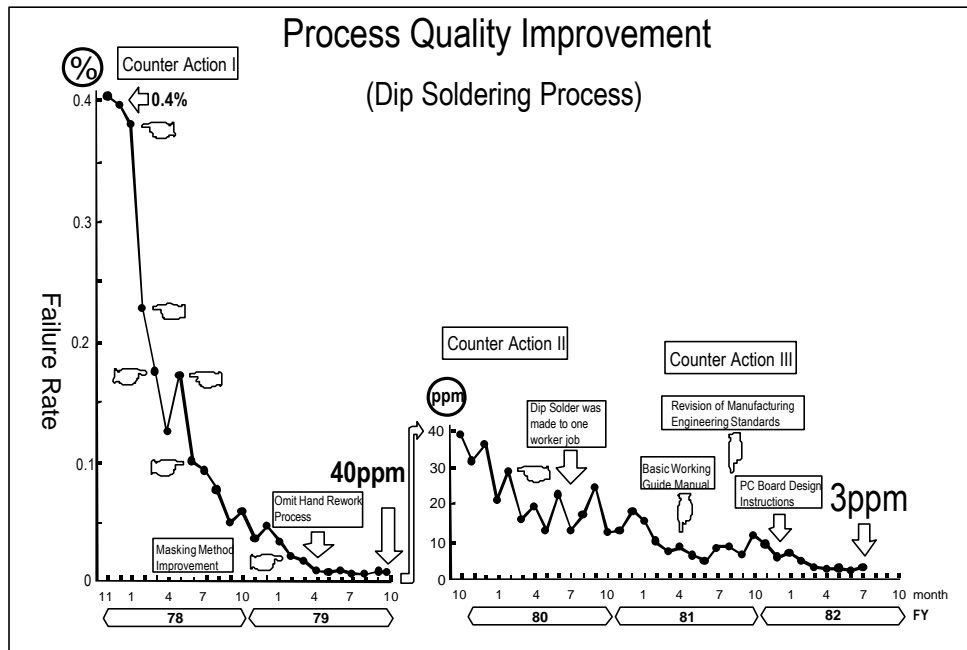
©1985, 2000 Arthur M. Schneiderman All Rights Reserved. Slide 10 4/8/90-04080-1

As a prelude to our approach to creating the management information system that I was about to describe, I used this slide to describe the approach that we would be taking. I stressed the importance of a systematic, data driven, team based model. Since the audience for this presentation was principally IT professionals, I used the next several slides to provide a context for what we were trying to accomplish.

Slide 11



Slide 12

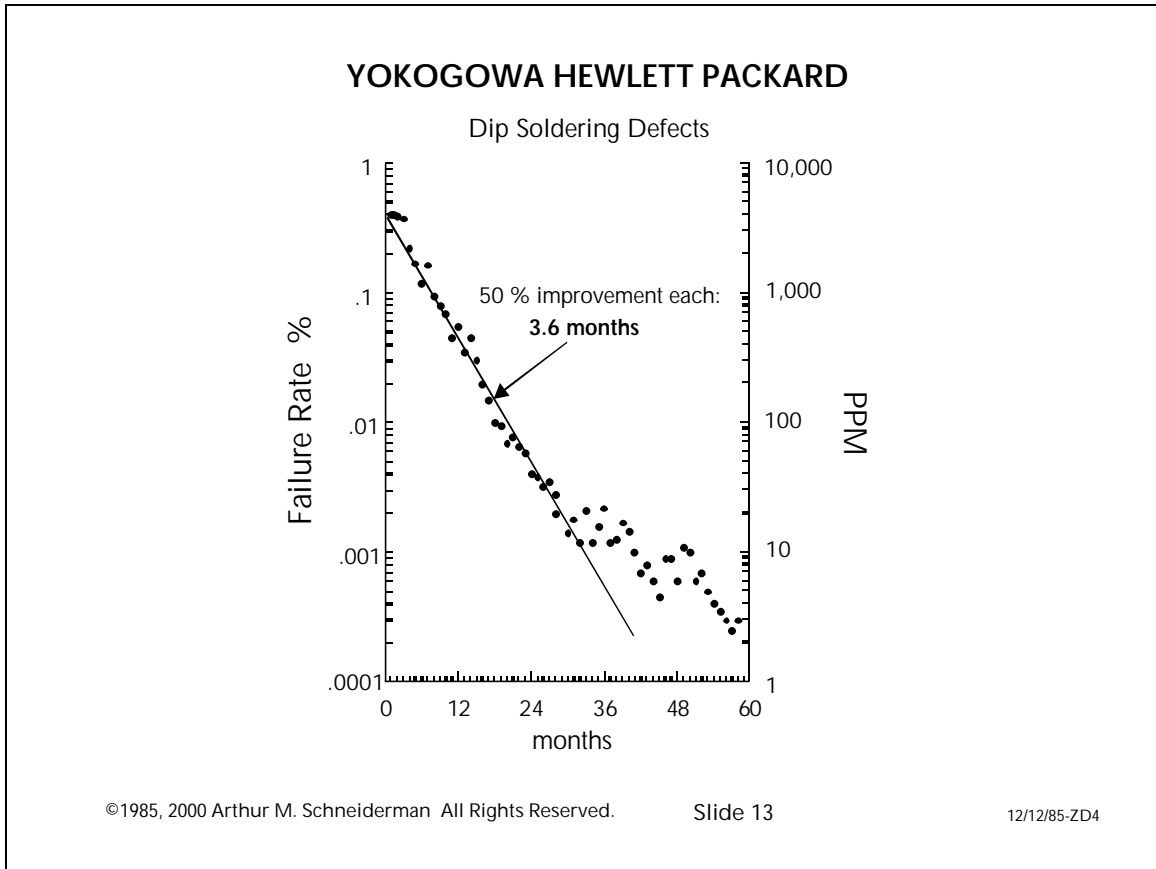


Source: Kenzo Sasaoka, President  
Yokagawa-Hewlett-Packard 7/84

©1985, 2000 Arthur M. Schneiderman All Rights Reserved.

