

SOFTWARE ENGINEERING LABORATORY SERIES

SEL-82-001

EVALUATION OF MANAGEMENT MEASURES OF SOFTWARE DEVELOPMENT

VOLUME 2: DATA DESCRIPTION

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National Aeronautics and
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Goddard Space Flight Center
Greenbelt, Maryland 20771

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FOREWORD

The Software Engineering Laboratory (SEL) is an organization sponsored by the National Aeronautics and Space Administration, Goddard Space Flight Center (NASA/GSFC) and created for the purpose of investigating the effectiveness of software engineering technologies when applied to the development of applications software. The SEL was created in 1977 and has three primary organizational members:

NASA/GSFC (Systems Development and Analysis Branch)
The University of Maryland (Computer Sciences Department)
Computer Sciences Corporation (Flight Systems Operation)

The goals of the SEL are (1) to understand the software development process in the GSFC environment; (2) to measure the effect of various methodologies, tools, and models on this process; and (3) to identify and then to apply successful development practices. The activities, findings, and recommendations of the SEL are recorded in the Software Engineering Laboratory Series, a continuing series of reports that includes this document. A version of this document was also issued as Computer Sciences Corporation document CSC/TM-82/6063.

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ABSTRACT

This document reports the results of an evaluation of a large set of software development measures relevant to the Goddard Space Flight Center (GSFC) environment. Volume 1 explains the conceptual model, the data classification scheme, and the analytic procedures. This volume also summarizes the analytic results and recommends specific software measures for collection and monitoring. Volume 2 presents a detailed description of the data analyzed including definitions of measures, lists of values, and summary statistics. This volume also reproduces in full the results of the computer analyses.

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SECTION 1 - INTRODUCTION

This is the second volume of a two-part document that reports the results of evaluating a large set of software development measures relevant to the Goddard Space Flight Center (GSFC) environment. Volume 1 explains the conceptual model, data classification scheme, and analytic procedures. That volume also summarizes the analytic results, recommends specific software measures for collection and monitoring, and reproduces the results of the computer analyses.

Volume 2 (this volume) presents a detailed description of the data. Although the information contained in Volume 2 was essential to the development of the explanation and summary presented in Volume 1, it is not essential to the understanding of that explanation and summary. However, Volume 2 is useful in its own right as a source of data and reference for future research.

Information in this volume is contained in one appendix. Appendix A presents a detailed description of the data analyzed, including definitions of measures, lists of values, summary statistics, and graphs. This appendix is organized according to the classes of measures defined in Section 2.2 of Volume 1.

APPENDIX A - DESCRIPTION OF SEL SOFTWARE
DEVELOPMENT MEASURES AND DATA

A.0 INTRODUCTION

A.0.1 GENERAL INFORMATION

This appendix contains a detailed description of a set of software development measures used by the SEL. However, no attempt is made to describe each measure in detail, and no detailed explanation of how the values are obtained is provided. This information will be provided in a future SEL document. A brief phrase is used to indicate the general meaning of each measure in this particular document, although some examples are provided in the text to give the the reader a better understanding of the measures.

Table A.0-1 lists seven major classes of measures discussed in this document. The table also gives the subsection of the appendix in which each class of measures is described, the Appendix A page number referencing each category, the abbreviation code for each class of measures used in tables and figures, and the number of measures and the number of combinations of measures in each class. Table A.0-2 contains a cross-reference of the seven major classes of measures to the four components of the software development model used by the SEL.

Not all the measures discussed in this appendix are mutually exclusive. Some are repeated in more than one class--for the most part, scaled differently to suit the input requirements of a model or the requirements of their intended use. Of the 747 measures listed here, 91 have been left undefined for later expansion; 68 are indicated combinations (weighted sums); approximately 150 are derived by combining several measures; and approximately 100 in the models class are repeated in some form. These numbers indicate a maximum of approximately 300 mutually exclusive measures.

Table A.0-1. Classes of Measures (1 of 2)

| <u>Section</u> | <u>Category</u> | <u>Page No.</u> | <u>Abbreviation</u> | <u>Number of Measures</u> | <u>Sums</u> |
|----------------|-------------------------------------|-----------------|---------------------|---------------------------|-------------|
| A.1 | Software Engineering | 14 | | | |
| A.1.1 | Practices and Techniques | 14 | MT | 30 | 4 |
| A.1.2 | Tools | 28 | TS | 15 | 1 |
| A.1.3 | Documentation | 40 | DC | 15 | 1 |
| A.1.4 | Software Engineering Methodology | 52 | SE | 0 | 1 |
| A.2 | Development Team Ability | 63 | | | |
| A.2.1 | Experience With Application | 63 | AP | 15 | 4 |
| A.2.2 | Effectiveness of Management | 75 | MG | 35 | 13 |
| A.2.3 | Performance of Team | 94 | PF | 40 | 0 |
| A.2.4 | Ability of Team | 109 | AB | 0 | 12 |
| A.3 | Difficulty of Project | 120 | | | |
| A.3.1 | Complexity of Problem | 120 | CP | 15 | 5 |
| A.3.2 | Internal Influences on Project | 132 | IN | 15 | 4 |
| A.3.3 | External Influences on Project | 144 | EX | 20 | 7 |
| A.3.4 | Difficulty of Project | 158 | DF | 0 | 1 |
| A.4 | Process and Product Characteristics | 169 | | | |
| A.4.1 | Resources Available | 169 | RA | 20 | 5 |
| A.4.2 | Software Product | 181 | PR | 20 | 4 |
| A.4.3 | Product/Process Performance | 193 | PP | 15 | 3 |

Table A.0-1. Classes of Measures (2 of 2)

| <u>Section</u> | <u>Category</u> | <u>Page No.</u> | <u>Abbreviation</u> | <u>Number of Measures</u> | <u>Sums</u> |
|----------------|----------------------------------|-----------------|---------------------|---------------------------|-------------|
| A.5 | Development Team Background | 205 | | | |
| A.5.1 | Team Rank | 205 | RK | 40 | 0 |
| A.5.2 | Years of Professional Experience | 224 | YP | 40 | 0 |
| A.5.3 | Years of Applicable Experience | 236 | YA | 40 | 0 |
| A.5.4 | Years of Environment Experience | 251 | YE | 40 | 0 |
| A.6 | Models | 266 | | | |
| A.6.1 | Walston-Felix | 266 | WF | 80 | 2 |
| A.6.2 | PRICE S3 | 289 | PS | 20 | 1 |
| A.6.3 | COCOMO | 302 | CO | 15 | 0 |
| A.7 | Additional Detail | 305 | | | |
| A.7.1 | Miscellaneous | 306 | MS | 40 | 0 |
| A.7.2 | Code Breakdown | 320 | SW | 90 | 0 |
| A.7.3 | Estimated Statistics | 343 | ES | 19 | 0 |

Table A.0-2. Class Cross-Reference With Components of Software Development Model

| <u>Category</u> | <u>Problem</u> | <u>Environ- ment</u> | <u>Process</u> | <u>Product</u> |
|--------------------------------|----------------|--------------------------|----------------|----------------|
| Software Engineering | | | | |
| Practices and Techniques | | | x | |
| Tools | | | x | |
| Documentation | | | x | |
| Dev. Team Ability | | | | |
| Experience With Application | | x | | |
| Effectiveness of Management | | x | | |
| Performance of Team | | x | | |
| Difficulty of Project | | | | |
| Complexity of Problem | x | | | |
| Internal Influences | | x | | |
| External Influences | | x | | |
| Process and Product | | | | |
| Characteristics | | | | |
| Resources Available | | x | | |
| Software Product | | | x | x |
| Product/Process Performance | | | x | x |
| Dev. Team Background | | | | |
| Team Rank | | x | | |
| Years' Professional Experience | | x | | |
| Years' Applicable Experience | | x | | |
| Years' Environment Experience | | x | | |
| Models | | | | |
| Walston-Felix | x | x | x | x |
| PRICE S3 | x | x | x | x |
| COCOMO | x | x | x | x |
| Additional Detail | | | | |
| Miscellaneous | | | x | x |
| Code Breakdown | | | x | x |
| Estimated Statistics | | | x | x |

Although this document does not describe each measure fully, each subsection characterizes its class of measures in the following terms, which are explained below:

- Objective or subjective
- Absolute or relative
- Explicit or derived
- Dynamic or static
- Predictive or explanatory

Objective/Subjective. Measures are objective when they are counts of things that exist, are expended, or are used. Examples include number of input data sets, number of computer hours expended, or number of graphics terminals available. Measures are subjective when a person (without the benefit of absolutely objective data) interprets a result or an effect and then ranks or rates it relative to similar results or effects. However, some objective measures may be examined to make a subjective evaluation. For example, there is no objective measure of how well a development project leader knows the details of his project. The project leader can only be judged by observing his presentations, reading his/her progress reports, and observing how the project leader performs project tasks. This project leader's performance can then be compared to the performance of other project leaders.

Some objective measures are restated as ranks for convenience and to highlight significant distinctions. For example, years of experience (YOE) may be scaled from 1 to 3 as follows. Less than 2 YOE is assigned a value of 1; between 2 and 5 YOE is assigned a value of 2; and greater than 5 YOE is assigned a value of 3. This scale may be useful in one environment; however, it may not be useful in environments weighted with very junior (less than 5 YOE) or very senior (more than 5 YOE) personnel. Although such rating

scales are arbitrarily defined, an appropriately defined scale can be more easily understood and applied than the raw data itself can.

Absolute/Relative. Measures are absolute when nothing can change them (for example, number of data sets used by a completed software product). When another case is added to an absolute measure category, none of the other cases is affected. Measures are relative when a whole measure category has to be reevaluated each time a new case is added or when scaling criteria change. With sufficient experience and the consistent application of rating criteria, the need to reevaluate relative measures diminishes. Objective measures are frequently absolute. Subjective measures are always relative. Objective measures are relative only in the sense of how things are scaled or counted. For example, it is not clear what executable statements are in different programming languages and what their relationships are to each other on the same and different computers.

Explicit/Derived. Measures are explicit when their values can be obtained directly (for example, the number of FORTRAN subroutines). Measures are derived when two or more measures are combined or some computation is required to form the measure (for example, mean executable statements per FORTRAN subroutine). Objective measures are usually explicit or derived values of interest. Subjective measures are frequently derived from objective data and are scaled in some manner.

Dynamic/Static. Measures are dynamic either when they change during the development process (for example, the size of the software product, no matter how it is measured) or when they are relative (subjective) measures. Measures are static either when they can no longer change (completed product size measures) or when a large enough sample is

obtained to represent the full spectrum, from worst to best, in a relative category.

Predictive/Explanatory. Measures are predictive when, whether or not they work in a model, they can be obtained at points before an occurrence of interest. For example, before implementation starts, the number of data sets and the years of experience of the implementation team are known fairly accurately. Measures are explanatory when they cannot be determined completely or with any accuracy until a development phase or the project itself is complete (for example, number of individuals involved in the project). The predictive measures can be made more accurate when the phase predicted is complete, thereby making the measures explanatory. Typical or average values of explanatory measures, of course, can always be used for prediction.

The terms just discussed are used at the beginning of each subsection to describe its class of measures. The tone of the discussion is that the measures are useful and work; however, exactly how useful they are and how well they work are not completely known. What is known is that they form a very comprehensive set of measures that describes one flight dynamics problem, environment, process, and product.

Throughout the appendix, sums of measures are used to capture the effect of measures that by themselves will fail the test of normality. It is clear that if one or several projects uses practices, techniques, methods, or procedures not used in general by other projects, the test of normality will discard their effect. Therefore, sums are used to incorporate the effect of seldom used or occurring facets of development and to test the possibility that a single measure, derived from several input measures, can be used to describe a particular aspect of development.

A.0.2 APPENDIX ORGANIZATION

Because of the volume of data contained in this appendix, the following organizational information is provided to help the reader use the appendix more effectively.

The description of each of the seven classes of measures, along with the corresponding data for each class, begins on a new page and has a major section number matching the number of the class. For example, the first class of measures, Software Engineering, is described in Section A.1, the second class is described in Section A.2, and so on. The categories within each class have a second-level section number corresponding to the number of the category within the class. For example, the first category of Software Engineering measures, Practices and Techniques, is described in Section A.1.1, the second category in the Software Engineering class is described in Section A.1.2, and so on.

Table A.0-1 on pages A-2 and A-3 is a quick reference to the types and numbers of measures in any class. Table A.0-1 also contains the page number of each section.

Each description of a category of measures begins with the following key:

| | |
|------------------|-------------------|
| — — — Objective | — — — Subjective |
| — — — Absolute | — — — Relative |
| — — — Explicit | — — — Derived |
| — — — Static | — — — Dynamic |
| — — — Predictive | — — — Explanatory |

where an uppercase X preceding a term indicates that, in general, the category has the character described by the term. The narrative that follows the key indicates how or when the general character of the measures may change and usually contains an example to give the reader a better understanding of the measures.

