F-FS7

FIELD SERVICE BRIEF

PRODUCTIVITY AND STANDARDS

DECEMBER 1980

FIELD SERVICE PROGRAM

OBJECTIVE: To provide senior field service managers with basic information and data to support their planning and operational decisions.

DESCRIPTION: Clients of this program receive the following services each year:

- Field Service Briefs - Six reports which analyze important new technical and management issues within the field service areas. Reports focus on specific issues that require timely attention by senior management.
- Major Planning Reports - Three reports that present an in-depth analysis of major technical or management issues. They make recommendations that will assist in the formulatic ... nning of field services.
- Annual Report - ... ties in the field services industry ... ts on future field service pla ... in technical and management ... future requirements of
- Annual Presenta ... esentation to field service exe ... s year's research and to ... he research program for the ... the first half of each year.
- Consulting Supp ... h staff on an as-needed basis

RESEARCH METHOD: ... uters, communications and associ

- Research topics ... client representatives.
- Research for thi ... users, vendors, universities, ind
- Conclusions deri ... nt of INPUT's staff.
- Professional sta ... ore years of experience in da ... ior management pos

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FIELD SERVICE PROGRAM

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PRODUCTIVITY AND STANDARDS

ABSTRACT

This Field Service Brief deals with the issue of people productivity in the field engineering context. Criteria for establishing measurable standards are presented along with examples of standards used by successful organizations both within and without the field service environment. A methodology for evaluating current productivity status is presented along with a set of guidelines for implementation of productivity improvement procedures.

F-FS7
December 1980

PRODUCTIVITY AND STANDARDS

TABLE OF CONTENTS

LIST OF EXHIBITS

I INTRODUCTION

A. IMPORTANCE OF PRODUCTIVITY

- Labor is the major service expense, and it is increasing at a faster rate than material costs.

  - In 1930 the labor-to-materials ratio was typically reported at 1:2; by 1946 the ratio was 1:1; and in 1976 the ratio reached 2:1.

  - As shown in Exhibit I-1, labor costs are rising faster than productivity, based on U.S. Department of Labor statistics.

  - The upward trend in labor costs is expected to continue.

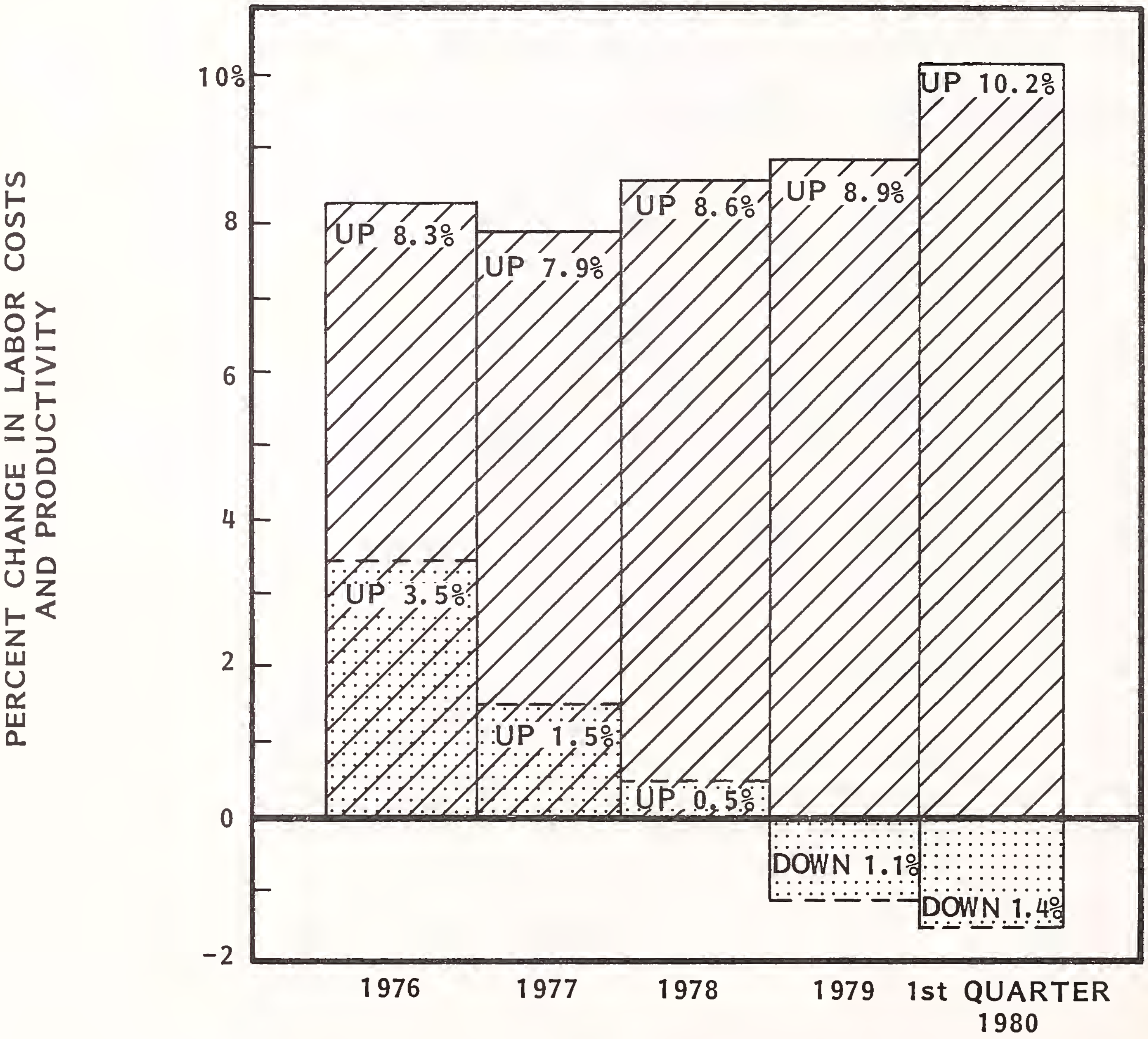
  - In order to reverse the trend, more goods and services will have to be produced without a corresponding increase in expenditures of time and materials. This requires higher productivity.