Slide 12

c. 1982-YHP



## PROPOSED HALF-LIFE MODEL VALUES

<u>PROJECT TYPE</u>	<u>EXAMPLES</u>	MONTHS	
		<u>MODEL HALF-LIFE</u>	<u>EXPECTED RANGE</u>
<i>uni-functional</i>	operator errors WIP	3	0 to 6
<i>cross-functional</i>	new product cycle time outgoing PPM	9	6 to 12
<i>multi-entity</i>	vendor quality warranty costs	18	12 to 24

## ADI RESPONSE TO HALF-LIFE CONCEPT

### *Supporters*

Embodies the concept of KAIZEN  
Easy to understand  
Makes sense  
Data not negotiation based ⇨ realistic  
Accepted by line organization  
Works  
focuses on results not process

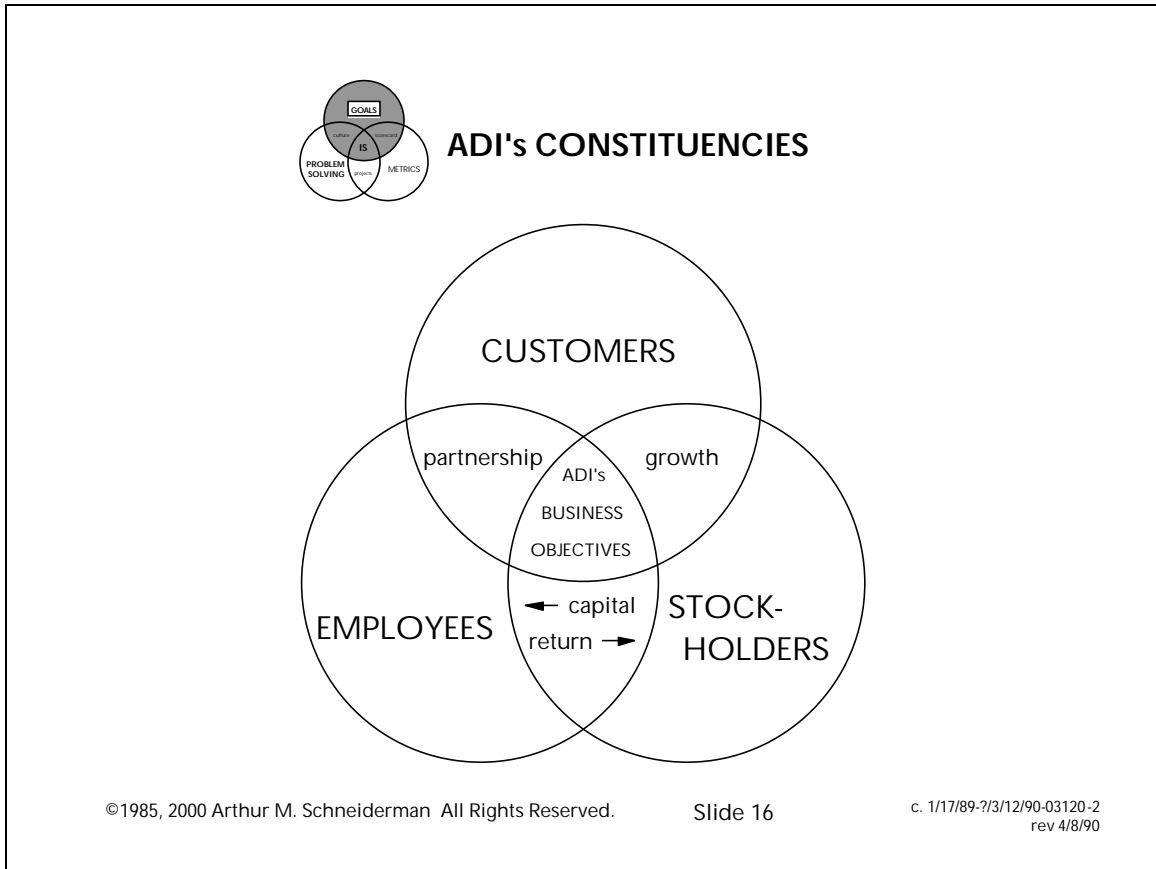
### *Critics*

Doesn't reflect where we need to be  
Hard to understand  
Hard to use  
manual vs. computerized  
assumes instant startup  
assumes constant rate of learning  
focuses on results not process


**"...the rate at which individuals and organizations learn  
may become the only sustainable competitive advantage..."**

**Ray Stata**

Slide 16



Slide 17



## ADI QIP GOALS

**BUSINESS**

**OBJECTIVES:**

- MARKET LEADERSHIP (RMS)
- REVENUE GROWTH
- PROFITABILITY

**DRIVERS:**

- BE RATED #1 BY OUR CUSTOMERS  
IN **TOTAL VALUE DELIVERED**

**EXTERNAL LEVERS:**

- PRODUCTS
- DEFECT LEVELS
- ON-TIME DELIVERY
- LEADTIME
- PRICE
- RESPONSIVENESS

**INTERNAL LEVERS:**

- TIME TO MARKET
- PROCESS PPM
- MANUFACTURING CYCLE TIME
- YIELD

©1985, 2000 Arthur M. Schneiderman All Rights Reserved.