The last paragraph introduces the description of the measures and the data for 25 developed software systems. Each

category of measures, along with the corresponding data for that category, is described in a series of six tables and four figures. Each table and each figure are labeled with the appropriate subsection number. Both the tables and the figures have a running count number within the subsection (e.g., Table A.1.1-1, Table A.1.1-2, and so on); there are always six tables and four figures for each category.

The first table (Table A.x.x-1) in each subsection contains for each measure

- A code number (CODE) that identifies the measure category and the measure number within the category
- A mnemonic name (MEASURE) that summarizes the meaning of the measure
- An acceptable range (RANGE) of values for the measure in terms of the smallest (LOW) and largest (HIGH) acceptable values
- A brief phrase (DESCRIPTION) to indicate the general meaning of the measure

The second table (Table A.x.x-2) contains for each of the 25 developed software systems in the total sample (1) the 4-digit project code (PRCO) and (2) the raw data for each of the measures in the category that has data associated with it. Within each subsection, the introduction of the raw data indicates whether large values of the measures represent the best or worst of the properties being measured.

The last four tables (Tables A.x.x-3 through A.x.x-6) are paired with figures (Figures A.x.x-1 through A.x.x-4) and represent four samples from the 25 developed software systems. The first sample represents 11 mission projects and is described in Table A.x.x-3 and Figure A.x.x-1. Each mission project developed one or more software systems that

were measured. The 4-digit project codes for the 11 mission projects are

| <u>Mission Project</u> | <u>Project Code (PRCO)</u> |
|------------------------|----------------------------|
| 1 | 0100 |
| 2 | 0200 |
| 3 | 0300 |
| 4 | 0400 |
| 5 | 0500 |
| 6 | 0600 |
| 7 | 0700 |
| 8 | 0800 |
| 9 | 0900 |
| 10 | 1000 |
| 11 | 1100 |

The second sample represents 20 independent software systems. One or more of the 20 independent software systems were developed within one of the 11 mission projects.

Tables A.x.x-4 and Figure A.x.x-2 describe the 20 independent software systems. The 4-digit project codes for the 20 independent software systems are

| <u>Independent Software System</u> | <u>Project Code (PRCO)</u> |
|------------------------------------|----------------------------|
| 1 | 0100 |
| 2 | 0200 |
| 3 | 0300 |
| 4 | 0400 |
| 5 | 0500 |
| 6 | 0610 |
| 7 | 0620 |
| 8 | 0630 |
| 9 | 0710 |
| 10 | 0720 |
| 11 | 0730 |
| 12 | 0740 |
| 13 | 0750 |
| 14 | 0760 |
| 15 | 0770 |
| 16 | 0780 |
| 17 | 0800 |
| 18 | 0900 |
| 19 | 1000 |
| 20 | 1100 |

The third sample represents 9 large software systems, i.e., more than 30,000 delivered lines of code. Table A.x.x-5 and Figure A.x.x-3 describe the 9 large software systems. The 4-digit project codes for the nine large software systems are

| <u>Large Software System</u> | <u>Project Code (PRCO)</u> |
|------------------------------|----------------------------|
| 1 | 0100 |
| 2 | 0200 |
| 3 | 0300 |
| 4 | 0400 |
| 5 | 0500 |
| 6 | 0610 |
| 7 | 0730 |
| 8 | 0900 |
| 9 | 1000 |

The fourth sample represents 11 small software systems, i.e., fewer than 30,000 delivered lines of code. Table A.x.x-6 and Figure A.x.x-4 describe the 11 small software systems. The 4-digit project codes for the 11 small software systems are

| <u>Small Software System</u> | <u>Project Code (PRCO)</u> |
|------------------------------|----------------------------|
| 1 | 0620 |
| 2 | 0630 |
| 3 | 0710 |
| 4 | 0720 |
| 5 | 0740 |
| 6 | 0750 |
| 7 | 0760 |
| 8 | 0770 |
| 9 | 0780 |
| 10 | 0800 |
| 11 | 1100 |

The table for each of these four samples contains

- Code number (CODE) of each measure
- Mnemonic name (NAME) of each measure

- Acceptable values (ALLOWED RANGE) for each measure in terms of
 - The smallest (LOW) acceptable value
 - The largest (HIGH) acceptable value
- Actual range (ACTUAL RANGE) of the data in the sample for each measure in terms of
 - The smallest (LOW) value in the sample
 - The first quartile (1ST Q) value of the sample
 - The second quartile (MEDIAN) value of the sample
 - The third quartile (3RD Q) value of the sample
 - The fourth quartile (HIGH) value of the sample
- Average (AVERAGE) value of the sample for each measure
- Standard deviation (STD DEV) of the average value of the sample for each measure
- Average value of the sample minus 1 standard deviation (AVG-SD) for each measure
- Average value of the sample plus 1 standard deviation (AVG+SD) for each measure

The figure for each of the four samples is a cluster map based on the category of measures. Cluster analysis groups projects that are most similar via a Euclidean distance calculation. From 1 to N clusters (or groups) can be defined, where N is the number of projects in the sample. Each project in the sample is represented by a full-figure vertical bar of asterisks. The vertically oriented labels above these bars are the 4-digit project codes. The left-hand axis indicates the number of clusters defined for an appropriate level of similarity. The height of the vertical bars

between two project vertical bars indicates the level of similarity between projects.

Starting at the bottom of the histogram, a continuous horizontal bar of asterisks indicates that all projects are similar at the level indicated by the left-hand axis. Once a break occurs in a horizontal bar, the projects to the left and the projects to the right of the break form clusters; that is, the break indicates that the projects to the left and the projects to the right of the break are no longer similar at the level where the break occurs.

In general, the authors use the cluster maps to find three clusters that represent the category quality in terms of the most, the least, and the typical amount of the quality. The description of the measures and data follows.

A.1 SOFTWARE ENGINEERING CLASS OF MEASURES

The Software Engineering class measures the degree of use of development

- Practices and Techniques (MT01 through MT30)
 - Organization (MT01 and MT02)
 - Design (MT03 through MT14)
 - Coding (MT15 through MT23)
 - Testing (MT24 through MT30)
 - Sums (MT81 through MT84)
- Tools (TS01 through TS15)
 - Sum (TS81)
- Documentation Procedures (DC01 through DC15)
 - Sum (DC81)
- Software Engineering Methodology
 - Sum (SE81)

A.1.1 PRACTICES AND TECHNIQUES

| | | |
|---------------------|----------------|-------------|
| -- -- -- Objective | -- <u>X</u> -- | Subjective |
| -- -- -- Absolute | -- <u>X</u> -- | Relative |
| -- -- -- Explicit | -- <u>X</u> -- | Derived |
| -- -- -- Static | -- <u>X</u> -- | Dynamic |
| -- -- -- Predictive | -- <u>X</u> -- | Explanatory |

This category measures the degree of use of practices and techniques available during the development process. These measures are subjective and therefore relative and dynamic in the sense that an extreme new case could change the values of the sample. Since they are relative (subjective) measures, they are primarily explanatory. The samples, however, can be used to obtain typical, average, or trend values. They can be predictive when the skills and the performance of development team personnel are well known.

The remainder of this subsection contains tables and figures that describe the Practices and Techniques measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.1.1-1)
- Values of the measures for 25 systems (Table A.1.1-2), where large values indicate a high degree of use
- Summary statistics for 11 projects (Table A.1.1-3)
- Cluster map for 11 projects (Figure A.1.1-1)
- Summary statistics for 20 independent systems (Table A.1.1-4)
- Cluster map for 20 independent systems (Figure A.1.1-2)
- Summary statistics for 9 large systems (Table A.1.1-5)
- Cluster map for 9 large systems (Figure A.1.1-3)
- Summary statistics for 11 small systems (Table A.1.1-6)
- Cluster map for 11 small systems (Figure A.1.1-4)

Table A.1.1-1. Practices and Techniques: Description of Measures (1 of 2)

| Code | Measure | Range | | Description |
|--------------|-----------|-------|------|---|
| | | Low | High | |
| Organization | | | | |
| MT01 | ORGCHIEF | 00 | 50 | Chief Programmer |
| MT02 | ORG | 00 | 00 | Not Defined |
| Design | | | | |
| MT03 | DWALKTHR | 00 | 50 | Walkthroughs |
| MT04 | DFORREV | 00 | 50 | Formal Reviews |
| MT05 | DFORISMS | 00 | 50 | Formalisms |
| MT06 | DTRECHAR | 00 | 50 | Tree Charts |
| MT07 | DPDL | 00 | 50 | Program Design Language (PDL) |
| MT08 | DHIPO | 00 | 50 | Hierarchical Input Processing Output (HIPO) |
| MT09 | DTOPDOWN | 00 | 50 | Top-Down |
| MT10 | DIENHANC | 00 | 50 | Iterative Enhancement |
| MT11 | DN2CHART | 00 | 50 | N-Squared Charts |
| MT12 | D | 00 | 00 | Not Defined |
| MT13 | D | 00 | 00 | Not Defined |
| MT14 | D | 00 | 00 | Not Defined |
| Code | | | | |
| MT15 | CSTUBS | 00 | 50 | Stubs |
| MT16 | CTOPDOWN | 00 | 50 | Top-Down |
| MT17 | CSTRUCT | 00 | 50 | Structured |
| MT18 | CWALKLTHR | 00 | 50 | Walkthroughs |
| MT19 | CREADING | 00 | 50 | Reading |
| MT20 | CCONFIG | 00 | 50 | Configuration Control |
| MT21 | C | 00 | 00 | Not Defined |
| MT22 | C | 00 | 00 | Not Defined |
| MT23 | C | 00 | 00 | Not Defined |

Table A.1.1-1. Practices and Techniques: Description of Measures (2 of 2)

| <u>Code</u> | <u>Measure</u> | <u>Range</u> | | <u>Description</u> |
|-------------|----------------|--------------|-------------|--|
| | | <u>Low</u> | <u>High</u> | |
| | | | | Test |
| MT24 | TFORISMS | 00 | 50 | Formalism |
| MT25 | TFOLTHRU | 00 | 50 | Followthrough |
| MT26 | TBATCH | 00 | 50 | Batch Processing |
| MT27 | TVNVPRES | 00 | 50 | Verification and Validation (V&V) Team Presence |
| MT28 | TVNVUSE | 00 | 50 | V&V Team Use |
| MT29 | T | 00 | 00 | Not Defined |
| MT30 | T | 00 | 00 | Not Defined |
| MT81 | DESIGN | 000 | 400 | Sum MT03 Through MT10 |
| MT82 | CODE | 000 | 300 | Sum MT15 Through MT20 |
| MT83 | TEST | 000 | 250 | Sum MT24 Through MT28 |
| MT84 | TOTAL | 0000 | 1000 | Sum MT81 Through MT83 and MT01 |

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Table A.1.1-2. Practices and Techniques: Values of the Measures for 25 Systems (1 of 2)

| PRCD | MT01 | MT03 | MT04 | MT05 | MT06 | MT07 | MT08 | MT09 | MT10 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 45 | 40 | 40 | 50 | 40 | 0 | 0 | 20 | 40 |
| 0200 | 40 | 10 | 30 | 40 | 30 | 0 | 0 | 20 | 20 |
| 0300 | 25 | 10 | 25 | 30 | 30 | 0 | 0 | 20 | 20 |
| 0400 | 20 | 10 | 25 | 35 | 40 | 10 | 0 | 20 | 20 |
| 0500 | 50 | 45 | 50 | 50 | 40 | 20 | 0 | 10 | 40 |
| 0600 | 50 | 40 | 50 | 45 | 40 | 30 | 0 | 25 | 40 |
| 0700 | 35 | 35 | 40 | 45 | 40 | 20 | 0 | 20 | 30 |
| 0800 | 50 | 40 | 45 | 50 | 50 | 30 | 25 | 25 | 40 |
| 0900 | 20 | 40 | 50 | 40 | 30 | 20 | 0 | 20 | 20 |
| 1000 | 30 | 40 | 50 | 40 | 35 | 20 | 0 | 20 | 30 |
| 1100 | 40 | 35 | 45 | 40 | 30 | 10 | 0 | 20 | 40 |
| 9000 | 25 | 40 | 50 | 40 | 30 | 20 | 0 | 20 | 25 |
| 0610 | 50 | 40 | 50 | 45 | 40 | 30 | 0 | 20 | 40 |
| 0620 | 50 | 40 | 50 | 40 | 40 | 10 | 0 | 30 | 40 |
| 0630 | 40 | 45 | 40 | 45 | 35 | 20 | 0 | 30 | 40 |
| 0631 | 50 | 50 | 50 | 50 | 40 | 35 | 0 | 30 | 40 |
| 0632 | 20 | 35 | 20 | 30 | 30 | 0 | 0 | 30 | 40 |
| 0710 | 40 | 35 | 40 | 45 | 40 | 20 | 0 | 20 | 40 |
| 0720 | 50 | 40 | 40 | 45 | 40 | 25 | 0 | 20 | 40 |
| 0730 | 35 | 35 | 40 | 45 | 40 | 20 | 0 | 20 | 20 |
| 0740 | 40 | 40 | 35 | 45 | 40 | 10 | 0 | 10 | 15 |
| 0750 | 40 | 20 | 30 | 25 | 30 | 0 | 0 | 25 | 50 |
| 0760 | 50 | 40 | 35 | 45 | 40 | 0 | 0 | 10 | 10 |
| 0770 | 40 | 40 | 30 | 45 | 40 | 35 | 0 | 20 | 40 |
| 0780 | 40 | 35 | 30 | 40 | 40 | 20 | 0 | 20 | 40 |