- Increased productivity requires the efforts of both management and labor.

  - An important reason for Japan's sustained high growth is the cooperative attitude between management and labor. The Chairman of Sony Corporation states that in its American operations, a mixture of 60% Japanese management technique and 40% American, produces the best results.

EXHIBIT I-1

LABOR COSTS RISING FASTER THAN PRODUCTIVITY



SOURCE: U.S. DEPARTMENT OF LABOR

- Steelcase, Inc., commissioned a survey to find out how office and service workers felt about their workplace. The respondents stated clearly that they could be more productive, given the right tools and environment. But they wanted to be involved in decisions concerning efficiency at work.

- The challenge to management is to understand the things which motivate their people, so that management and labor can cooperate in setting and reaching production goals.

• Automation and technology can substitute for some labor.

  - One problem with increasing field service productivity through automation is that most service managers have little or no capital budget. This situation is turning around as field service becomes a corporate-level concern, and funding becomes available.

  - Intelligent terminals can help automate functions. Examples are terminals for remote job entry, data entry, and word processing. Centralized dispatch systems are another current example of automation.

  - The major immediate avenue for productivity improvement, however, lies not in automation, but in improved motivation.

B. MOTIVATIONAL FACTORS

• In-depth current research regarding rating of motivational factors for field engineers is not available. However, INPUT recently completed extensive research on the subject of productivity and motivation among a related group - programming personnel in large EDP organizations.

- Both field engineers and programming personnel work in a technical, time-pressure, people-short, data processing-based environment.

- Both typically do not have incentive compensation plans.

- Both are areas of high employee turnover.

- The typical field engineer differs from programming personnel in that:

  - Most often the field engineer functions as an individual, rather than in a group.

  - Field engineers directly create revenue, while programming personnel in an in-house environment do not; however, programming personnel in a professional services environment where their time is "sold" function in a manner similar to FEs with regard to revenue generation.

- On balance, there are significant similarities between field engineers and programming personnel with the major difference being that the work environment of the field engineer is more isolated. This difference tends to make the management task of improving productivity of FEs more difficult.

- For all of these reasons, plus the increasing involvement of field engineering in software, results of INPUT's work on programmer productivity will be related to field engineer productivity. With the continued development of support centers, the worlds of the field engineer and the programmer will converge. In Exhibit I-2, motivators for programming personnel are rated.

  - By far the most effective motivator is an environment which is "challenging/meaningful/learning," with twice the frequency of mention of "adequate/competitive compensation."

  - For management, this means an opportunity to trade off compensation dollars for dollars spent for FE education and related challenges; such

EXHIBIT I-2

MOST IMPORTANT MOTIVATORS FOR ANALYST/PROGRAMMING PERSONNEL, AS REPORTED BY EDP MANAGERS

MOTIVATOR	PERCENT* OF RESPONDENTS
CHALLENGING/MEANINGFUL/LEARNING/ ENVIRONMENT	32%
BEING A VALUED, CONTRIBUTING MEMBER OF ORGANIZATION	15
STATE-OF-THE-ART TECHNOLOGY/WORKING ENVIRONMENT	15
ADEQUATE, COMPETITIVE COMPENSATION	15
GOOD SUPERVISORS/PROGRESSIVE MANAGEMENT	13
MANAGEMENT RECOGNITION/SUPPORT	12
WELL-DEFINED PROJECT/GOALS	11
DELEGATED RESPONSIBILITY	10

*MULTIPLE ANSWERS POSSIBLE
SOURCE: MAIL QUESTIONNAIRE
NUMBER OF RESPONSES = 142

dollars can have double impact by reducing turnover and increasing the capability of the work force.

- For management, non-compensation motivators often require increased management skill.

  . Management recognition and support of superior performance require good measurement tools and an agreement by management and labor concerning performance levels.

  . State-of-the-art technology and working environment require that management invest in new techniques and not hesitate to implement change.

• Non-salary incentives for productivity improvement offer a particularly attractive option. These incentives are often more difficult for a competitor to match particularly in the short term. A rating of these incentives is given in Exhibit I-3.

  - Two incentives, education and career growth, relate directly to the change in field engineer skill levels which INPUT discussed in the 1980 Field Service Annual Report. Education can help the field engineer grow to fill the more specialized requirements of the 1980s. The option is often for the field engineers to be restricted to the emerging lower skill levels required for on-site hardware maintenance, as remote diagnostics and other techniques lower the skill requirement of many on-site maintenance tasks.

  - The working environment, particularly flexible working hours, rates high as an incentive.

• The least successful factors for productivity improvement according to EDP managers interviewed by INPUT started with salary/bonus incentives, as shown in Exhibit I-4.

EXHIBIT I-3

OTHER NON-SALARY INCENTIVES FOR PRODUCTIVITY IMPROVEMENT, AS REPORTED BY EDP MANAGERS

NON-SALARY INCENTIVE	PERCENT* OF RESPONDENTS
EDUCATION/COLLEGE/PROFESSIONAL SEMINARS	26%
FLEXIBLE WORKING HOURS	20
COMPREHENSIVE FRINGE BENEFITS	20
EXCELLENT PHYSICAL WORKING ENVIRONMENT	15
CAREER GROWTH	11
SPECIAL RECOGNITION/AWARDS	11

*MULTIPLE ANSWERS POSSIBLE
SOURCE: MAIL QUESTIONNAIRE
NUMBER OF RESPONSES = 133

EXHIBIT I-4

SINGLE LEAST SUCCESSFUL FACTOR FOR PRODUCTIVITY IMPROVEMENT, AS REPORTED BY EDP MANAGERS

FACTOR	PERCENT OF RESPONDENTS
SALARY/BONUS INCENTIVES	20%
UNREALISTIC SCHEDULE/DEADLINES	11
DETAILED MANAGEMENT CONTROLS	11
FLEXIBLE TIME	5
SOFTWARE PRODUCTIVITY AIDS	5
FRINGE BENEFITS	4
USER-ORIENTED LANGUAGES	4
SUBTOTAL	60%
OTHER	40
TOTAL	100%

SOURCE: MAIL QUESTIONNAIRE
NUMBER OF RESPONSES = 76

- These results are consistent with the poor results reported by field engineering management for incentive programs.