Slide 17

c. 1/17/89-AMS-5  
rev. 4/8/90-04080-2

Slide 18

<u>METRIC</u>	<u>1987</u>	<u>HALF-LIFE</u>	<u>1992</u>
<b>EXTERNAL</b>			
On time delivery	85%	9	>99.8%
Outgoing defect levels	500 PPM	9	<10 PPM
Lead time	10 wks	9	<3 wks
<b>INTERNAL</b>			
Manufacturing Cycle Time	15 wks	9	4-5wks
Process Defect Levels	5000 PPM	6	<10 PPM
Yield	20%	9	>50%
Time to Market	36 mths	24	6 mths


WHILE AGGRESSIVELY PURSUING  
CORPORATE-WIDE COST MANAGEMENT

©1985, 2000 Arthur M. Schneiderman All Rights Reserved. Slide 18 c. 7/12/87-QIP-16/QS-16B  
rev. 7/25/87

Slide 19

FY1990 CORPORATE SCORECARD											
FINANCIAL	End FY89	Q1 90		Q2 90		Q3 90		Q4 90		FY 90	
	ACTUAL	BHMK	ACTUAL	BHMK	ACTUAL	BHMK	ACTUAL	BHMK	ACTUAL	BHMK	ACTUAL
SALES											
SALES GROWTH YTY											
CONTRIBUTION MARGIN											
ROA (CM)											
<i>O/P</i>											
ON TIME DELIVERY (To FCD)											
% CRDs NOT MATCHED											
EXCESS LEADTIME											
LABOR TURNOVER											
<i>MANUFACTURING METRICS: IC PRODUCTS</i>											
OUTGOING PPM											
PROCESS PPM											
CYCLE TIME											
YIELD											
<i>MANUFACTURING METRICS: ASSEMBLED PRODUCTS</i>											
OUTGOING PPM											
PLUG-IN YIELD											
CYCLE TIME											
% COST OF SCRAP/REWORK											
<i>NEW PRODUCTS</i>											
BOOKINGS POST-85 PROD	ACTUAL	FY87 PLAN	ACTUAL	FY87 PLAN	ACTUAL	FY87 PLAN	ACTUAL	FY87 PLAN	ACTUAL	FY87 PLAN	ACTUAL
FORECAST 3 <sup>rd</sup> YR BOOKINGS of new product releases	FY89	1Q90	2Q90	3Q90	4Q90	FY90					


Slide 20



**PERFORMANCE MEASUREMENT**

**If you don't measure it,  
it will not improve.**


**does not mean**

measurement  improvement

©1985, 2000 Arthur M. Schneiderman All Rights Reserved. Slide 20 5/22/90-05220-4


This slide stressed the importance of metrics and goals in Analog's implementation of TOM. I also stressed that although they were necessary, they were not sufficient to assure achievement of our overall business objectives.

In later versions of this slide, I added: "If you don't monitor it, it will get worse" to emphasize the importance of integration of measurement into the normal management systems.



**GOAL:**  
**IMPROVE CUSTOMER SERVICE**

**CUSTOMER SERVICE METRICS**

**ON TIME**  
% late       % on time  
% early

**RESPONSIBILITY**  
factory                  credit  
warehouse              customer

**LATENESS/EARLINESS**  
shipped late, how late?  
shipped early, how early?  
still late, how late?  
months to ship late backlog

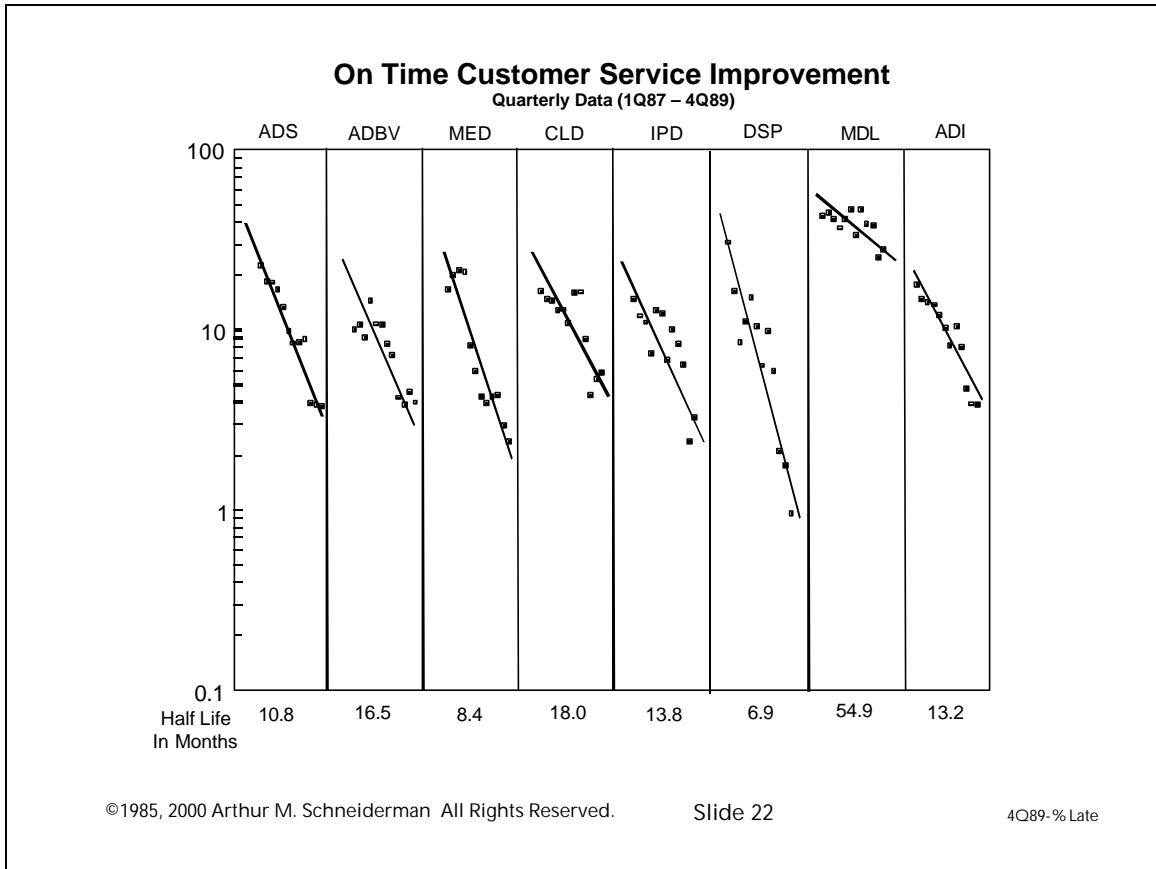
**LEAD TIME**  
customer requested lead time  
% CRD's matched  
excess lead time