| PRCD | MT15 | MT16 | MT17 | MT18 | MT19 | MT20 | MT24 | MT25 | MT26 | MT27 | MT28 |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 50 | 40 | 30 | 30 | 40 | 45 | 50 | 45 | 50 | 0 | 0 |
| 0200 | 0 | 10 | 20 | 0 | 10 | 30 | 0 | 5 | 10 | 0 | 0 |
| 0300 | 0 | 10 | 10 | 10 | 20 | 20 | 20 | 15 | 30 | 0 | 0 |
| 0400 | 0 | 10 | 35 | 0 | 10 | 20 | 30 | 25 | 30 | 0 | 0 |
| 0500 | 45 | 30 | 45 | 30 | 50 | 50 | 50 | 45 | 40 | 0 | 0 |
| 0600 | 45 | 40 | 35 | 25 | 45 | 40 | 45 | 40 | 40 | 0 | 0 |
| 0700 | 30 | 35 | 30 | 5 | 30 | 20 | 45 | 30 | 15 | 0 | 0 |
| 0800 | 40 | 40 | 45 | 35 | 40 | 50 | 50 | 45 | 50 | 0 | 0 |
| 0900 | 20 | 10 | 20 | 5 | 10 | 0 | 30 | 0 | 10 | 40 | 10 |
| 1000 | 35 | 20 | 30 | 10 | 20 | 20 | 35 | 30 | 20 | 35 | 35 |
| 1100 | 25 | 30 | 30 | 0 | 5 | 20 | 40 | 25 | 5 | 25 | 10 |
| 9000 | 25 | 15 | 25 | 5 | 15 | 10 | 35 | 15 | 15 | 35 | 20 |
| 0610 | 45 | 40 | 35 | 30 | 50 | 40 | 50 | 45 | 40 | 0 | 0 |
| 0620 | 30 | 40 | 20 | 0 | 10 | 40 | 30 | 25 | 40 | 0 | 0 |
| 0630 | 35 | 40 | 45 | 30 | 50 | 45 | 40 | 30 | 45 | 0 | 0 |
| 0631 | 45 | 45 | 45 | 40 | 50 | 50 | 40 | 30 | 45 | 0 | 0 |
| 0632 | 10 | 40 | 45 | 10 | 40 | 30 | 20 | 10 | 45 | 0 | 0 |
| 0710 | 30 | 40 | 40 | 0 | 10 | 30 | 45 | 35 | 30 | 0 | 0 |
| 0720 | 40 | 40 | 45 | 0 | 40 | 45 | 45 | 40 | 30 | 0 | 0 |
| 0730 | 40 | 30 | 25 | 10 | 35 | 30 | 40 | 25 | 10 | 0 | 0 |
| 0740 | 10 | 20 | 30 | 10 | 30 | 40 | 40 | 30 | 0 | 0 | 0 |
| 0750 | 0 | 40 | 35 | 0 | 10 | 0 | 30 | 20 | 45 | 0 | 0 |
| 0760 | 0 | 20 | 35 | 0 | 40 | 45 | 45 | 40 | 0 | 0 | 0 |
| 0770 | 45 | 30 | 35 | 0 | 10 | 40 | 40 | 35 | 50 | 0 | 0 |
| 0780 | 40 | 40 | 35 | 10 | 40 | 45 | 45 | 40 | 0 | 0 | 0 |

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Table A.1.1-2. Practices and Techniques: Values of the
Measures for 25 Systems (2 of 2)

| PRCO | MT81 | MT82 | MT83 | MT84 |
|------|------|------|------|------|
| 0100 | 230 | 235 | 145 | 655 |
| 0200 | 150 | 70 | 15 | 275 |
| 0300 | 135 | 70 | 65 | 295 |
| 0400 | 160 | 75 | 85 | 340 |
| 0500 | 255 | 250 | 135 | 690 |
| 0600 | 270 | 230 | 125 | 675 |
| 0700 | 230 | 150 | 90 | 505 |
| 0800 | 305 | 250 | 145 | 750 |
| 0900 | 220 | 65 | 90 | 395 |
| 1000 | 235 | 135 | 155 | 555 |
| 1100 | 220 | 110 | 105 | 475 |
| 9000 | 225 | 95 | 120 | 465 |
| 0610 | 265 | 240 | 135 | 690 |
| 0620 | 250 | 140 | 95 | 535 |
| 0630 | 255 | 245 | 115 | 655 |
| 0631 | 295 | 275 | 115 | 735 |
| 0632 | 185 | 175 | 75 | 455 |
| 0710 | 240 | 150 | 110 | 540 |
| 0720 | 250 | 210 | 115 | 625 |
| 0730 | 220 | 170 | 75 | 500 |
| 0740 | 195 | 140 | 70 | 445 |
| 0750 | 180 | 85 | 95 | 400 |
| 0760 | 180 | 140 | 85 | 455 |
| 0770 | 250 | 160 | 125 | 575 |
| 0780 | 225 | 210 | 85 | 560 |

Table A.1.1-3. Practices and Techniques: Summary Statistics for 11 Projects

| CODE | NAME | --ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|-----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| MT01 | ORGCHIEF | 0 | 50 | 20 | 25 | 40 | 50 | 50 | 36.8 | 11.7 | 25.1 | 48.5 |
| MT03 | DWALKTHR | 0 | 50 | 10 | 10 | 40 | 40 | 45 | 31.4 | 14.0 | 17.4 | 45.3 |
| MT04 | DFORREV | 0 | 50 | 25 | 30 | 45 | 50 | 50 | 40.9 | 10.0 | 31.0 | 50.9 |
| MT05 | DFORISMS | 0 | 50 | 30 | 40 | 40 | 50 | 50 | 42.3 | 6.5 | 35.8 | 48.7 |
| MT06 | DTRECHAR | 0 | 50 | 30 | 30 | 40 | 40 | 50 | 36.8 | 6.4 | 30.4 | 43.2 |
| MT07 | DPDL | 0 | 50 | 0 | 0 | 20 | 20 | 30 | 14.5 | 11.3 | 3.3 | 25.8 |
| MT08 | DHIPO | 0 | 50 | 0 | 0 | 0 | 0 | 25 | 2.3 | 7.5 | -5.3 | 9.8 |
| MT09 | DTOPDOWN | 0 | 50 | 10 | 20 | 20 | 20 | 25 | 20.0 | 3.9 | 16.1 | 23.9 |
| MT10 | DIENHANC | 0 | 50 | 20 | 20 | 30 | 40 | 40 | 30.9 | 9.4 | 21.5 | 40.3 |
| MT15 | CSTUBS | 0 | 50 | 0 | 0 | 30 | 45 | 50 | 26.4 | 19.1 | 7.2 | 45.5 |
| MT16 | CTOPDOWN | 0 | 50 | 10 | 10 | 30 | 40 | 40 | 25.0 | 13.2 | 11.8 | 38.2 |
| MT17 | CSTRUCT | 0 | 50 | 10 | 20 | 30 | 35 | 45 | 30.0 | 10.5 | 19.5 | 40.5 |
| MT18 | CWALKTHR | 0 | 50 | 0 | 0 | 10 | 30 | 35 | 13.6 | 13.6 | 0.0 | 27.3 |
| MT19 | CREADING | 0 | 50 | 5 | 10 | 20 | 40 | 50 | 25.5 | 16.2 | 9.3 | 41.6 |
| MT20 | CCONFIG | 0 | 50 | 0 | 20 | 20 | 45 | 50 | 28.6 | 15.8 | 12.8 | 44.5 |
| MT24 | TFORISMS | 0 | 50 | 0 | 30 | 40 | 50 | 50 | 35.9 | 15.5 | 20.4 | 51.4 |
| MT25 | TFOLTHRU | 0 | 50 | 0 | 15 | 30 | 45 | 45 | 27.7 | 15.9 | 11.9 | 43.6 |
| MT26 | TBATCH | 0 | 50 | 5 | 10 | 30 | 40 | 50 | 27.3 | 16.3 | 10.9 | 43.6 |
| MT27 | TVNVPRES | 0 | 50 | 0 | 0 | 0 | 25 | 40 | 9.1 | 15.9 | -6.8 | 25.0 |
| MT28 | TVNVUSE | 0 | 50 | 0 | 0 | 0 | 10 | 35 | 5.0 | 10.7 | -5.7 | 15.7 |
| MT81 | DESIGN | 0 | 400 | 135 | 160 | 230 | 255 | 305 | 219.1 | 52.0 | 167.0 | 271.1 |
| MT82 | CODE | 0 | 300 | 65 | 70 | 135 | 235 | 250 | 149.1 | 78.2 | 70.9 | 227.3 |
| MT83 | TEST | 0 | 250 | 15 | 85 | 105 | 145 | 155 | 105.0 | 41.9 | 63.1 | 146.9 |
| MT84 | TOTAL | 0 | 1000 | 275 | 340 | 505 | 675 | 750 | 510.0 | 168.8 | 341.2 | 678.8 |

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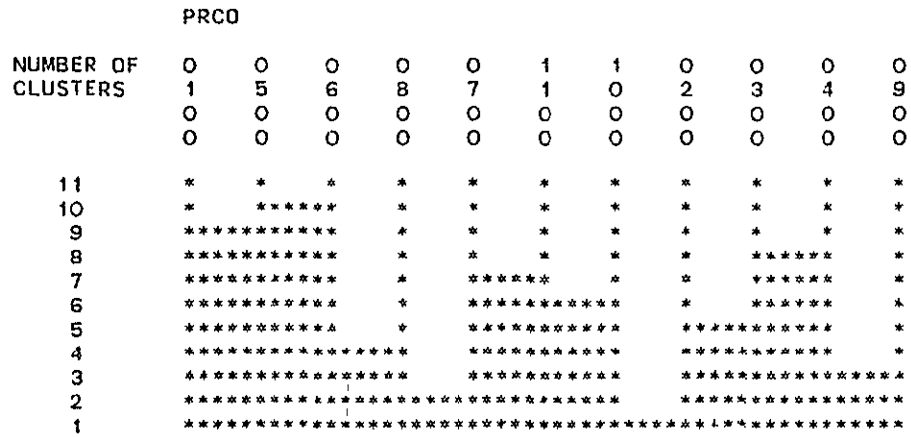


Figure A.1.1-1. Practices and Techniques: Cluster Map for 11 Projects

Table A.1.1-4. Practices and Techniques: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| MT01 | DRGCHIEF | 0 | 50 | 20 | 36 | 40 | 50 | 50 | 39.8 | 9.7 | 30.1 | 49.4 |
| MT03 | DWALKTHR | 0 | 50 | 10 | 35 | 40 | 40 | 45 | 34.0 | 11.5 | 22.5 | 45.5 |
| MT04 | DFORREV | 0 | 50 | 25 | 30 | 40 | 49 | 50 | 39.0 | 8.7 | 30.3 | 47.7 |
| MT05 | DFORISMS | 0 | 50 | 25 | 40 | 45 | 45 | 50 | 42.0 | 6.4 | 35.6 | 48.4 |
| MT06 | DTRECHAR | 0 | 50 | 30 | 31 | 40 | 40 | 50 | 37.5 | 5.3 | 32.2 | 42.8 |
| MT07 | DPDL | 0 | 50 | 0 | 3 | 20 | 20 | 35 | 15.0 | 11.1 | 3.9 | 26.1 |
| MT08 | DHIPO | 0 | 50 | 0 | 0 | 0 | 0 | 25 | 1.3 | 5.6 | -4.3 | 6.8 |
| MT09 | DTOPDOWN | 0 | 50 | 10 | 20 | 20 | 20 | 30 | 20.0 | 5.4 | 14.6 | 25.4 |
| MT10 | DIENHANC | 0 | 50 | 10 | 20 | 40 | 40 | 50 | 32.3 | 11.5 | 20.7 | 43.8 |
| MT15 | CSTUBS | 0 | 50 | 0 | 3 | 33 | 40 | 50 | 26.5 | 18.2 | 8.3 | 44.7 |
| MT16 | CTOPDOWN | 0 | 50 | 10 | 20 | 30 | 40 | 40 | 29.0 | 12.1 | 16.9 | 41.1 |
| MT17 | CSTRUCT | 0 | 50 | 10 | 26 | 35 | 39 | 45 | 32.3 | 9.7 | 22.6 | 41.9 |
| MT18 | CWALKTHR | 0 | 50 | 0 | 0 | 8 | 25 | 35 | 10.5 | 12.9 | -2.4 | 23.4 |
| MT19 | CREADING | 0 | 50 | 5 | 10 | 25 | 40 | 50 | 26.5 | 16.4 | 10.1 | 42.9 |
| MT20 | CCONFIG | 0 | 50 | 0 | 20 | 40 | 45 | 50 | 32.8 | 15.2 | 17.6 | 47.9 |
| MT24 | TFORISMS | 0 | 50 | 0 | 30 | 40 | 45 | 50 | 37.8 | 12.2 | 25.6 | 49.9 |
| MT25 | TFOLTHRU | 0 | 50 | 0 | 25 | 30 | 40 | 45 | 30.0 | 13.0 | 17.0 | 43.0 |
| MT26 | TBATCH | 0 | 50 | 0 | 10 | 30 | 44 | 50 | 26.8 | 18.3 | 8.4 | 45.1 |
| MT27 | TVNVPRES | 0 | 50 | 0 | 0 | 0 | 0 | 40 | 5.0 | 12.5 | -7.5 | 17.5 |
| MT28 | TVNVUSE | 0 | 50 | 0 | 0 | 0 | 0 | 35 | 2.8 | 8.2 | -5.4 | 10.9 |
| MT81 | DESIGN | 0 | 400 | 135 | 184 | 228 | 250 | 305 | 221.0 | 42.7 | 178.3 | 263.7 |
| MT82 | CODE | 0 | 300 | 65 | 91 | 145 | 229 | 250 | 157.5 | 66.1 | 91.4 | 223.6 |
| MT83 | TEST | 0 | 250 | 15 | 85 | 100 | 133 | 155 | 102.3 | 33.6 | 68.7 | 135.8 |
| MT84 | TOTAL | 0 | 1000 | 275 | 411 | 538 | 648 | 750 | 520.5 | 135.7 | 384.8 | 656.2 |