- However, in a recent survey of 20 vendors, six reported incentive programs; significantly, these companies were all West Coast-based, and in early stages of growth.

- Quality of management is reflected in the relatively frequent mention of "Unrealistic Schedule/Deadlines" and "Detailed Management Controls."

  . Both speak to the need for management and labor to be in good communication on basic issues.

  . Standards for performance can be valuable tools to build good communication, and are discussed in the following chapter.

II STANDARDS FOR FIELD SERVICE

A. CRITERIA FOR STANDARDS

- Productivity must be measured against clearly stated standards.

- Standards should meet five criteria: they should be written, understandable, measurable, challenging and achievable.

  - Putting the words in writing achieves permanency, repeatability and accuracy of communication.

  - Understandable means that everyone interprets the standards the same way.

  - The measurable criteria assure that the goal can be identified in quantifiable terms.

  - Challenging and achievable are two edges of the same sword. The standards should be worthy of attainment, but should require an extra stretch to reach.

- An example of a poor goal is: "Respond as necessary to satisfy customers."

- A better goal that meets the above criteria is: "Achieve response time of two hours or less on 95% of all service calls, as measured by the Customer Service Activity Report."

- Standards should be established for the items that have the largest influence on productivity.

- Some goals should be communicated to customers.

- The tools must be available to achieve productivity goals. Chasing parts is wasteful for both the field engineer and other involved personnel, including managers, stockroom staff, delivery people, and other FEs who may have to go out of their way to deliver parts. However, tools are only the final block in the productivity pyramid, as shown in Exhibit II-1.

B. TYPICAL STANDARDS

- This section includes typical field service standards. Individual organizations will of course adjust these standards to meet their own objectives.

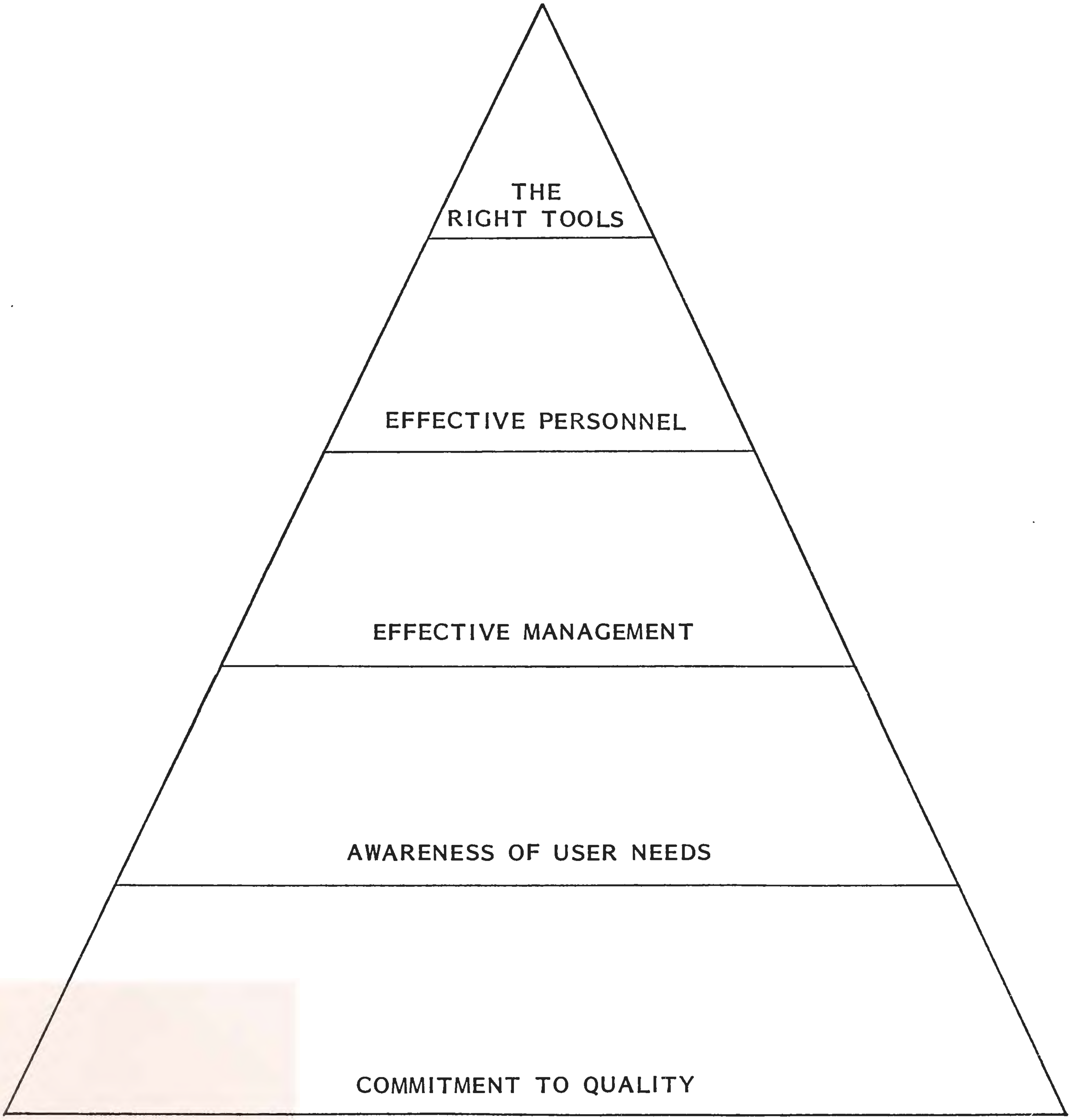
- Time and ratio standards should include:

    - Availability (Ao); e.g., the system will be operational 95% of the time from 8 a.m. to 12 p.m., EST.