**RESPONSIVENESS**  
time to schedule an order

©1985, 2000 Arthur M. Schneiderman All Rights Reserved.      Slide 21      4/8/90-04080-3  
rev 5/13/90

This slide introduced the comprehensive set of measures that Analog developed for its order fulfillment process. Not only did we measure our overall performance in terms of late shipments, but also we recognized the emerging customer requirement that we not ship early either. To start the journey to root causes, we measured responsibility of the late shipment. The lateness/earliness measures addressed the “societal loss” associated with not being on time. To a customer, responsiveness (an other emerging customer requirement) took the form of how quickly we made a delivery commitment after their initial query.

Slide 22



This slide showed the rapid improvement that we were achieving in our most important order fulfillment process metric.

Slide 23

**CREDITS**

Elizabeth Derwin

Jim Doscher

Wally Francis

Rich Lynch

Ira Moskowitz

Holley Murphy

Art Schneiderman

Pilot Executive Software

©1985, 2000 Arthur M. Schneiderman All Rights Reserved.      Slide 23      5/22/90-05220-2

Having established the kind of information we would be dealing with as well as how we were using this information in the management of our business, I next introduced to the audience the cross-functional team that was currently given the responsibility of developing and implementing our system.

The team consisted of three members from my staff and three members from our Corporate Information Systems group (which reported to Analog's CFO) as well as me. My job was to assure that the team's product met the needs of all users of the system and to obtain the needed resources.

Our efforts at using information systems to manage our metrics and scorecard actually started in late 1986. Team membership changed as members moved on to other assignments, but always consisted of a similar mix of individuals.

?

Analog Devices - 1990 Scorecard

ADI

Qtr 1 1990

1  
2

Metric	Actual	Plan	Variance	% Variance
<b>QIP:</b>	.00	.00	.00	.00
On Time Delivery % (To FCD)	95.90	96.70	-.80	-.83
% CRDs Not Matched	51.40	46.10	5.30	11.50
Excess Leadtime (Weeks)	2.90	3.40	-.50	-14.71
Employee Turnover %	11.10	13.00	-1.90	-14.62
IC Outgoing PPM	1023.00	1481.00	-458.00	-30.93
IC Process PPM	1601.00	1966.00	-365.00	-18.57
IC Cycle Time	62.60	52.10	10.50	20.15
IC Yield	35.70	38.70	-3.00	-7.75
AP Outgoing PPM	5746.00	1715.00	4031.00	235.04
Plug In Yield	91.70	90.50	1.20	1.33
AP Cycle Time	23.90	24.20	-.30	-1.24
Scrap/Rework Cost	12.50	8.80	3.70	42.05

Retrace

Utilities

1989 Scorecard

Commentary

Return

©1985, 2000 Arthur M. Schneiderman All Rights Reserved.

Slide 24

1Q90-Scorecard-1

This is page one (of two) of the first screen in the resulting system. It's the Corporate Balanced Scorecard for the first quarter of 1990. I refer you to the working model of Pilot for a detailed description of the navigation rules for the system.

The next slide contains the second page. Two pages (rather than the one page I normally required) were necessary to assure legibility on all of our computer monitors. Today, both screens would easily fit on a single page.

From the original creation of these data in late 1986/early 1987, I was sent each month a set of transparencies of the major "screens" in the system. I would replace the old ones with the new ones, so that I could always show people our latest results. This, and the following slides represent a snapshot of the contents of my "transparency folder" as of April 1990. I brought it to all meetings and could quickly retrieve the appropriate data when it was appropriate.

?

Analog Devices - 1990 Scorecard

ADI

Qtr 1 1990

1

Metric	Actual	Plan	Variance	% Variance
<b>NEW PRODUCTS:</b>	.00	.00	.00	.00
Post 1985 Products	.00	39.10	-39.10	-100.00
Forecasted 3 <sup>rd</sup> Year Bookings	.00	14.20	-14.20	-100.00
<b>FINANCIALS:</b>	.00	.00	.00	.00
Sales	109.70	112.40	-2.70	-2.40
Sales Growth (YTY)	-3.90	-1.50	-2.40	160.00
Contribution Margin	7.20	7.80	-.60	-7.69
ROA (Contribution Margin)	6.90	8.60	-1.70	-19.77

Retrace

Utilities

1989 Scorecard

Commentary

Return

©1985, 2000 Arthur M. Schneiderman All Rights Reserved.
Slide 25
1Q90-Scorecard-2