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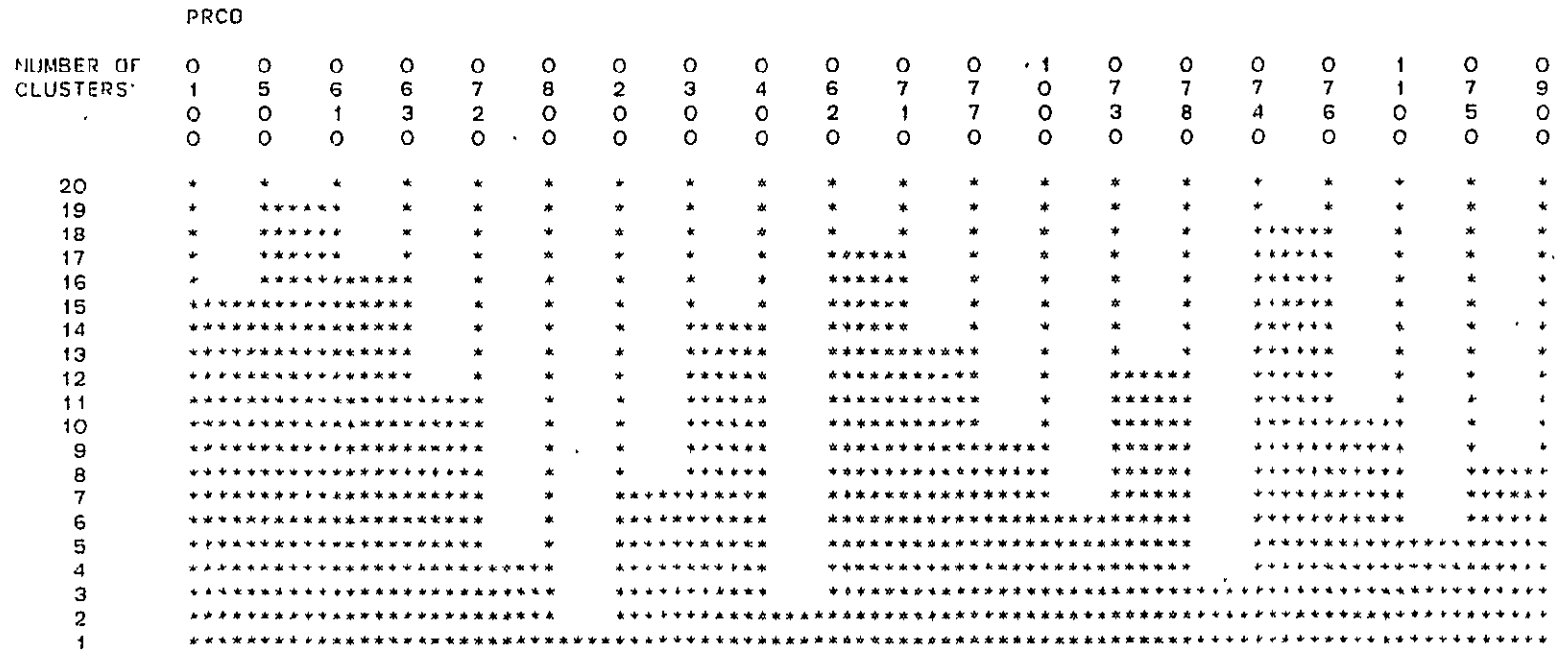


Figure A.1.1-2. Practices and Techniques: Cluster Map for 20 Independent Systems

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Table A.1.1-5. Practices and Techniques: Summary Statistics
for 9 Large Systems

| CODE | NAME | --ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|-----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| MT01 | ORGCHIEF | 0 | 50 | 20 | 23 | 35 | 48 | 50 | 35.0 | 12.0 | 23.0 | 47.0 |
| MT03 | DWALKTHR | 0 | 50 | 10 | 10 | 40 | 40 | 45 | 30.0 | 15.2 | 14.8 | 45.2 |
| MT04 | DFORREV | 0 | 50 | 25 | 28 | 40 | 50 | 50 | 40.0 | 10.9 | 29.1 | 50.9 |
| MT05 | DFORISMS | 0 | 50 | 30 | 38 | 40 | 48 | 50 | 41.7 | 6.6 | 35.1 | 48.3 |
| MT06 | DIRECHAR | 0 | 50 | 30 | 30 | 40 | 40 | 40 | 36.1 | 4.9 | 31.3 | 41.0 |
| MT07 | DPDL | 0 | 50 | 0 | 0 | 20 | 20 | 30 | 13.3 | 11.2 | 2.2 | 24.5 |
| MT08 | DHIPO | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| MT09 | DTOPDOWN | 0 | 50 | 10 | 20 | 20 | 20 | 20 | 18.9 | 3.3 | 15.6 | 22.2 |
| MT10 | DIENHANC | 0 | 50 | 20 | 20 | 20 | 40 | 40 | 27.8 | 9.7 | 18.1 | 37.5 |
| MT15 | CSTUBS | 0 | 50 | 0 | 0 | 35 | 45 | 50 | 26.1 | 21.3 | 4.8 | 47.4 |
| MT16 | CTOPDOWN | 0 | 50 | 10 | 10 | 20 | 35 | 40 | 22.2 | 13.0 | 9.2 | 35.2 |
| MT17 | CSTRUCT | 0 | 50 | 10 | 20 | 30 | 35 | 45 | 27.8 | 10.3 | 17.4 | 38.1 |
| MT18 | CWALKTHR | 0 | 50 | 0 | 3 | 10 | 30 | 30 | 13.9 | 12.7 | 1.2 | 26.6 |
| MT19 | CREADING | 0 | 50 | 10 | 10 | 20 | 45 | 50 | 27.2 | 16.8 | 10.4 | 44.0 |
| MT20 | CCONFIG | 0 | 50 | 0 | 20 | 30 | 43 | 50 | 28.3 | 15.4 | 12.9 | 43.7 |
| MT24 | TFORISMS | 0 | 50 | 0 | 25 | 35 | 50 | 50 | 33.9 | 16.5 | 17.3 | 50.4 |
| MT25 | TFOLTHRU | 0 | 50 | 0 | 10 | 25 | 45 | 45 | 26.1 | 17.1 | 9.0 | 43.2 |
| MT26 | TBATCH | 0 | 50 | 10 | 10 | 30 | 40 | 50 | 26.7 | 15.0 | 11.7 | 41.7 |
| MT27 | TVNVPRES | 0 | 50 | 0 | 0 | 0 | 18 | 40 | 8.3 | 16.6 | -8.2 | 24.9 |
| MT28 | TVNVUSE | 0 | 50 | 0 | 0 | 0 | 5 | 35 | 5.0 | 11.7 | -6.7 | 16.7 |
| MT81 | DESIGN | 0 | 400 | 135 | 155 | 220 | 245 | 265 | 207.8 | 47.4 | 160.4 | 255.2 |
| MT82 | CODE | 0 | 300 | 65 | 70 | 135 | 238 | 250 | 145.6 | 80.2 | 65.4 | 225.7 |
| MT83 | TEST | 0 | 250 | 15 | 70 | 90 | 140 | 155 | 100.0 | 46.0 | 54.0 | 146.0 |
| MT84 | TOTAL | 0 | 1000 | 275 | 318 | 500 | 673 | 690 | 488.3 | 168.6 | 319.8 | 656.9 |

| NUMBER OF CLUSTERS | PRCO | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 8 | 1 | 5 | 6 | 7 | 0 | 2 | 3 | 4 | 9 |
| 7 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 9 | * | * | * | * | * | * | * | * | * |
| 8 | * | ***** | * | * | * | * | * | * | * |
| 7 | ***** | * | * | * | * | * | * | * | * |
| 6 | ***** | * | * | * | * | * | * | * | * |
| 5 | ***** | * | * | * | * | * | * | * | * |
| 4 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |

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Figure A.1.1-3. Practices and Techniques: Cluster Map for 9 Large Systems

Table A.1.1-6. Practices and Techniques: Summary Statistics for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| MT01 | ORGCHIEF | 0 | 50 | 40 | 40 | 40 | 50 | 50 | 43.6 | 5.0 | 38.6 | 48.7 |
| MT03 | DWALKTHR | 0 | 50 | 20 | 35 | 40 | 40 | 45 | 37.3 | 6.5 | 30.8 | 43.7 |
| MT04 | DFORREV | 0 | 50 | 30 | 30 | 40 | 45 | 50 | 38.2 | 6.8 | 31.4 | 45.0 |
| MT05 | DFORISMS | 0 | 50 | 25 | 40 | 45 | 45 | 50 | 42.3 | 6.5 | 35.8 | 48.7 |
| MT06 | DTRECHAR | 0 | 50 | 30 | 35 | 40 | 40 | 50 | 38.6 | 5.5 | 33.1 | 44.2 |
| MT07 | DPDL | 0 | 50 | 0 | 10 | 20 | 25 | 35 | 16.4 | 11.4 | 4.9 | 27.8 |
| MT08 | DHYPD | 0 | 50 | 0 | 0 | 0 | 0 | 25 | 2.3 | 7.5 | -5.3 | 9.8 |
| MT09 | DTOPDOWN | 0 | 50 | 10 | 20 | 20 | 25 | 30 | 20.9 | 6.6 | 14.3 | 27.5 |
| MT10 | DIENHANC | 0 | 50 | 10 | 40 | 40 | 40 | 50 | 35.9 | 12.0 | 23.9 | 47.9 |
| MT15 | CSTUBS | 0 | 50 | 0 | 10 | 30 | 40 | 45 | 26.8 | 16.3 | 10.5 | 43.1 |
| MT16 | CTOPDOWN | 0 | 50 | 20 | 30 | 40 | 40 | 40 | 34.5 | 8.2 | 26.3 | 42.7 |
| MT17 | CSTRUCT | 0 | 50 | 20 | 30 | 35 | 45 | 45 | 35.9 | 7.7 | 28.2 | 43.6 |
| MT18 | CWALKTHR | 0 | 50 | 0 | 0 | 0 | 10 | 35 | 7.7 | 12.9 | -5.2 | 20.6 |
| MT19 | CREADING | 0 | 50 | 5 | 10 | 30 | 40 | 50 | 25.9 | 16.9 | 9.1 | 42.8 |
| MT20 | CCONFIG | 0 | 50 | 0 | 30 | 40 | 45 | 50 | 36.4 | 14.7 | 21.7 | 51.0 |
| MT24 | TFORISMS | 0 | 50 | 30 | 40 | 40 | 45 | 50 | 40.9 | 6.3 | 34.7 | 47.2 |
| MT25 | TFOLTHRU | 0 | 50 | 20 | 25 | 35 | 40 | 45 | 33.2 | 7.8 | 25.3 | 41.0 |
| MT26 | TBATCH | 0 | 50 | 0 | 0 | 30 | 45 | 50 | 26.8 | 21.4 | 5.5 | 48.2 |
| MT27 | TVNVPRES | 0 | 50 | 0 | 0 | 0 | 0 | 25 | 2.3 | 7.5 | -5.3 | 9.8 |
| MT28 | TVNVUSE | 0 | 50 | 0 | 0 | 0 | 0 | 10 | 0.9 | 3.0 | -2.1 | 3.9 |
| MT81 | DESIGN | 0 | 400 | 180 | 195 | 240 | 250 | 305 | 231.8 | 37.2 | 194.6 | 269.1 |
| MT82 | CODE | 0 | 300 | 85 | 140 | 150 | 210 | 250 | 167.3 | 54.0 | 113.3 | 221.3 |
| MT83 | TEST | 0 | 250 | 70 | 85 | 105 | 115 | 145 | 104.1 | 21.1 | 83.0 | 125.2 |
| MT84 | TOTAL | 0 | 1000 | 400 | 455 | 540 | 625 | 750 | 546.8 | 102.8 | 444.0 | 649.7 |

| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 6 | 7 | 7 | 7 | 7 | 7 | 7 | 1 | 7 | 6 | 7 | 8 |
| 2 | 1 | 7 | 8 | 4 | 6 | 0 | 0 | 5 | 3 | 2 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | |
|----|---|---|---|---|---|---|---|---|---|---|---|
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | * |
| 9 | * | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * | * |

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Figure A.1.1-4. Practices and Techniques: Cluster Map for 11 Small Systems

A.1.2 TOOLS

ADD FOOTNOTES

| | | | | | |
|----|------------|----|---|----|-------------|
| -- | Objective | -- | X | -- | Subjective |
| -- | Absolute | -- | X | -- | Relative |
| -- | Explicit | -- | X | -- | Derived |
| -- | Static | -- | X | -- | Dynamic |
| -- | Predictive | -- | X | -- | Explanatory |

This category measures the degree of use of tools available during the development process. These measures are subjective and therefore relative and dynamic in the sense that an extreme new case could change the values of the sample. Since they are relative (subjective) measures, they are primarily explanatory. The samples, however, can be used to obtain typical, average, or trend values. They can be predictive when the skills and the performance of development team personnel are well known.

The remainder of this subsection contains tables and figures that describe the Tools measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.1.2-1)
- Values of the measures for 25 systems (Table A.1.2-2), where large values indicate a high degree of use
- Summary statistics for 11 projects (Table A.1.2-3)
- Cluster map for 11 projects (Figure A.1.2-1)
- Summary statistics for 20 independent systems (Table A.1.2-4)
- Cluster map for 20 independent systems (Figure A.1.2-2)

- Summary statistics for 9 large systems
(Table A.1.2-5)
- Cluster map for 9 large systems (Figure A.1.2-3)
- Summary statistics for 11 small systems
(Table A.1.2-6)
- Cluster map for 11 small systems (Figure A.1.2-4)

Table A.1.2-1. Tools: Description of Measures

| <u>Code</u> | <u>Measure</u> | <u>Range</u> | | <u>Description</u> |
|-------------|----------------|--------------|-------------|---------------------------------------|
| | | <u>Low</u> | <u>High</u> | |
| TS01 | FRMTRAIN | 00 | 50 | Formal Training in Methodology |
| TS02 | INFTRAIN | 00 | 50 | Informal Training |
| TS03 | MTRENFRC | 00 | 50 | Methodology Reenforcement |
| TS04 | MEDLR | 00 | 50 | Requirements Language (MEDL-R) |
| TS05 | PDL | 00 | 50 | Design Language (PDL) |
| TS06 | SFORT | 00 | 50 | Precompiler (SFORT) |
| TS07 | AIDS | 00 | 50 | Software Aids (e.g., XREF, MAP, LIST) |
| TS08 | LIBRARIN | 00 | 50 | Librarian |
| TS09 | DATAGENS | 00 | 50 | Data Generators |
| TS10 | TSO | 00 | 50 | Terminals (TSO) |
| TS11 | RJP | 00 | 50 | Remote Job Processing (RJP) |
| TS12 | CAT | 00 | 50 | Configuration Analysis Tool (CAT) |
| TS13 | | 00 | 00 | Not Defined |
| TS14 | | 00 | 00 | Not Defined |
| TS15 | | 00 | 00 | Not Defined |
| TS81 | TOTAL | 000 | 600 | Sum TS01 Through TS12 |

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Table A.1.2-2. Tools: Values of the Measures for 25 Systems

| PRCD | TS01 | TS02 | TS03 | TS04 | TS05 | TS06 | TS07 | TS08 | TS09 | TS10 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 20 | 30 | 50 | 0 | 0 | 0 | 40 | 50 | 50 | 50 |
| 0200 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 10 | 0 | 40 |
| 0300 | 0 | 0 | 20 | 0 | 0 | 30 | 20 | 0 | 0 | 30 |
| 0400 | 10 | 0 | 10 | 0 | 20 | 40 | 30 | 0 | 0 | 10 |
| 0500 | 50 | 30 | 50 | 0 | 40 | 40 | 50 | 50 | 20 | 50 |
| 0600 | 50 | 30 | 50 | 0 | 50 | 50 | 50 | 50 | 40 | 40 |
| 0700 | 20 | 20 | 30 | 0 | 30 | 50 | 30 | 10 | 5 | 20 |
| 0800 | 50 | 20 | 50 | 0 | 50 | 50 | 40 | 40 | 10 | 50 |
| 0900 | 10 | 40 | 10 | 10 | 30 | 40 | 25 | 10 | 30 | 20 |
| 1000 | 20 | 40 | 25 | 15 | 30 | 40 | 30 | 25 | 0 | 0 |
| 1100 | 0 | 40 | 15 | 10 | 30 | 50 | 15 | 10 | 0 | 0 |
| 9000 | 15 | 40 | 15 | 15 | 30 | 40 | 25 | 15 | 15 | 10 |
| 0610 | 50 | 30 | 50 | 0 | 50 | 50 | 50 | 50 | 40 | 40 |
| 0620 | 50 | 10 | 30 | 0 | 30 | 50 | 10 | 50 | 0 | 40 |
| 0630 | 30 | 20 | 40 | 0 | 35 | 35 | 25 | 40 | 35 | 25 |
| 0631 | 50 | 30 | 50 | 0 | 50 | 50 | 40 | 50 | 50 | 30 |
| 0632 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 10 | 0 | 0 |
| 0710 | 0 | 0 | 30 | 0 | 40 | 50 | 30 | 10 | 0 | 0 |
| 0720 | 50 | 20 | 50 | 0 | 40 | 50 | 40 | 10 | 20 | 50 |
| 0730 | 30 | 20 | 30 | 0 | 30 | 40 | 30 | 25 | 0 | 10 |
| 0740 | 0 | 20 | 30 | 0 | 20 | 50 | 0 | 15 | 0 | 0 |
| 0750 | 0 | 10 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 |
| 0760 | 30 | 20 | 20 | 0 | 0 | 30 | 40 | 10 | 0 | 50 |
| 0770 | 30 | 20 | 40 | 0 | 50 | 50 | 40 | 10 | 0 | 30 |
| 0780 | 30 | 20 | 30 | 0 | 40 | 50 | 30 | 20 | 0 | 50 |

| PRCD | TS11 | TS12 | TS81 |
|------|------|------|------|
| 0100 | 50 | 0 | 340 |
| 0200 | 10 | 0 | 90 |
| 0300 | 30 | 0 | 130 |
| 0400 | 20 | 0 | 140 |
| 0500 | 40 | 0 | 420 |
| 0600 | 50 | 0 | 460 |
| 0700 | 15 | 0 | 230 |
| 0800 | 50 | 0 | 410 |
| 0900 | 15 | 20 | 260 |
| 1000 | 30 | 5 | 260 |
| 1100 | 5 | 5 | 180 |
| 9000 | 20 | 10 | 250 |
| 0610 | 50 | 0 | 460 |
| 0620 | 50 | 0 | 320 |
| 0630 | 50 | 0 | 335 |
| 0631 | 50 | 0 | 450 |
| 0632 | 50 | 0 | 80 |
| 0710 | 20 | 0 | 180 |
| 0720 | 30 | 0 | 360 |
| 0730 | 20 | 0 | 235 |
| 0740 | 0 | 0 | 135 |
| 0750 | 0 | 0 | 60 |
| 0760 | 0 | 0 | 200 |
| 0770 | 50 | 0 | 320 |
| 0780 | 0 | 0 | 270 |

Table A.1.2-3. Tools: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| TS01 | FRMTRAIN | 0 | 50 | 0 | 0 | 20 | 50 | 50 | 20.9 | 20.2 | 0.7 | 41.1 |
| TS02 | INFTRAIN | 0 | 50 | 0 | 0 | 30 | 40 | 40 | 22.7 | 16.2 | 6.5 | 38.9 |
| TS03 | MTRENFRC | 0 | 50 | 0 | 10 | 25 | 50 | 50 | 28.2 | 19.0 | 9.2 | 47.2 |
| TS04 | MEDLR | 0 | 50 | 0 | 0 | 0 | 10 | 15 | 3.2 | 5.6 | -2.4 | 8.8 |
| TS05 | PDL | 0 | 50 | 0 | 0 | 30 | 40 | 50 | 25.5 | 18.6 | 6.8 | 44.1 |
| TS06 | SFORT | 0 | 50 | 0 | 30 | 40 | 50 | 50 | 35.5 | 18.6 | 16.8 | 54.1 |
| TS07 | AIDS | 0 | 50 | 15 | 25 | 30 | 40 | 50 | 32.7 | 11.3 | 21.5 | 44.0 |
| TS08 | LIBRARIN | 0 | 50 | 0 | 10 | 10 | 50 | 50 | 23.2 | 20.5 | 2.7 | 43.7 |
| TS09 | DATAGENS | 0 | 50 | 0 | 0 | 5 | 30 | 50 | 14.1 | 18.3 | -4.2 | 32.4 |
| TS10 | TSO | 0 | 50 | 0 | 10 | 30 | 50 | 50 | 28.2 | 19.4 | 8.8 | 47.6 |
| TS11 | RJP | 0 | 50 | 5 | 15 | 30 | 50 | 50 | 28.6 | 16.9 | 11.7 | 45.5 |
| TS12 | CAT | 0 | 50 | 0 | 0 | 0 | 5 | 20 | 2.7 | 6.1 | -3.3 | 8.8 |
| TS81 | TOTAL | 0 | 600 | 90 | 140 | 260 | 410 | 460 | 265.5 | 127.2 | 138.3 | 392.6 |

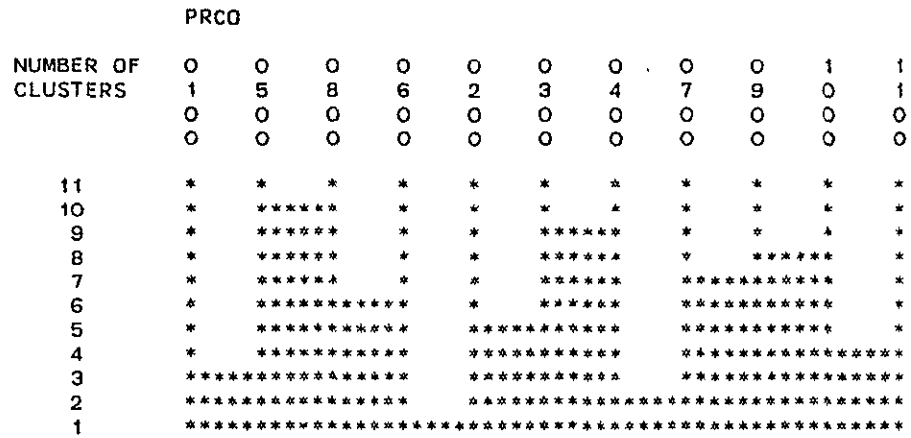


Figure A.1.2-1. Tools: Cluster Map for 11 Projects

Table A.1.2-4. Tools: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|--------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST. Q | MEDIAN | 3RD Q | HIGH | | | | |
| TSO1 | FRMTRAIN | 0 | 50 | 0 | 0 | 25 | 45 | 50 | 23.0 | 19.8 | 3.2 | 42.8 |
| TSO2 | INFTRAIN | 0 | 50 | 0 | 10 | 20 | 30 | 40 | 19.5 | 13.2 | 6.3 | 32.7 |
| TSO3 | MTRENFRC | 0 | 50 | 0 | 16 | 30 | 48 | 50 | 29.0 | 16.6 | 12.4 | 45.6 |
| TSO4 | MEDLR | 0 | 50 | 0 | 0 | 0 | 0 | 15 | 1.8 | 4.4 | -2.6 | 6.1 |
| TSO5 | PDL | 0 | 50 | 0 | 5 | 30 | 40 | 50 | 26.8 | 17.9 | 8.8 | 44.7 |
| TSO6 | SFORT | 0 | 50 | 0 | 36 | 45 | 50 | 50 | 39.8 | 15.3 | 24.5 | 55.0 |
| TSO7 | AIDS | 0 | 50 | 0 | 21 | 30 | 40 | 50 | 28.8 | 14.2 | 14.5 | 43.0 |
| TSO8 | LIBRARIN | 0 | 50 | 0 | 10 | 13 | 40 | 50 | 21.8 | 18.2 | 3.5 | 40.0 |
| TSO9 | DATAGENS | 0 | 50 | 0 | 0 | 0 | 20 | 50 | 10.3 | 16.3 | -6.0 | 26.5 |
| TS10 | TSO | 0 | 50 | 0 | 3 | 30 | 50 | 50 | 27.3 | 20.5 | 6.8 | 47.7 |
| TS11 | RJP | 0 | 50 | 0 | 6 | 25 | 50 | 50 | 26.0 | 19.6 | 6.4 | 45.6 |
| TS12 | CAT | 0 | 50 | 0 | 0 | 0 | 0 | 20 | 1.5 | 4.6 | -3.1 | 6.1 |
| TSB1 | TOTAL | 0 | 600 | 60 | 150 | 260 | 339 | 460 | 255.3 | 114.7 | 140.6 | 369.9 |