    - Mean Time Between Maintenance (MTBM); e.g., the system will average at least 100 hours between requirements for any preventive or corrective maintenance actions. (Note this includes Mean Time Between Failure (MTBF).)

EXHIBIT II-1

THE PRODUCTIVITY PYRAMID



- Response Time; e.g., response time from receipt of request for service until the field engineer arrives at system site will average less than four hours.

- Mean Downtime (MDT); e.g., mean downtime from receipt of request for service until the system is again operational will average less than five hours.

- Maximum Downtime (MDT max .95); e.g., the downtime measured at the 95th percentile will not exceed 16 hours. Stated differently, downtime will be 16 hours or less 95% of the time.

- Mean Time to Repair (MTTR); e.g., average time to correct system malfunctions will not exceed one hour from the time the FE arrives at the system until it is operational.

- Mean Installation Time (MIT); e.g., the FE will arrive within three days of request for installation and the average installation will be complete in less than eight working hours.

- Maximum Installation Time (IT max .95); e.g., installation on-site time measured at the 95th percentile will not exceed 24 working hours.

- Callback Rate; e.g., callbacks - defined as requests for service on equipment for the same or a related problem within three days of corrective, preventive or installation service - will occur on less than 4% of all service calls.

- Overtime Hours/Total Regular Hours; e.g., overtime hours will average less than 10% of normal work hours, and will be paid only with prior management approval.

- Active Work Hours/Paid Hours; e.g., the percentage of revenue-producing hours to paid hours will be at least 65%.

- Corrective Maintenance (CM) Time/Total Maintenance Time; e.g., CM hours will be less than 30% of total time. Or, the ratio of CM to PM time will be less than 1 CM to 2 PM.

- Maintenance Hours/Operating Hours; e.g., no more than one hour of maintenance will be required for 100 hours of system operation.

- Out of Territory Calls; e.g., effort will be made to dispatch FEs only to service calls within their assigned territories, and no more than 10% of calls will be out of normal territory.

- Travel; e.g., travel will be controlled to average less than 100 miles per day. (This obviously depends on distance between equipment, and can generally be reduced through control.)

- Calls Per Day; e.g., a FE is expected to average at least three calls per day, measured over a work week.

- Contract versus Time-and-Materials Customers; e.g., the number of customers for contract and warranty service will be at least 70% of total customers, allowing less than 30% for time-and-materials.

- Level of Part Service; e.g., parts will be carried by FEs to fill 80% of needs. Additional parts to provide another 15% will be available within four hours, and the remaining 5% within 24 hours.

- Administration/Production Ratio; e.g., there will be no more than one field service administrative or managerial person per every four revenue-producing field engineers.

- Average Maintenance Cost; e.g., maintenance cost will average less than $1,000 per month for the specified system.

- Warranty Costs; e.g., cost of providing warranty service for the initial 90 days will average less than $3,500.

- Expense/Revenue; e.g., service expenses will not exceed 10% of revenues. (This is most applicable to leased equipment.)

- Labor Cost; e.g., labor cost will be less than 40% of total service costs, and will not exceed $2.00 per system operating hour.

- Parts and Materials Cost; e.g., parts and service consumables costs will be less than 20% of total service costs, and will not exceed $1.00 per system operating hour.

- Production Loss; e.g., cost of lost production due to system malfunction will not exceed $500 per week.

- Revenue Per Person; e.g., each field engineer is expected to produce annual billings of at least $75,000.

- Return on Investment (ROI); e.g., ROI on service projects must average at least 30% a year for the initial three years.

- Inventory Per FE; e.g., the value of inventory carried by an FE will not exceed $3,000 at cost.

- Inventory Turnover; e.g., measured at cost, inventory will turn over at least 3.5 times a year.

- Fixed Assets; e.g., fixed capital assets per FE will not average over $20,000, including car, test equipment, tools and facilities.

- Profit Margin; e.g., service is expected to produce a profit margin of at least 20% before taxes.

III TYPICAL PROBLEMS RELATED TO PRODUCTIVITY

A. FIELD ENGINEERS' WORK DAY

- Since time on the job is vital, every effort should be made to optimize FE time.

  - A recent evaluation of several hundred FEs showed most leaving home at the expected start time, rather than arriving at the first customer at the expected start time.

  - The end of the day should be flexible. Once on the job, most FEs will go to great lengths to get the equipment operating; getting started promptly is often the key to finishing on time.

- Standards should be published that state the time FEs are expected to be at their first account.

  - For example: "FEs are expected to be at their first customer by 8:00 and to work a full eight-hour day with an hour for lunch at some convenient time between 11:00 and 2:00."

B. TRAINING PROCEDURES

- Productivity is improved by teaching the "one best way."

  - Headquarters should develop, communicate and teach the best way to do every task.

  - The idea that competent FEs will be "turned-off" by a cookbook approach has been proven false. There are enough challenges in servicing equipment quickly, and there are not enough competent FEs available, so procedures must be outlined for the inexperienced person.

- Training must be reinforced by on-the-job experience. There are many items that cannot accurately be replicated in a training class. Dirty equipment, contaminated by paper dust or airborne particles, for example, will be most realistically found in field machines. A supervisor should work with a new technician to assure that inspection and preventive maintenance activities (such as cleaning) are learned well under realistic conditions.

- KISS (KEEP IT SIMPLE, STUPID) is a principle that greatly aids productivity.

  - One program manager recalls watching a technician attempt to repair a sophisticated copier - a new "block 5" - outside the manager's door. This exercise was of particular interest since the copier was put there so the manager could observe the amount of service and any peculiarities in system operation.

  - Watching the service call proceed, the manager was alarmed at the amount of time required to find the trouble. After three hours, the manager finally asked the FE to explain what was wrong, and found that the electrical readings were different from those shown in the service manual, (and were) in illogical sequence.

- Closer observation showed the FE's problem to be a block-4 manual on a block-5 machine with new circuitry. The FE hadn't noticed the difference, and no instructions were shipped with the machine. In sum, productivity was lost because the FE missed the one-digit change in serial number series - an easy mistake.