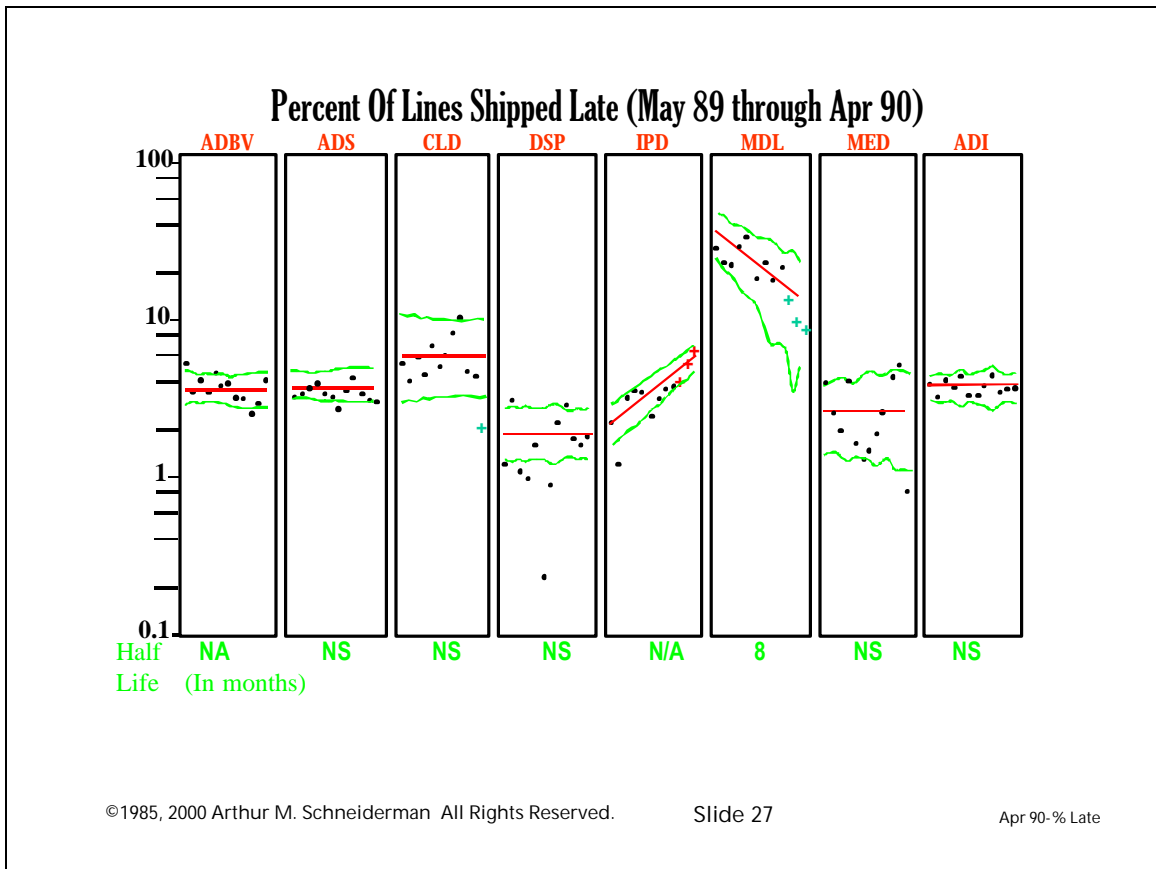
Slide 26

CUSTOMER SERVICE METRICS – ON TIME/RESPONSIBILITY						
April 1990						
	Early %	On Time %	Not Late %	Division %	Warehse. %	Credit %
ADBV	9.94	85.55	95.49	4.38	.29	.52
ADS	6.64	89.98	96.62	3.91	.34	.44
CLD	30.86	66.79	97.65	4.22	.18	.30
CTS	7.82	91.62	99.44	.56	.00	.00
DSP	2.52	95.50	98.02	2.52	.36	.18
IPD	5.67	88.20	93.87	6.87	.36	.23
MDL	61.94	28.39	90.32	8.39	.00	1.29
MED	20.24	78.87	99.11	2.58	.00	.10
ADI	9.28	86.72	96.00	4.53	.31	.39
ALL	9.28	86.72	96.00	4.53	.31	.39

[Utilities](#)    [Change Metrics](#)    [Return](#)

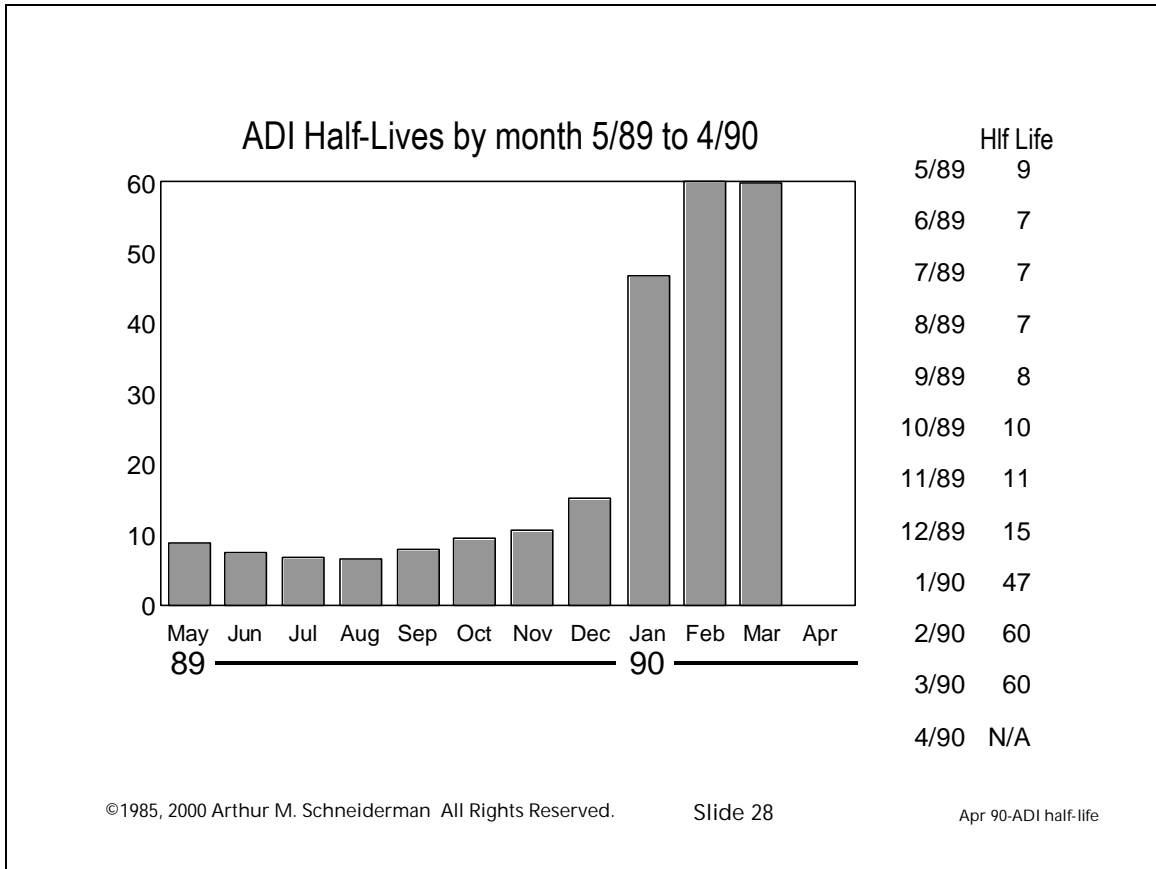
©1985, 2000 Arthur M. Schneiderman All Rights Reserved.      Slide 26      Apr 90-OTD

Clicking on [On Time Delivery % \(To FCD\)](#) on the corporate scorecard brings you to this screen which gives the delivery metrics disaggregated by business unit.