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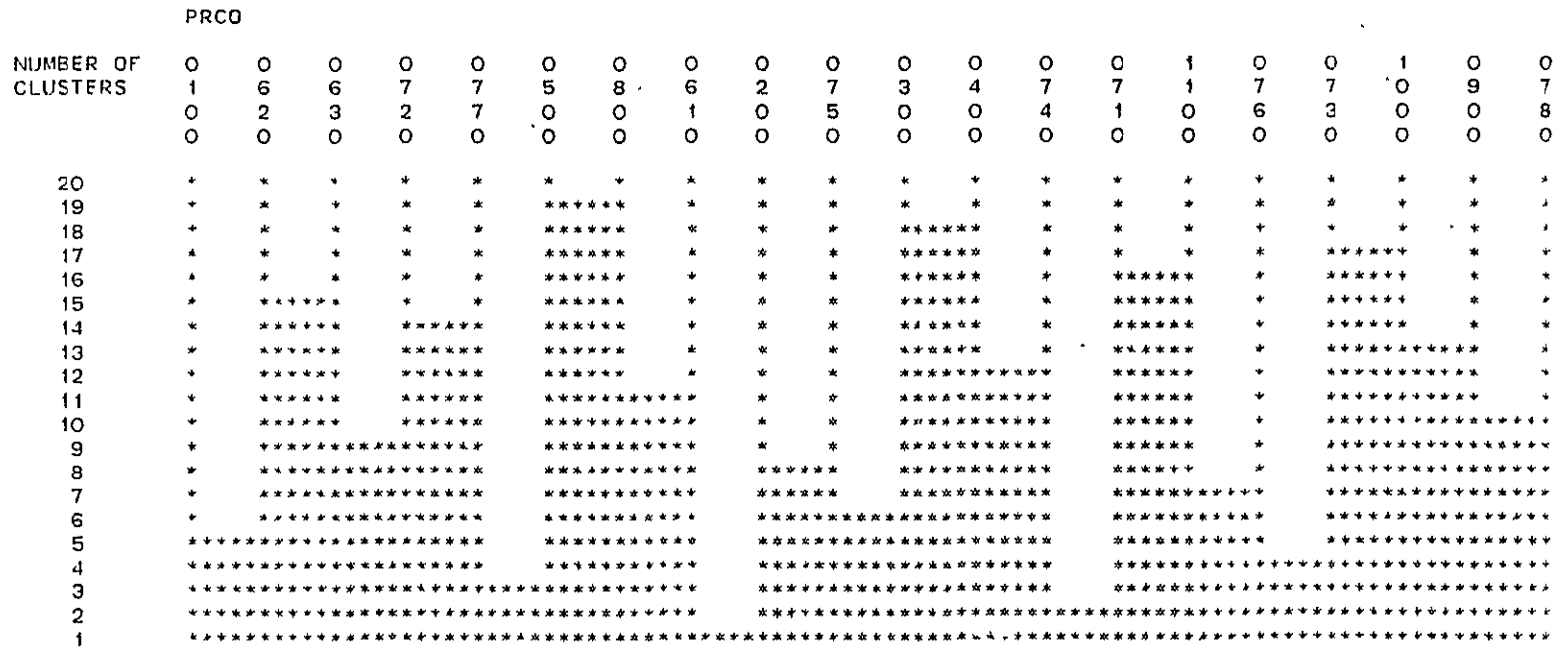


Figure A.1.2-2. Tools: Cluster Map for 20 Independent Systems

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Table A.1.2-5. Tools: Summary Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| TSO1 | FRMTRAIN | 0 | 50 | 0 | 5 | 20 | 40 | 50 | 21.1 | 19.0 | 2.1 | 40.1 |
| TSO2 | INFTRAIN | 0 | 50 | 0 | 0 | 30 | 35 | 40 | 21.1 | 16.9 | 4.2 | 38.0 |
| TSO3 | MTRENFRC | 0 | 50 | 0 | 10 | 25 | 50 | 50 | 27.2 | 19.2 | 8.0 | 46.4 |
| TSO4 | MEDLR | 0 | 50 | 0 | 0 | 0 | 5 | 15 | 2.8 | 5.7 | -2.9 | 8.4 |
| TSO5 | PDL | 0 | 50 | 0 | 0 | 30 | 35 | 50 | 22.2 | 18.6 | 3.7 | 40.8 |
| TSO6 | SFORT | 0 | 50 | 0 | 15 | 40 | 40 | 50 | 31.1 | 18.3 | 12.8 | 49.4 |
| TSO7 | AIDS | 0 | 50 | 20 | 28 | 30 | 45 | 50 | 33.9 | 10.5 | 23.3 | 44.4 |
| TSO8 | LIBRARIN | 0 | 50 | 0 | 5 | 25 | 50 | 50 | 24.4 | 21.1 | 3.3 | 45.6 |
| TSO9 | DATAGENS | 0 | 50 | 0 | 0 | 0 | 35 | 50 | 15.6 | 20.1 | -4.5 | 35.6 |
| TS10 | TSO | 0 | 50 | 0 | 10 | 30 | 45 | 50 | 27.8 | 18.6 | 9.2 | 46.3 |
| TS11 | RJP | 0 | 50 | 10 | 18 | 30 | 45 | 50 | 29.4 | 14.7 | 14.8 | 44.1 |
| TS12 | CAT | 0 | 50 | 0 | 0 | 0 | 3 | 20 | 2.8 | 6.7 | -3.9 | 9.4 |
| TSB1 | TOTAL | 0 | 600 | 90 | 135 | 260 | 380 | 460 | 259.4 | 128.9 | 130.6 | 388.3 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1 | 7 | 0 | 9 | 5 | 6 | 2 | 3 | 4 |
| | 0 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | ***** |
| 7 | * | ***** | * | * | * | * | * | * | ***** |
| 6 | * | ***** | * | ***** | * | ***** | * | ***** | |
| 5 | * | ***** | ***** | ***** | ***** | ***** | * | ***** | |
| 4 | * | ***** | ***** | ***** | ***** | ***** | ***** | ***** | |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | |

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Figure A.1.2-3. Tools: Cluster Map for 9 Large Systems

Table A.1.2-6. Tools: Summary Statistics for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| TSO1 | FRMTRAIN | 0 | 50 | 0 | 0 | 30 | 50 | 50 | 24.5 | 21.1 | 3.4 | 45.7 |
| TSO2 | INFTRAIN | 0 | 50 | 0 | 10 | 20 | 20 | 40 | 18.2 | 9.8 | 8.4 | 28.0 |
| TSO3 | MTRENFRC | 0 | 50 | 0 | 20 | 30 | 40 | 50 | 30.5 | 14.9 | 15.5 | 45.4 |
| TSO4 | MEDLR | 0 | 50 | 0 | 0 | 0 | 0 | 10 | 0.9 | 3.0 | -2.1 | 3.9 |
| TSO5 | PDL | 0 | 50 | 0 | 20 | 35 | 40 | 50 | 30.5 | 17.4 | 13.1 | 47.8 |
| TSO6 | SFORT | 0 | 50 | 30 | 50 | 50 | 50 | 50 | 46.8 | 7.2 | 39.7 | 54.0 |
| TSO7 | AIDS | 0 | 50 | 0 | 10 | 30 | 40 | 40 | 24.5 | 15.9 | 8.7 | 40.4 |
| TSO8 | LIBRARIN | 0 | 50 | 0 | 10 | 10 | 40 | 50 | 19.5 | 16.2 | 3.4 | 35.7 |
| TSO9 | DATAGENS | 0 | 50 | 0 | 0 | 0 | 10 | 35 | 5.9 | 11.6 | -5.7 | 17.5 |
| TS10 | TSO | 0 | 50 | 0 | 0 | 30 | 50 | 50 | 26.8 | 22.8 | 4.0 | 49.7 |
| TS11 | RJP | 0 | 50 | 0 | 0 | 20 | 50 | 50 | 23.2 | 23.3 | -0.1 | 46.4 |
| TS12 | CAT | 0 | 50 | 0 | 0 | 0 | 0 | 5 | 0.5 | 1.5 | -1.1 | 2.0 |
| TSB1 | TOTAL | 0 | 600 | 60 | 180 | 270 | 335 | 410 | 251.8 | 108.0 | 143.8 | 359.9 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | 6 | 6 | 7 | 7 | 8 | 7 | 1 | 7 | 7 | 7 | 7 |
| | 2 | 3 | 2 | 7 | 0 | 1 | 0 | 4 | 5 | 6 | 8 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | * |
| 9 | * | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * | * |

Figure A.1.2-4. Tools: Cluster Map for 11 Small Systems

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A.1.3 DOCUMENTATION

| | | | | | |
|----|------------|----|---|----|-------------|
| -- | Objective | -- | X | -- | Subjective |
| -- | Absolute | -- | X | -- | Relative |
| -- | Explicit | -- | X | -- | Derived |
| -- | Static | -- | X | -- | Dynamic |
| -- | Predictive | -- | X | -- | Explanatory |

This category measures the degree of use of documentation procedures available during the development process. These measures are subjective and therefore relative and dynamic in the sense that an extreme new case could change the values of the sample. Since they are relative (subjective) measures, they are primarily explanatory. The samples, however, can be used to obtain typical, average, or trend values. They can be predictive when the skills and the performance of development personnel are well known.

The remainder of this subsection contains tables and figures that describe the documentation measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.1.3-1)
- Values of the measures for 25 systems (Table A.1.3-2), where large values indicate a high degree of use
- Summary statistics for 11 projects (Table A.1.3-3)
- Cluster map for 11 projects (Figure A.1.3-1)
- Summary statistics for 20 independent systems (Table A.1.3-4)
- Cluster map for 20 independent systems (Figure A.1.3-2)

- Summary statistics for 9 large systems
(Table A.1.3-5)
- Cluster map for 9 large systems (Figure A.1.3-3)
- Summary statistics for 11 small systems
(Table A.1.3-6)
- Cluster map for 11 small systems (Figure A.1.3-4)

Table A.1.3-1. Documentation: Description of Measures

| Code | Measure | Range | | Description |
|------|----------|-------|------|--|
| | | Low | High | |
| DC01 | SELFORMS | 00 | 50 | SEL Forms |
| DC02 | DSGNDOC | 00 | 50 | Design Document |
| DC03 | DSGNDCSN | 00 | 50 | Design Decisions |
| DC04 | SEMIQA | 00 | 50 | Semiformal Quality Assurance |
| DC05 | ACTNOTBK | 00 | 50 | Activity Notebooks |
| DC06 | UNITDEVF | 00 | 50 | Unit Development Folders |
| DC07 | TESTPLAN | 00 | 50 | Test Plans |
| DC08 | USERSSYS | 00 | 50 | User's Guide/System Description |
| DC09 | FTUSERS | 00 | 50 | Formal Treatment of User's Guide/System Description |
| DC10 | WEEKMNTH | 00 | 50 | Weekly/Monthly Progress Reports |
| DC11 | | 00 | 00 | Not Defined |
| DC12 | | 00 | 00 | Not Defined |
| DC13 | | 00 | 00 | Not Defined |
| DC14 | | 00 | 00 | Not Defined |
| DC15 | | 00 | 00 | Not Defined |
| DC81 | TOTAL | 000 | 500 | Sum DC01 Through DC10 |