C. MANAGEMENT TIME AND ABILITY

- All the standards and measurements in the world are ineffective unless the manager sees the technician on the technician's own territory and the technician perceives that the manager understands. A manager in the field at least 50% of the time could be a goal at the manager level.

- Poor management training and field effectiveness are root causes of low technician productivity.

  - Management performance review standards are necessary.

  - Managers are often bogged down by paperwork and administrative requirements.

- Many field managers spend time reviewing activity reports, expense reports and other paper that could be evaluated much more quickly by computer, with the variances identified for management action.

  - In a recent survey conducted during management workshops on motivation, only 12% of the managers felt that salary was a motivating factor.

  - When asked the hypothetical question, "If you could earn the same as a technician or as a team leader, which position would you prefer?" 20% said that they would prefer the technician while 80% would prefer the challenge, responsibility and status of team leader.

D. TRAVEL

- Geography is one of the major barriers to FE productivity. Travel time is FE downtime, even though the customer may be billed for it.

    - It is therefore important that a service organization know the location of its FEs at any time so that the closest qualified person may be sent on the service call.

    - In one call-management system, 95% of the response times were brought within the four-hour target, and travel was reduced 10% by call management based on selecting the closest qualified FE and managing the response time. Prior to installation of the system, 50% of the calls were over the four-hour target.

- As Exhibit III-1 illustrates, the number of FEs assigned to a territory has direct influence on response time and productivity.

    - Frequency of equipment failure (MTBF) determines how often service will be required. Travel to the equipment and the actual service time required to repair it determine how long the FE is tied up on the average machine.

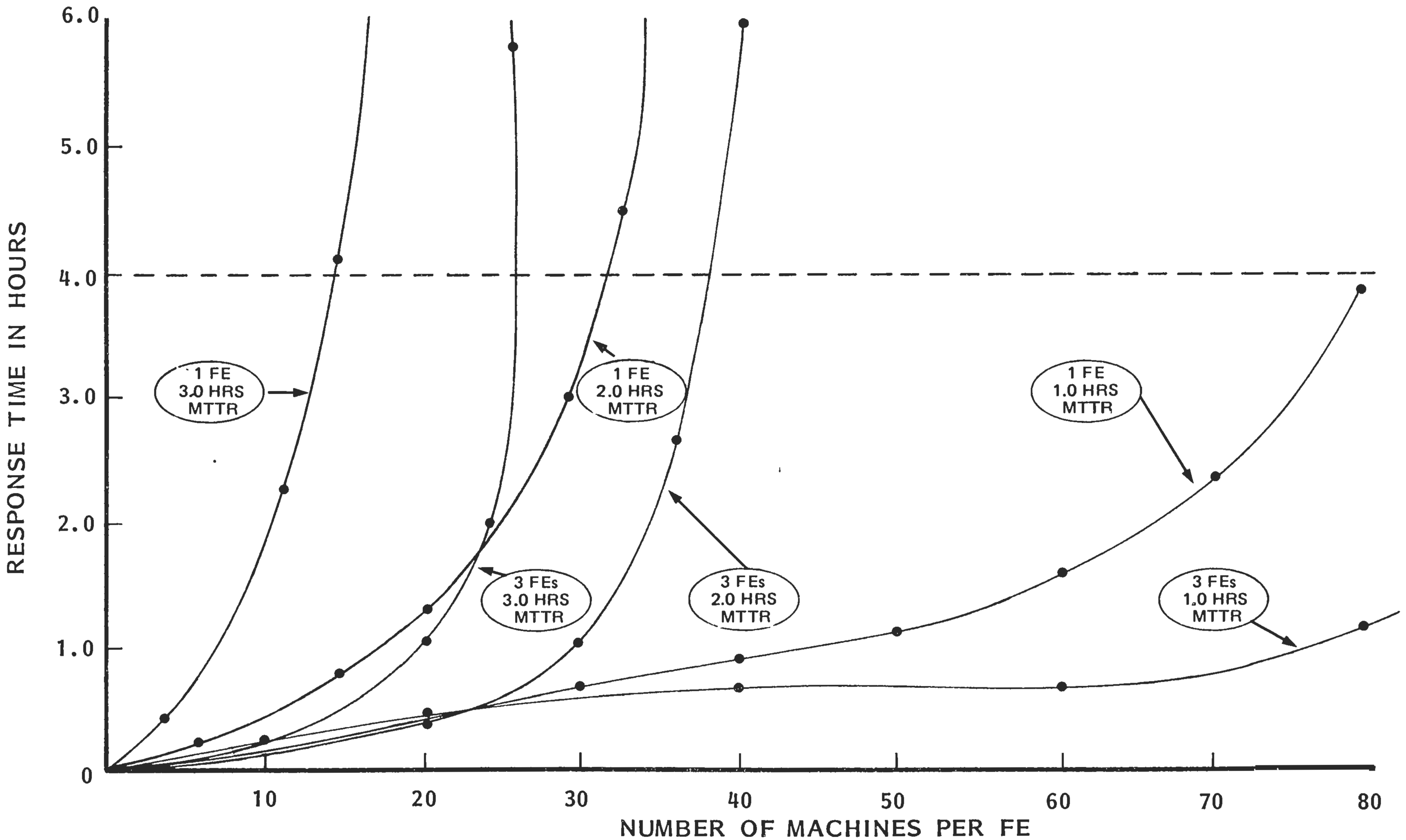
    - The Poisson distribution can be used to describe the pattern of failures and probabilities that will require service. Operations research techniques can then be used to plot curves similar to those shown in Exhibit III-1.