Clicking on any of the numbers in the previous slide (here it's "not late" for the entire corporation) produces this standardized view. The metric is broken down by business unit (each column) and shows the most recent twelve months of results. The green "control limits" identify the band of statistical insignificance in month-to-month variation. The red line is a fit of my half-life model to the data. The resulting half-life is shown at the bottom of each column. If the half-life is statistically insignificant ( $r^2 < .3$ ), the letters NS (i.e. not significant) appear in place of a numerical value. If the half-life is negative or greater than 5 years, then NA (for not applicable) appears. Clicking on a half-life value produces the next slide.

Slide 28



This slide shows that during the period of May 1989 through April of 1990, Analog's rate of improvement was rapidly declining. This plateauing in improvement is discussed in several my other presentations.

Slide 29

Print
Adi Ontime
?

/ADI
CUSTOMER
TYPE

TABLE: CSTB

ENTITY	ERY_SHIP_PCT (4/90)	ON_TIME_PCT (4/90)	NOT_LATE_PCT (4/90)	DIVISION_PCT (4/90)
LATEST PERIOD	TOTAL	TOTAL	TOTAL	TOTAL
ADI	9.28	86.72	96.00	4.53

Reset
Metrics
Views
Calendar
Return

Select label, composite, or new key field.

©1985, 2000 Arthur M. Schneiderman All Rights Reserved.
Slide 29
Apr 90-S&D-1

Our system was not only an EIS with predetermined views, but also a data warehouse where a wide variety of measures could be viewed through a process call "slice and dice." The user specified the Analog business unit, specific customer (if in the top 400) or customer category, product or product category, and time frame and then chose from a large variety of order fulfillment process measures.

?

ADI CUSTOMER SERVICE METRICS

<b>ASAP</b>	Number Of ASAP Orders Placed During The Period
<b>ASAP_PCT</b>	Percent Of Orders Received That Were ASAP
<b>AVG_SHIP</b>	Weighted Average Number of Shipments Per Period
<b>BACKLOG</b>	Total Number Of Unshipped Orders
<b>CRD_HOLD_PCT</b>	Percent Of Lines Late Due To Credit Hold
<b>CRED_REF_PCT</b>	Percent Of Lines Late Due To Credit Referrals
<b>CREDIT</b>	Number Of Lines Late Due To All Credit Causes
<b>CREDIT_HOLD</b>	Number Of Lines Late Due To Credit Hold Causes
<b>CREDIT_PCT</b>	Percent Of Lines Late Due To All Credit Causes
<b>CREDIT_REF</b>	Number Of Lines Late Due To Credit Referrals
<b>CUST_STOP</b>	Number Of Lines Late Due To Customer Stops
<b>CUST_STP_PCT</b>	Percent Of Lines Late Due To Customer Stops
<b>CUSTOMER</b>	Number Of Lines Late Due To All Customer Causes
<b>CUSTOMER_LT</b>	Average Customer Requested Lead Time
<b>CUSTOMER_PCT</b>	Percent Of Lines Late Due To All Customer Causes
<b>DISTRIBUTION</b>	Number Of Lines Late Due To All Distribution Causes
<b>DISTRN_PCT</b>	Percent Of Lines Late Due To All Distribution Causes
<b>DIV_WAREHSE</b>	Lines Late Due To Divisional Warehouse Error
<b>DIV_WE_PCT</b>	Percent Of Lines Late Due To Divisional Warehouse Error
<b>DIVISION</b>	Number Of Lines Late Due To All Divisional Causes

V END CANCEL CLEAR DONE

Select label, composite, or new key field

©1985, 2000 Arthur M. Schneiderman All Rights Reserved.Slide 30c. 1987-CS Metrics

Here's the first page of specific measures available in the system.

Slide 31

Print      Adi Ontime      ?  
/ADI      CUSTOMER      TYPE

TABLE: CSTB  
CUSTOMER      ERY\_SHIP\_PCT      ON\_TIME\_PCT      NOT\_LATE\_PCT      DIVISION\_PCT  
LATEST PERIOD Finished      (4/90)      (4/90)      (4/90)      (4/90)

CORPORATE KEY ACCOUNT  
DOMESTIC KEY ACCOUNT  
FOREIGN KEY ACCOUNT  
KEY ACCOUNT  
NON KEY ACCOUNT  
ADKK  
ALLEN BRADLEY  
AMOCO  
ARMCO  
ATT  
BEACKMAN  
BENDIX  
BETHLEHEM STEEL

---

Reset      V      END      Metrics      Views      Calendar      Return

Select label, composite, or new key field.

©1985, 2000 Arthur M. Schneiderman All Rights Reserved.      Slide 31      Apr 90-S&D-2

This is the first page of choices for customer category and specific top customers.