        - For example, if one FE has a territory of 25 systems, each with 100 hours MTBF and requiring two hours MTTR (the elapsed time from the FE's arrival on-site until the repair is completed) then there will be 25 failures in 100 hours (two and one-half weeks at

EXHIBIT III-1

AVERAGE RESPONSE TIME VERSUS NUMBER OF MACHINES/FIELD ENGINEER

MTBF = 100 HOURS



NOTE: MTTR = MEAN TIME TO REPAIR - THE ELAPSED TIME FROM THE FE'S ARRIVAL ON-SITE UNTIL THE REPAIR IS COMPLETED.

eight hours per day as in this case, or 4.2 days at 24 hours per day). If each of the 25 failures requires two hours of the FE's time, that is 50 of the 100 hours (50%). Since the 25 calls require travel as well as MTTR, and several calls may overlap, it should be no surprise that the response time goes up rapidly when the FE is overloaded.

. In Exhibit III-1 the relationship of different combinations of FEs and MTTRs is shown. It can be seen that teams of three FEs are more efficient in this example than single FEs.

. Note that the curves are for a specific set of circumstances, and should be plotted for each set of possibilities.

. These response times are averages and the maximum time will be about three times greater. To guarantee response in four hours or less, staffing should be to a 1.3 hour average.

. Dramatic improvements in productivity are possible by improving MTBF and reducing travel and MTTR. For a single FE territory the productivity gain for improving from 50 to 100 hours MTBF, and three hours down to one hour MTTR, is a factor of 12.5!

E. CALL MANAGEMENT

- Productivity optimization, from the field service point of view - meaning a customer is always in a queue so the serviceman is kept busy and travel is minimized - may not be acceptable to the customers.

  - Response time can be managed so that customers receive a promised response time and a reasonable balance of FE productivity is obtained.

- The push toward centralized dispatching offers the opportunity to optimize both the use of people and response to the customers. Any time a large pool of people is available, an individual need can be met more easily than with a smaller supply of people; centralized dispatch creates the larger pool of people.

- An important step in improving service productivity should be to attempt to eliminate the need for a service call.

  - This may be accomplished by machine diagnostics and qualified customer support representatives who may talk out the problem over the telephone.

  - For example, the Xerox Customer Service Center in Dallas (TX), has found that with one of its document distribution and creation products, 35% of the time it is not necessary to dispatch a technical representative to the machine site.

  - This not only provides the customer with immediate assistance, but also ensures that valuable field engineers are busy at the activities they do best.

  - Remote diagnostics and support centers are currently being studied by INPUT, and further analysis of these subjects will shortly be sent to clients in the Field Service Program.

- Communications of customers to service dispatchers and field engineers must be brief, thorough and accurate.

  - Typically, FEs phone dispatch either after every call or at set times, such as 11:30-12:00 and 4:30-5:00.

  - A good policy is for FEs to call the customer within ten minutes of call receipt. This alleviates the customer's anxiety and gives the FE information on any special parts, tools or manuals that should be taken to the call.

- Call-backs should receive special attention since they indicate a problem that either was not corrected the first try, or was caused by actions during that previous call.

F. SPECIALISTS VERSUS GENERALISTS

- Specialists have an advantage over generalists on complex products where the learning curve progress is great.

  - Mechanical items offer greater potential for high learning than do electronics; but unless electronics are thoroughly "black boxed" with 100% testability, a specialist will provide faster diagnostics.

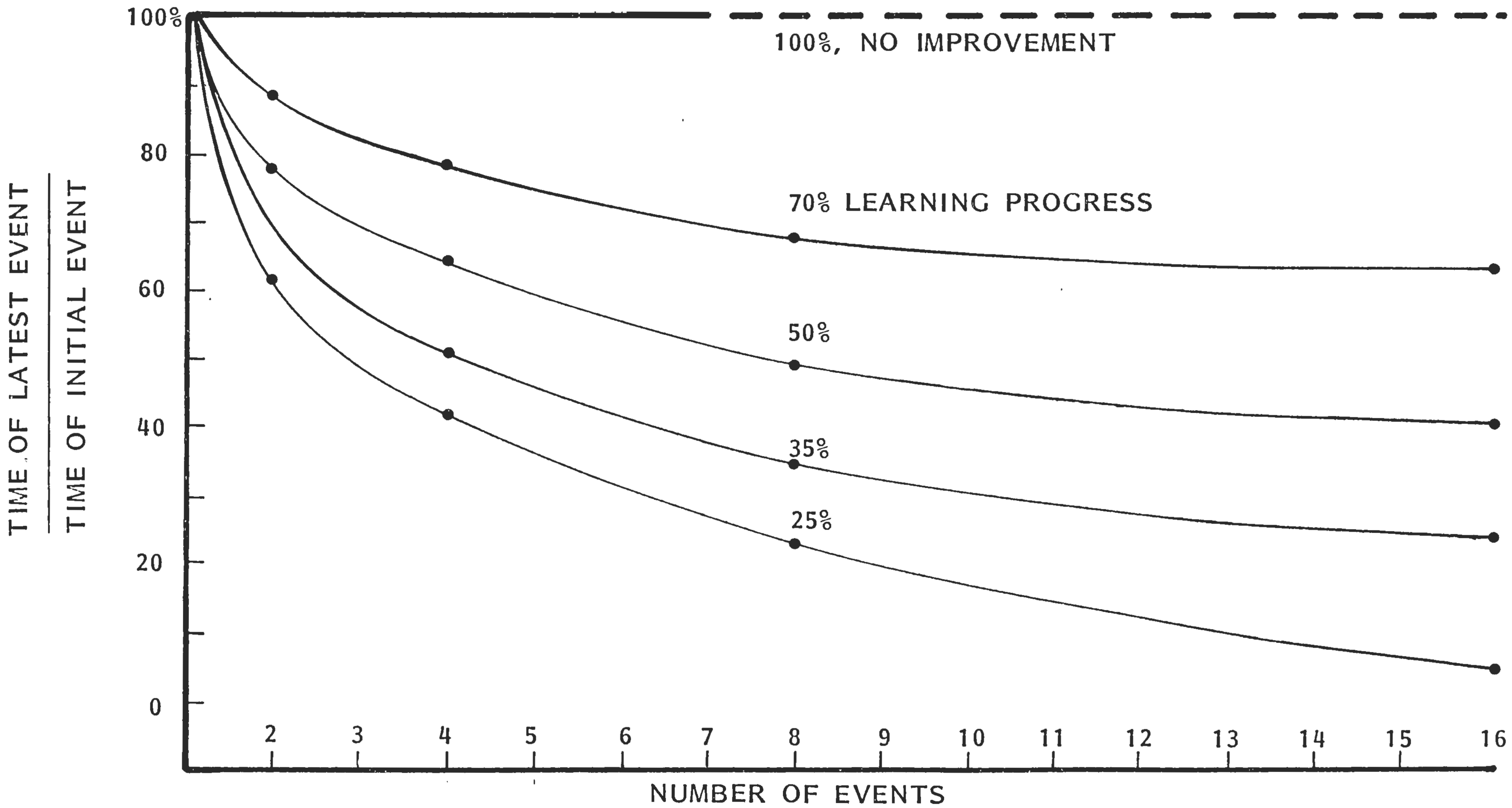
- Minimization of product coverage allows a FE to become more expert and reduces MTTR. The specialist can also carry a more efficient stock of parts and support items.

- The productivity tradeoff is between faster response and less travel with more generalist FEs, and faster repairs once the specialist FE is on site.

- Learning progress is illustrated in Exhibit III-2. Observing and timing a few trials will show if there is improvement as the task is repeated.

  - For example, installing the first disk drive might require four hours. The second installation would probably go much more quickly, at about three hours; the third at about 2.7; the fourth about 2.5; and after about 16 installations, the time would be about 2.0 hours.

TIME REDUCTIONS DUE TO LEARNING PROGRESS



OPERATES ON DOUBLING FACTOR OF 1: 2: 4: 8: 16: . . . E.G., 100 MINUTES FIRST TRIAL x 0.90 = 90 MINUTES SECOND TRIAL, x 0.90 = 81 MINUTES FOURTH, x 0.90 = 73 MINUTES EIGHTH . . .

    - This illustrates an 80% learning curve. Each repetition of a given procedure reduces the time to 80% of the preceding effort.

    - The first few trials result in great improvement, with slower gain after the initial ten or so.

  - If this example is typical, then installation specialists with experience should be able to do the job up to 2.0 hours faster than an inexperienced generalist FE.

G. SUPPORT

- Parts support can have a significant impact on productivity.

  - Typically, 8% of an FE's day is spent getting parts. This could be reduced to 4%, with a revenue time value of about $15.

  - Information must be accurate and easily accessible.

- A service call reporting system should have cause and actions reported for every activity.

  - Analysis of the problems by the FE may lead to the discovery that some technicians always find and fix certain problems very rapidly, while others require much more time.

  - While there may be some differences due to reporting, it is then possible to observe the fast personnel to discover their methods and then observe the slow personnel to identify what is being done differently and why.

- Training should be concentrated on the activities that take most of the technician's time.

  - The difficult technical challenge that will be seen less than once every three months should be well illustrated in the service manual. Time spent on those in class is not productive since the FE will have little reinforcement and will still have to relearn the task every time it is encountered.

H. REVENUE PRODUCTION

- Field engineering is typically measured financially by expense-to-revenue ratios. Factors discussed thus far have to do with expenses; the following factors deal with revenue production.

  - There is a move in service toward a profit-center organization.

    - Nineteen of twenty vendors recently interviewed by INPUT either had already organized field engineering as a profit center, or were planning to do so within two years.

    - A true profit center has major control over both maintenance related revenues and expenses, and pays for all related costs including training, hiring, inventory, operating costs and facilities.

    - Some are concerned that a profit-center organization places profit over consumer satisfaction.

    - The challenge to management is to produce both profits and customer satisfaction.

- Profit-center orientation can also push service toward trying to gain full control over maintenance revenues, thereby creating a second marketing effort for maintenance contract sales. It can also mean the collection business eventually must come under service.

IV A METHODOLOGY FOR IMPROVING PRODUCTIVITY

A. DETERMINE PRESENT PRODUCTIVITY

- A first step in improving productivity is to determine current productivity.
- Exhibits IV-1 through IV-3 illustrate typical forms used for collecting field information.
    - One service improvement program (SIP) used 120 similar fact-gathering instruments for a 1,000-person organization.
    - The SIP required ten people on a six-month evaluation that cost $250,000.
    - Results of the service improvement program illustrated below paid off over 100 times the $250,000 cost in the first year, with a 50% reduction in response time, an increase of 33% more service calls per day and reduction of 10% in travel mileage.

EXHIBIT IV-1

DATA COLLECTION QUESTIONNAIRE

Name & Title ______________________ Product Line ____________________

A. Maintenance Procedures (published by headquarters)

1. Are published maintenance procedures available at branch level?
   Yes ____ No ____

2. Do you feel "by the numbers" maintenance procedures should be used?
   Yes ____ No ____

   a. If not , why? ____

3. Do you or your people follow these published maintenance procedures when making PM inspection? Yes ____ No ____

   a. If so, are these procedures effective? Yes ____ No ____

   b. If not, why? ____ Too much verbiage ____ Not thorough ____ Cannot understand procedure ____

4. What needs to be improved? ______________________________________

5. Are standard times set down to perform PM on equipment? ___Yes ___No

   a. If so, by whom?___Branch field management ___HQ ___Tech Rep ___Other

B. Documentation

Please rank the following according to the numbers listed below.

Meaning: 1 = Poor
2 = Acceptable
3 = Fair
4 = Good
5 = Excellent

EXHIBIT IV-1 (CONT.)

DATA COLLECTION QUESTIONNAIRE

1. Service Manuals - Categories — RATINGS (SEE PREVIOUS PAGE)

	1	2	3	4	5
a. Layout	____	____	____	____	____
b. Sequence	____	____	____	____	____
c. Content	____	____	____	____	____
d. Graphics	____	____	____	____	____
e. Writing	____	____	____	____	____
f. Completeness	____	____	____	____	____
g. Availability by: 1. Reorder	____	____	____	____	____
2. New Release	____	____	____	____	____
h. Revision issuance	____	____	____	____	____

	Seldom	Daily	Weekly	Monthly
i. Frequency of use	________	____	____	____

j. Which service manuals do you feel make a good and a poor example?