Slide 32

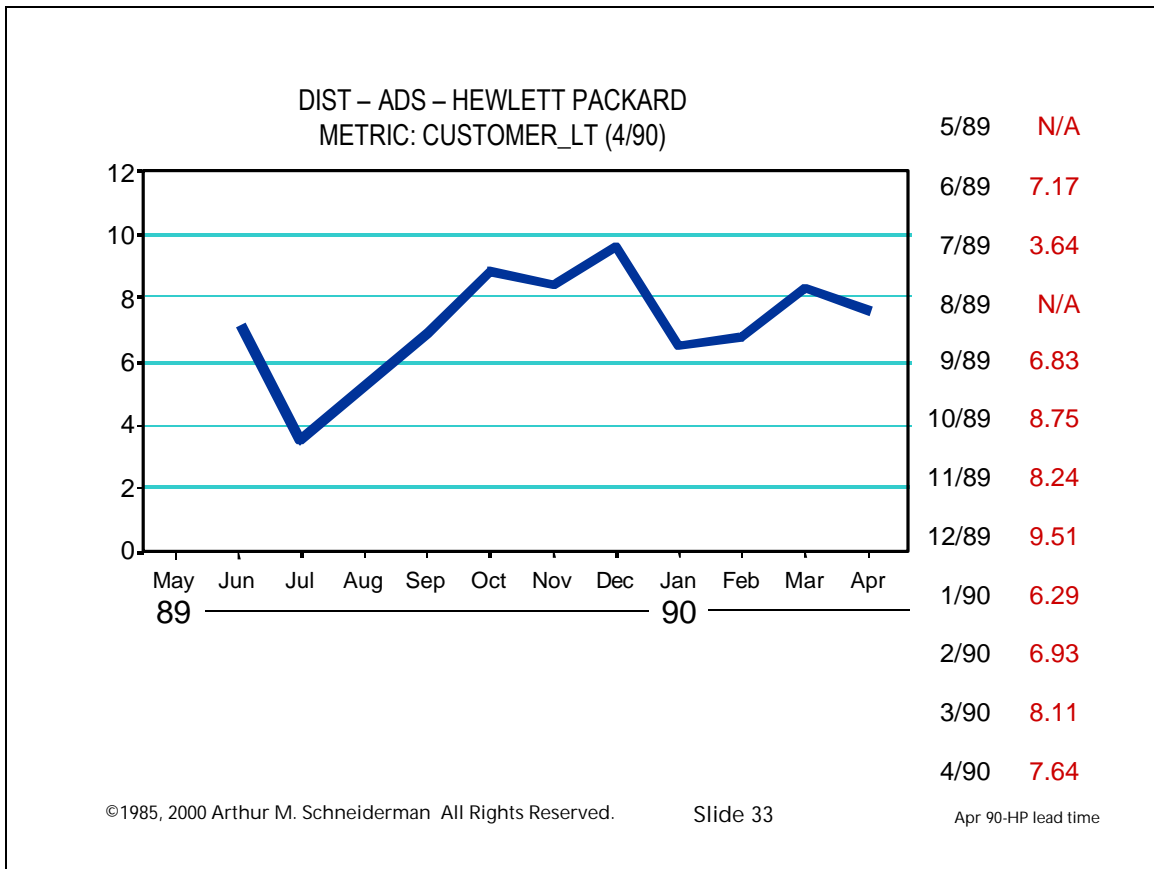
The screenshot shows a software interface with a navigation bar at the top containing buttons for 'Print', 'Adi Overtime', and a help icon '?'. Below the navigation bar is a table with the following data:

ENTITY	CUSTOMER_LT	TOTAL
LATEST PERIOD	(4/90)	
DIST - ADI - HEWLETT		7.64
OEM - ADI - HEWLETT		8.34

At the bottom of the interface, there is a horizontal line with buttons for 'Reset', 'Metrics', 'Views', 'Calendar', and 'Return'. Below these buttons is the text 'Select label, composite, or new key field.' and a copyright notice: '©1985, 2000 Arthur M. Schneiderman All Rights Reserved. Slide 32 Apr 90-S&D-3'.

Here's an example of Analogs overall performance to Hewlett-Packard for OEM (specialty) and Distribution (commodity) products for the month of April 1990. Again, by clicking on a number, its time history would be displayed.

Slide 33



This is the twelve-month time history of Hewlett-Packard's requested leadtime (customer request date minus order entry date) for Analog's specialty products.

When meeting with customers. I always brought a set of customer specific results. Usually, it was the first time that they had seen actual data on our performance. In one case, a large German electronics customer who considered us to be one of their worst suppliers based entirely on anecdotal evidence moved us to the top of the list of their best suppliers after seeing our actual data.

In another case, Hewlett-Packard, we agreed to use our data at our regular quarterly meetings rather than their own internally generated numbers since they considered ours to be far more accurate and comprehensive.