Good = Model ______________

Poor = Model ______________

2. Parts Catalogs - Categories — RATINGS (SEE PREVIOUS PAGE)

	1	2	3	4	5
a. Layout	____	____	____	____	____
b. Availability by: 1. Updates	____	____	____	____	____
2. New release	____	____	____	____	____
c. Ease of Use: 1. Hard-copy parts catalog	____	____	____	____	____
d. Legibility: 1. Hard-copy parts catalog	____	____	____	____	____
e. Frequency of Use: 1. Hard-copy parts catalog	____	____	____	____	____
2. Microfiche	____	____	____	____	____

EXHIBIT IV-1 (CONT.)

DATA COLLECTION QUESTIONNAIRE

		Seldom	Daily	Weekly	Monthly
e. Frequency of Use:	1. Hard-copy parts catalog	_____	_____	_____	_____
	2. Microfiche	_____	_____	_____	_____

f. Which do you prefer as illustrations on microfiche? ____ Photographs ____ Exploded views

g. Where is your microfiche located?

1 __________ Tool Kit

2 __________ Car

3 __________ Branch

4 __________ Home

5 __________ Other

EXHIBIT IV-2

COMMUNICATION QUESTIONNAIRE

Circle which Manager: FSS, FSM, DSM

1. What is the frequency of communication with management?

   Daily _____ Weekly _____ Monthly _____ More Than _____

2. Under what circumstances do the following types of communication take place, using the following as a rating scale:

   0 = No comment
   1 = Most frequently
   2 = Occasionally
   3 = Seldom
   4 = Never

	0	1	2	3	4
A. Discipline					
B. Merit Review					
C. Customer Problems					
D. Sales Problems					
E. Parts Problems					
F. Paperwork					
G. Personal					
H. Compliments					

EXHIBIT IV-3

SPECIALIST VERSUS GENERALIST QUESTIONNAIRE

Source: District Service Manager, Field Service Manager

1. Do you use specialists within product lines? Yes ____ No ____
   If yes, which product?

2. Would specialization be advantageous? Yes ____ No ____
   If yes, why isn't this being practiced?

   ____

   ____

   ____

3. What job classification are your Product Specialists?

4. What product groups easily lend themselves to specialization?

   Product Groups

   ____________ ________ ________ ________

   ____________ ________ ________ ________

   ____________ ________ ________ ________

   ____________ ________ ________ ________

*Specialization = Working on only one product within a product line. Example: TCS 4 or TCS 5 or TCS.

*Generalization = Working on all products within a product line and cross-product lines.

B. GUIDELINES FOR IMPLEMENTATION OF PRODUCTIVITY IMPROVEMENT PROCEDURES

- Using the data gathered to determine current productivity, a first step is to identify problems.
  - Any measurement that does not meet the standard is a problem.
  - Service personnel will usually have problems and suggested solutions.
  - "Opportunity" is a better word then "problem" where something is not serious, but could be improved.
- Establish alternatives.
  - Brainstorm first and then eliminate obviously poor ideas.
  - Put alternatives in writing.
- Gather facts and analyze.
  - The illustrated forms help assure that all topics are covered in a standard pattern.
  - Visit representative field locations in person.
    - Select from every major political, geographic, economic and urban segment of field operations.
    - Be visible with publicity that encourages a cooperative attitude and brings out problems and suggestions.
- Select recommended actions.

- There should be a solution for every productivity problem.

- Satisfactory, pragmatic, practical actions are preferred over theoretical optimums.

- Assure that the forecasted benefit is worth the cost.

- Implement.

  - A test location should be selected for initial trials.

  - Go with a best effort and push for success.

- Revise as necessary.

  - Most trials will show need for improvement, so plan to allow for changes.

  - Speed of implementation across the entire field organization is important, but quality of the effort will be the major determinant of success.

  - Productivity improvement is an ongoing activity and management's commitment must therefore be ongoing.

SUBSCRIPTION PROGRAMS: Designed for clients with a continuing need for information about a range of subjects in a given area. All subscription programs are fixed-fee and run on a calendar-year basis:

- Planning Service for Computer & Communications Users - Provides managers of large computer/communications facilities with timely and accurate information on developments which affect today's decisions and plans for the future.

- Computer Services Market Analysis Service - Provides market forecasts and business information to software and processing services companies to support planning and product decisions.

- Computer Services Company Analysis and Monitoring Program - Provides immediate access to detailed information on over 2,500 companies offering software and processing services in the U.S. and Europe.

- Field Service Program - Provides senior field service managers, in the U.S. and in Europe, with basic information and data to support their planning and operational decisions.

MULTICLIENT STUDIES: Research shared by a group of sponsors on topics for which there is a need for in-depth "one-time" information and analysis. A multiclient study typically has a budget of over $200,000, yet the cost to an individual client is usually less than $30,000. Recent studies specified by clients include:

- Maintenance Requirements For The Information Processing Industry

- The Market for Small Computers in Large Corporations

- Productivity Improvement, 1980-1983, Survival Strategies for EDP Executives

- Opportunities in Communications Services for Digital Information: A Study of User Networks and Needs

CUSTOM STUDIES: Custom studies are sponsored by a single client on a proprietary basis and are used to answer specific questions or to address unique problems. Fees are a function of the extent of the research work. Examples of recent assignments include:

- A determination of the U.S. market for small computer systems in 1985.

- An analysis of the opportunities and problems associated with field service capabilities for CAD/CAM systems.

- An analysis of the market potential for third-party maintenance.

- The 1980 ADAPSO Survey of the Computer Services Industry.

- An evaluation of the current status and future trends of software terms and conditions.

ABOUT INPUT

THE COMPANY

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs. Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

Many of INPUT's professional staff members have nearly 20 years experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international consulting firm. Clients include over 100 of the world's largest and most technically advanced companies.

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