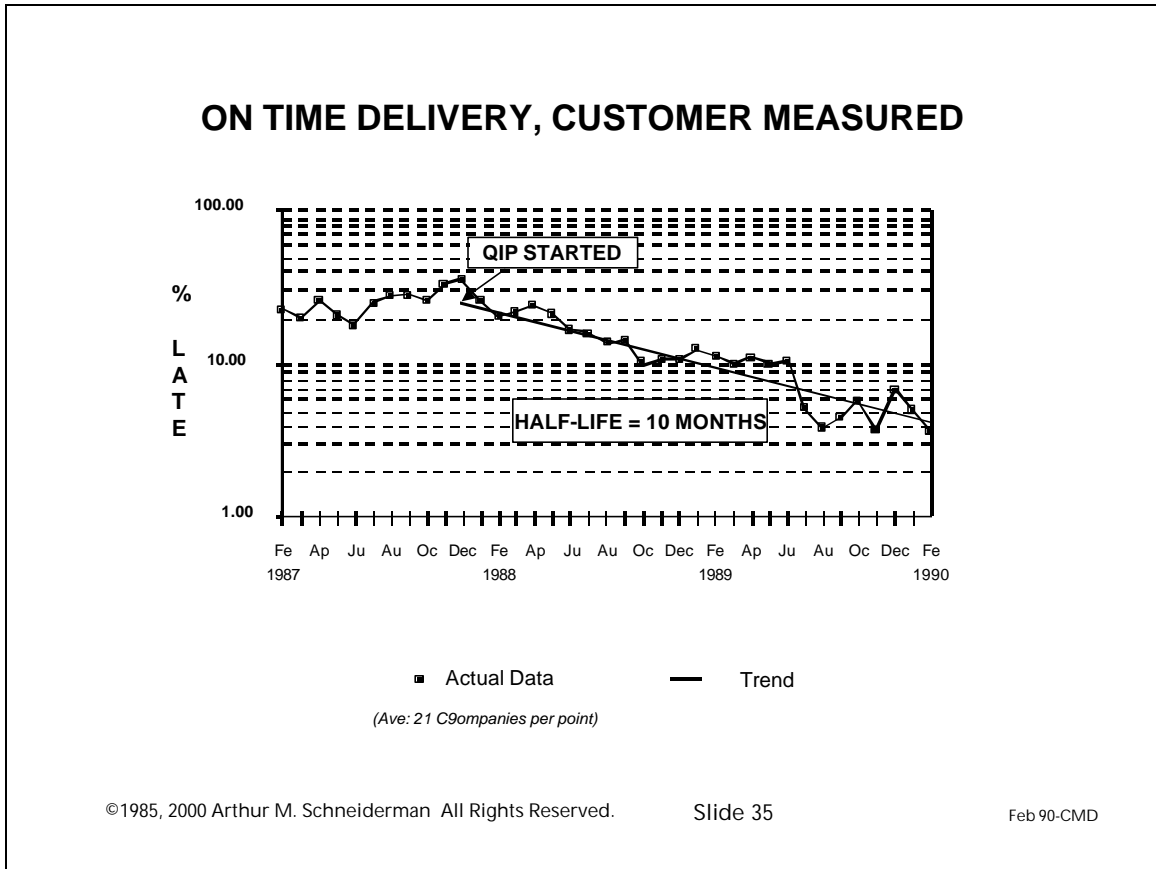
Slide 34

CUSTOMERS IN VENDOR RATING DATABASE

ABB  
AFGA  
Allen Bradley  
Allied Signal  
Ametek  
Analogic  
Apollo  
AT&T  
Bendix  
Compugraphic  
Eaton  
Ford  
General Electric  
GEC  
Gould  
Hewlett-Packard  
Honeywell  
Hughes  
Kodak  
Loral  
Lucas  
M/A-COM  
Marquette Electric  
Masscomp  
Measurex  
Perkin Elmer  
Raytheon  
Reliance Electric  
Rockwell  
Sanders  
Siemens  
Sikorsky  
Tektronix  
Teledyne  
Teradyne  
Texas Instruments  
Trillium  
United Technologies  
Waters Associates  
Westinghouse

©1985, 2000 Arthur M. Schneiderman All Rights Reserved.      Slide 34      Feb 90-Cust data base

From my frequent visits with customers, I discovered that many of them had vendor-rating systems in place. A surprising number of them didn't share this data with their suppliers. In other cases, the data was sent to an Analog salesperson where it subsequently disappeared. I started collecting these data and published a quarterly report of our aggregate performance as measured by our customers.



Here's the data for February 1990. The correlation of both level and half-life with our own internally generated numbers validated our internally generated view of our performance.

## Slide 36

**HEWLETT-PACKARD VENDOR RATINGS**

<i>year</i>	<i>ADI rank</i>	<i>total suppliers</i>	<i>category</i>
1986	8	16	linear IC suppliers
1987	5	8	linear IC suppliers
1988	5	15	all IC suppliers
1989	1 *	12	all IC suppliers

\* tied with one other supplier

©1985, 2000 Arthur M. Schneiderman All Rights Reserved.

Slide 36

5/22/90-05220-1

Here's an example of one key customer's view of our performance improvement. HP's vendor ranking system placed us in the middle of the pack of its 1986 16 linear IC suppliers. The same year, they announced that they would be consolidating their number of suppliers by 50%. We made the cut and in 1987 ranked fifth of their now eight linear IC suppliers. Keeping the pressure on, they announced that they would no longer treat linear and digital ICs separately, and we moved to fifth place in this augmented supplier group. In 1989, we tied for the first place ranking in a further reduced qualified supplier pool.

Slide 37

**(E)IS LESSONS LEARNED**  
**May 22, 1990**

- **The system MUST be:**
  - driven by business needs
  - user friendly
    - graphical, colorful
    - menu/mouse driven (no acronyms)
    - logical, intuitive and efficient
    - permit drilldown/consolidation
    - accessible and responsive
    - easy to get hard copy
  - available in 3-6 months
    - start with top management
    - financials first, then metrics
- **Be prepared for user proliferation**
  - top to bottom
  - err on the side of open access
- **Be prepared for information proliferation**
  - EIS to DSS

©1985, 2000 Arthur M. Schneiderman All Rights Reserved. Slide 37 5/22/90-05220-5

In creating and implementing our non-financial performance measurement information system, our team, particularly the CIS based members, learned many important lessons. The most important lesson was that our customers had to perceive that the system really helped them to do a better job, in other words it satisfied a real and significant customer need.


**PRACTICE THE PRINCIPLES OF QIP**

**Break down cross-functional barriers:**


*"You define the needs; we'll decide the best way to meet them".*

vs.

*"Let's work together to determine the best solution to the problem".*



uncover latent needs  
innovate new solutions



**(E)IS, THE FUEL FOR CONTINUOUS IMPROVEMENT**

©1985, 2000 Arthur M. Schneiderman All Rights Reserved.      Slide 38      5/22/90-05220-6

I made this slide, the final slide in my presentation, after our newly hired CIS Director met with me and complained about my role in championing our purchase of PILOT's EIS. He made the first statement in no uncertain terms. My response, the second quote, was instantly rebuffed. The "IS curtain," which had all but disappeared, instantly returned. I hope that some of his counterparts in the audience had a more favorable reaction to this slide and to our team's accomplishment. I am certain that without our customer-supplier partnership the resulting output would have been far less useful.