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Table A.1.3-2. Documentation: Values of the Measures for 25 Systems

| PRCO | DC01 | DC02 | DC03 | DC04 | DC05 | DC06 | DC07 | DC08 | DC09 | DC10 | DC81 |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 50 | 40 | 30 | 10 | 40 | 0 | 40 | 40 | 50 | 45 | 345 |
| 0200 | 10 | 20 | 10 | 10 | 10 | 0 | 10 | 30 | 40 | 40 | 180 |
| 0300 | 10 | 20 | 0 | 10 | 30 | 10 | 10 | 20 | 30 | 30 | 170 |
| 0400 | 0 | 20 | 0 | 10 | 10 | 10 | 30 | 10 | 40 | 30 | 160 |
| 0500 | 50 | 40 | 50 | 10 | 50 | 10 | 40 | 40 | 50 | 50 | 390 |
| 0600 | 50 | 50 | 50 | 40 | 50 | 0 | 45 | 50 | 50 | 50 | 435 |
| 0700 | 30 | 40 | 20 | 25 | 40 | 0 | 35 | 40 | 50 | 40 | 320 |
| 0800 | 40 | 50 | 20 | 50 | 40 | 0 | 50 | 50 | 50 | 40 | 390 |
| 0900 | 25 | 40 | 10 | 35 | 40 | 0 | 40 | 35 | 40 | 25 | 290 |
| 1000 | 50 | 40 | 20 | 40 | 50 | 0 | 40 | 50 | 50 | 40 | 380 |
| 1100 | 20 | 40 | 10 | 35 | 50 | 0 | 40 | 30 | 20 | 30 | 275 |
| 9000 | 35 | 40 | 15 | 35 | 45 | 0 | 40 | 40 | 40 | 30 | 320 |
| 0610 | 50 | 50 | 50 | 50 | 50 | 0 | 50 | 50 | 50 | 50 | 450 |
| 0620 | 20 | 50 | 50 | 40 | 50 | 0 | 10 | 50 | 50 | 50 | 370 |
| 0630 | 20 | 40 | 40 | 40 | 40 | 0 | 10 | 50 | 50 | 40 | 330 |
| 0631 | 30 | 50 | 50 | 40 | 50 | 0 | 10 | 50 | 50 | 50 | 380 |
| 0632 | 10 | 25 | 25 | 15 | 25 | 0 | 10 | 10 | 40 | 10 | 170 |
| 0710 | 40 | 40 | 20 | 25 | 40 | 0 | 35 | 40 | 50 | 40 | 330 |
| 0720 | 40 | 50 | 20 | 25 | 40 | 0 | 45 | 40 | 50 | 40 | 350 |
| 0730 | 40 | 50 | 30 | 25 | 40 | 0 | 35 | 40 | 50 | 40 | 350 |
| 0740 | 40 | 40 | 30 | 25 | 40 | 0 | 35 | 40 | 50 | 40 | 340 |
| 0750 | 10 | 10 | 0 | 5 | 10 | 0 | 10 | 40 | 50 | 40 | 175 |
| 0760 | 10 | 30 | 0 | 25 | 40 | 0 | 35 | 40 | 50 | 40 | 270 |
| 0770 | 10 | 30 | 30 | 25 | 40 | 0 | 35 | 40 | 50 | 40 | 300 |
| 0780 | 10 | 10 | 0 | 25 | 40 | 0 | 25 | 40 | 50 | 40 | 240 |

Table A.1.3-3. Documentation: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| DC01 | SELFORMS | 0 | 50 | 0 | 10 | 30 | 50 | 50 | 30.5 | 18.8 | 11.7 | 49.2 |
| DC02 | DSGNDQC | 0 | 50 | 20 | 20 | 40 | 40 | 50 | 36.4 | 11.2 | 25.2 | 47.6 |
| DC03 | DSGNDCSN | 0 | 50 | 0 | 10 | 20 | 30 | 50 | 20.0 | 17.3 | 2.7 | 37.3 |
| DC04 | SEMIQA | 0 | 50 | 10 | 10 | 25 | 40 | 50 | 25.0 | 15.5 | 9.5 | 40.5 |
| DC05 | ACTNOTBK | 0 | 50 | 10 | 30 | 40 | 50 | 50 | 37.3 | 14.9 | 22.4 | 52.2 |
| DC06 | UNITDEVF | 0 | 50 | 0 | 0 | 0 | 10 | 10 | 2.7 | 4.7 | -1.9 | 7.4 |
| DC07 | TESTPLAN | 0 | 50 | 10 | 30 | 40 | 40 | 50 | 34.5 | 13.1 | 21.4 | 47.7 |
| DC08 | USERSYS | 0 | 50 | 10 | 30 | 40 | 50 | 50 | 35.9 | 12.8 | 23.1 | 48.7 |
| DC09 | FTUSERS | 0 | 50 | 20 | 40 | 50 | 50 | 50 | 42.7 | 10.1 | 32.6 | 52.8 |
| DC10 | WEEKMNTN | 0 | 50 | 25 | 30 | 40 | 45 | 50 | 38.2 | 8.4 | 29.7 | 46.6 |
| DCB1 | TOTAL | 0 | 500 | 160 | 180 | 320 | 390 | 435 | 303.2 | 97.3 | 205.8 | 400.5 |

| | PRCO | | | | | | | | | | |
|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| NUMBER OF | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| CLUSTERS | 1 | 7 | 9 | 1 | 5 | 8 | 0 | 6 | 2 | 3 | 4 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | ***** | * | * | * | * | * |
| 9 | * | * | ***** | * | ***** | * | * | * | * | * | * |
| 8 | * | * | ***** | * | ***** | * | * | * | * | * | * |
| 7 | ***** | ***** | * | ***** | * | ***** | * | ***** | * | * | * |
| 6 | ***** | ***** | * | ***** | * | ***** | * | ***** | * | * | * |
| 5 | ***** | ***** | ***** | ***** | * | ***** | * | ***** | * | * | * |
| 4 | ***** | ***** | ***** | ***** | ***** | ***** | * | ***** | * | * | * |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |

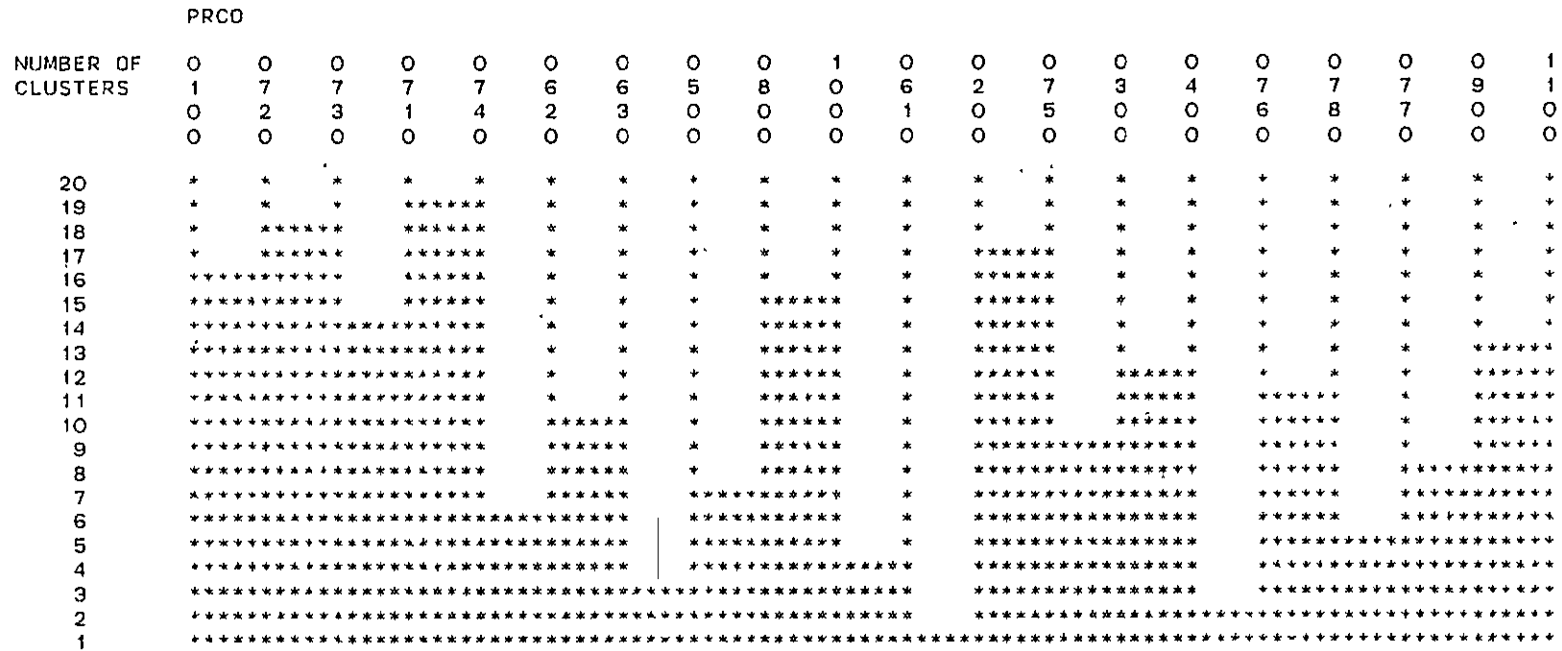
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Figure A.1.3-1. Documentation: Cluster Map for 11 Projects

Table A.1.3-4. Documentation: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| DC01 | SELFORMS | 0 | 50 | 0 | 10 | 23 | 40 | 50 | 27.3 | 17.1 | 10.1 | 44.4 |
| DC02 | DSGND0C | 0 | 50 | 10 | 23 | 40 | 48 | 50 | 35.5 | 13.2 | 22.3 | 48.7 |
| DC03 | DSGND0SN | 0 | 50 | 0 | 3 | 20 | 30 | 50 | 21.0 | 17.4 | 3.6 | 38.4 |
| DC04 | SEMIQA | 0 | 50 | 5 | 10 | 25 | 39 | 50 | 26.0 | 13.8 | 12.2 | 39.8 |
| DC05 | ACTNOTBK | 0 | 50 | 10 | 40 | 40 | 48 | 50 | 37.5 | 12.9 | 24.6 | 50.4 |
| DC06 | UNITDEVF | 0 | 50 | 0 | 0 | 0 | 0 | 10 | 1.5 | 3.7 | -2.2 | 5.2 |
| DC07 | TESTPLAN | 0 | 50 | 10 | 14 | 35 | 40 | 50 | 31.3 | 13.8 | 17.4 | 45.1 |
| DC08 | USERSSYS | 0 | 50 | 10 | 36 | 40 | 48 | 50 | 38.8 | 10.2 | 28.5 | 49.0 |
| DC09 | FTUSERS | 0 | 50 | 20 | 43 | 50 | 50 | 50 | 46.0 | 8.2 | 37.8 | 54.2 |
| DC10 | WEEKMNTN | 0 | 50 | 25 | 40 | 40 | 40 | 50 | 39.5 | 6.7 | 32.8 | 46.2 |
| DCB1 | TOTAL | 0 | 500 | 160 | 248 | 330 | 365 | 450 | 304.3 | 83.3 | 221.0 | 387.5 |

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Figure A.1.3-2. Documentation: Cluster Map for 20 Independent Systems

Table A.1.3-5. Documentation: Summary Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| DC01 | SELFORMS | 0 | 50 | 0 | 10 | 40 | 50 | 50 | 31.7 | 20.6 | 11.1 | 52.3 |
| DC02 | DSGND0C | 0 | 50 | 20 | 20 | 40 | 45 | 50 | 35.6 | 12.4 | 23.2 | 47.9 |
| DC03 | DSGNDCSI | 0 | 50 | 0 | 5 | 20 | 40 | 50 | 22.2 | 19.2 | 3.0 | 41.4 |
| DC04 | SEMIQA | 0 | 50 | 10 | 10 | 10 | 38 | 50 | 22.2 | 15.8 | 6.4 | 38.1 |
| DC05 | ACTNOTBK | 0 | 50 | 10 | 20 | 40 | 50 | 50 | 35.6 | 15.9 | 19.7 | 51.5 |
| DC06 | UNITDEVF | 0 | 50 | 0 | 0 | 0 | 10 | 10 | 3.3 | 5.0 | -1.7 | 8.3 |
| DC07 | TESTPLAN | 0 | 50 | 10 | 20 | 40 | 40 | 50 | 32.8 | 13.9 | 18.8 | 46.7 |
| DC08 | USERSSYS | 0 | 50 | 10 | 25 | 40 | 45 | 50 | 35.0 | 13.2 | 21.8 | 48.2 |
| DC09 | FTUSERS | 0 | 50 | 30 | 40 | 50 | 50 | 50 | 44.4 | 7.3 | 37.2 | 51.7 |
| DC10 | WEEKMNTH | 0 | 50 | 25 | 30 | 40 | 48 | 50 | 38.9 | 8.9 | 30.0 | 47.8 |
| DC81 | TOTAL | 0 | 500 | 160 | 175 | 345 | 385 | 450 | 301.7 | 107.5 | 194.1 | 409.2 |

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| NUMBER OF CLUSTERS | PRCD | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | 1 | 7 | 5 | 0 | 6 | 2 | 3 | 4 | 9 |
| | 0 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 9 | * | * | * | * | * | * | * | * | * |
| 8 | ***** | | * | * | * | * | * | * | * |
| 7 | ***** | | * | * | * | ***** | * | * | * |
| 6 | ***** | | * | * | * | ***** | ***** | * | * |
| 5 | ***** | | ***** | * | * | ***** | ***** | * | * |
| 4 | ***** | ***** | | * | * | ***** | ***** | * | * |
| 3 | ***** | ***** | ***** | | * | ***** | ***** | * | * |
| 2 | ***** | ***** | ***** | ***** | | ***** | ***** | * | * |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |

Figure A.1.3-3. Documentation: Cluster Map for 9 Large Systems

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Table A.1.3-6. Documentation: Summary Statistics for
11 Small Systems

| CODE | NAME | -ALLOWED-RANGE- | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|-----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| DCO1 | SELFORMS | 0 | 50 | 10 | 10 | 20 | 40 | 40 | 23.6 | 13.6 | 10.0 | 37.3 |
| DCO2 | DSGNDCC | 0 | 50 | 10 | 30 | 40 | 50 | 50 | 35.5 | 14.4 | 21.1 | 49.9 |
| DCO3 | DSGNDCSN | 0 | 50 | 0 | 0 | 20 | 30 | 50 | 20.0 | 16.7 | 3.3 | 36.7 |
| DCO4 | SEMIQA | 0 | 50 | 5 | 25 | 25 | 40 | 50 | 29.1 | 11.8 | 17.3 | 40.9 |
| DCO5 | ACTNOTBK | 0 | 50 | 10 | 40 | 40 | 40 | 50 | 39.1 | 10.4 | 28.6 | 49.5 |
| DCO6 | UNITDEVF | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| DCO7 | TESTPLAN | 0 | 50 | 10 | 10 | 35 | 40 | 50 | 30.0 | 14.3 | 15.7 | 44.3 |
| DCO8 | USERSSYS | 0 | 50 | 30 | 40 | 40 | 50 | 50 | 41.8 | 6.0 | 35.8 | 47.8 |
| DCO9 | FTUSERS | 0 | 50 | 20 | 50 | 50 | 50 | 50 | 47.3 | 9.0 | 38.2 | 56.3 |
| DC10 | WEEKMNTH | 0 | 50 | 30 | 40 | 40 | 40 | 50 | 40.0 | 4.5 | 35.5 | 44.5 |
| DCB1 | TOTAL | 0 | 500 | 175 | 270 | 330 | 350 | 390 | 306.4 | 62.6 | 243.8 | 369.0 |

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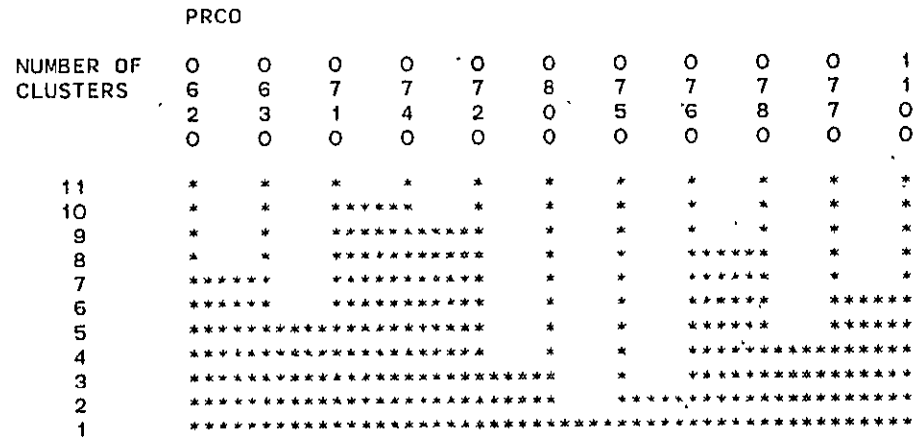


Figure A.1.3-4. Documentation: Cluster Map for 11 Small Systems

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A.1.4 SOFTWARE ENGINEERING METHODOLOGY

| | | | | | | |
|----|----|------------|----|---|----|-------------|
| -- | -- | Objective | -- | X | -- | Subjective |
| -- | -- | Absolute | -- | X | -- | Relative |
| -- | -- | Explicit | -- | X | -- | Derived |
| -- | -- | Static | -- | X | -- | Dynamic |
| -- | -- | Predictive | -- | X | -- | Explanatory |

This category comprises the weighted sum of the Practices and Techniques, Tools, and Documentation categories.

The remainder of this subsection contains tables and figures that describe the Software Engineering Methodology measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.1.4-1)
- Values of the measures for 25 systems (Table A.1.4-2), where large values indicate a high degree of use
- Summary statistics for 11 projects (Table A.1.4-3)
- Cluster map for 11 projects (Figure A.1.4-1)
- Summary statistics for 20 independent systems (Table A.1.4-4)
- Cluster map for 20 independent systems (Figure A.1.4-2)
- Summary statistics for 9 large systems (Table A.1.4-5)
- Cluster map for 9 large systems (Figure A.1.4-3)
- Summary statistics for 11 small systems (Table A.1.4-6)
- Cluster map for 11 small systems (Figure A.1.4-4)

Table A.1.4-1. Software Engineering Total: Description of Measures

| <u>Code</u> | <u>Measure</u> | <u>Range</u> | | <u>Description</u> |
|-------------|----------------|--------------|-------------|------------------------------|
| | | <u>Low</u> | <u>High</u> | |
| SE81 | SWENGNER | 0000 | 2000 | Sum MT84, TS81*500/600, DC81 |

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Table A.1.4-2. Software Engineering Total: Values of the Measures for 25 Systems

| PRCO | SEB1 |
|------|------|
| 0100 | 1283 |
| 0200 | 530 |
| 0300 | 573 |
| 0400 | 617 |
| 0500 | 1430 |
| 0600 | 1493 |
| 0700 | 1017 |
| 0800 | 1482 |
| 0900 | 902 |
| 1000 | 1152 |
| 1100 | 900 |
| 9000 | 993 |
| 0610 | 1523 |
| 0620 | 1172 |
| 0630 | 1264 |
| 0631 | 1490 |
| 0632 | 692 |
| 0710 | 1020 |
| 0720 | 1275 |
| 0730 | 1046 |
| 0740 | 897 |
| 0750 | 625 |
| 0760 | 892 |
| 0770 | 1142 |
| 0780 | 1025 |

Table A.1.4-3. Software Engineering Total: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|---------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| SE81 | SWENGER | 0 | 2000 | 530 | 617 | 1017 | 1430 | 1493 | 1034.5 | 363.3 | 671.1 | 1397.8 |

| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 1 | 0 | 5 | 6 | 8 | 2 | 3 | 4 | 7 | 9 | 1 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | * |
| 9 | * | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * | * |

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Figure A.1.4-1. Software Engineering Total: Cluster Map for 11 Projects

Table A.1.4-4. Software Engineering Total: Summary Statistics for
20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|---------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| SE81 | SWENGER | 0 | 2000 | 530 | 893 | 1036 | 1272 | 1523 | 1037.5 | 298.8 | 738.7 | 1336.3 |

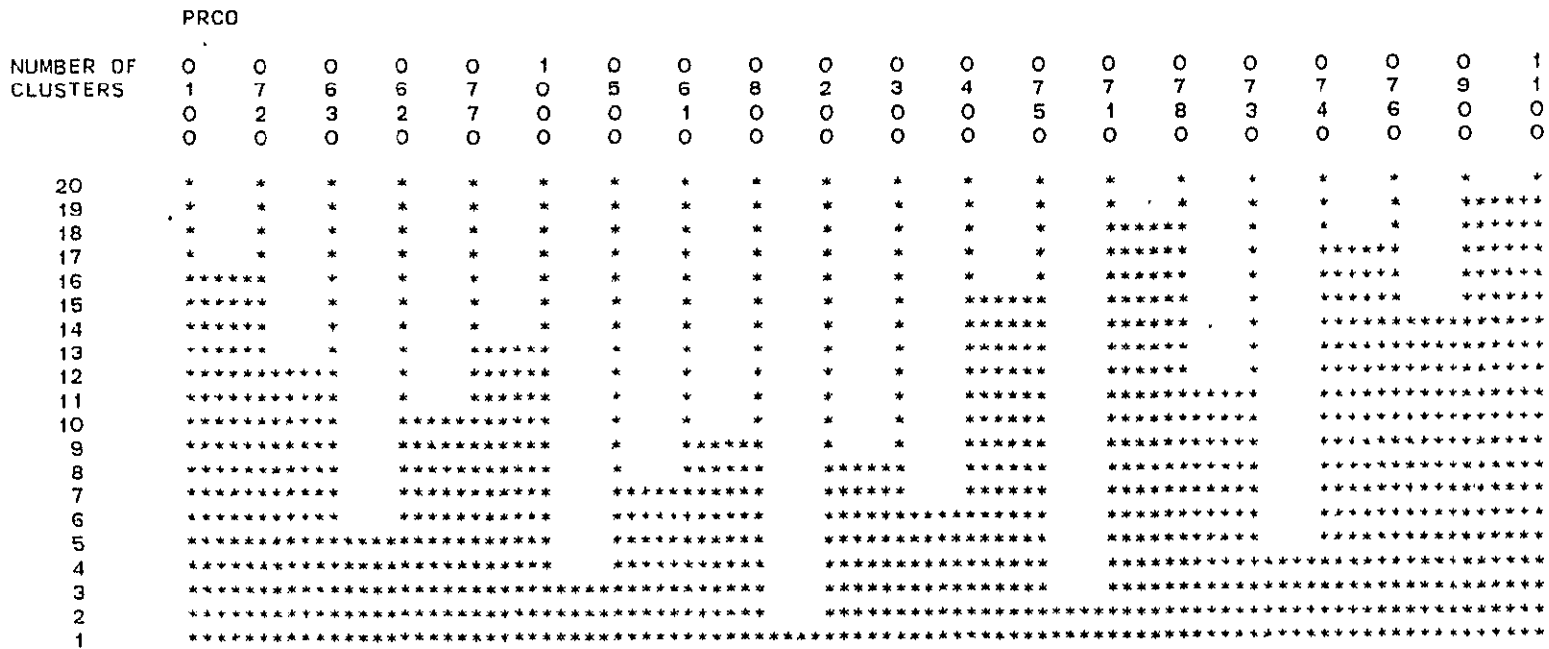


Figure A.1.4-2. Software Engineering Total: Cluster Map for 20 Independent Systems

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Table A.1.4-5. Software Engineering Total: Summary
 Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|---------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| SE81 | SWENGER | 0 | 2000 | 530 | 595 | 1046 | 1357 | 1523 | 1006.2 | 374.7 | 631 | 1380.9 |

| NUMBER OF CLUSTERS | PRCO | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|
| | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1 | 7 | 0 | 5 | 6 | 2 | 3 | 4 | 9 |
| | 0 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|---|---|
| 9 | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | ***** | * | * | * |
| 7 | * | * | * | * | * | ***** | ***** | * | * |
| 6 | * | * | * | ***** | ***** | ***** | ***** | * | * |
| 5 | * | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 4 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |

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Figure A.1.4-3. Software Engineering Total: Cluster Map for 9 Large Systems

Table A.1.4-6. Software Engineering Total: Summary Statistics
for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE- | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|-----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| SEB1 | SWENGNER | 0 | 2000 | 625 | 897 | 1025 | 1264 | 1482 | 1063.1 | 236.1 | 827 0 | 1299 2 |

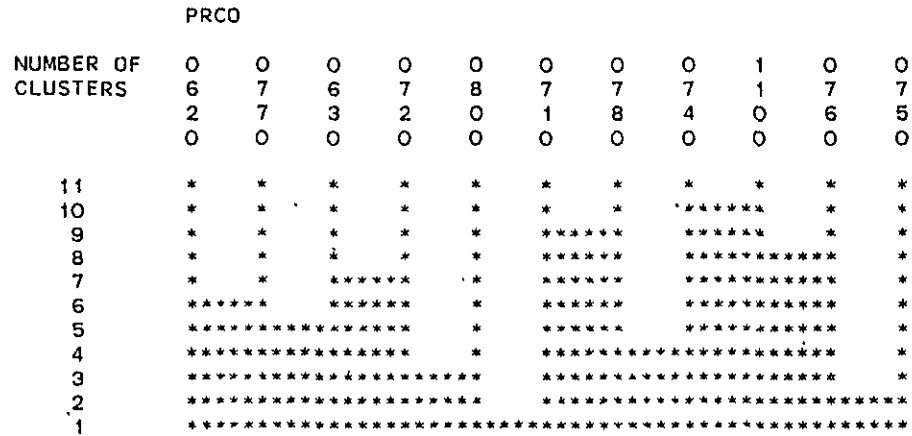


Figure A.1.4-4. Software Engineering Total: Cluster Map for 11 Small Systems

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A.2 DEVELOPMENT TEAM ABILITY CLASS OF MEASURES

The Development Team Ability class measures the

- Development Team's Experience With the Application (AP01 through AP15)
 - Sums (AP81 through AP84)
- Manager's Effectiveness (MG01 through MG35)
 - Preliminary Design (MG01 through MG06)
 - Detailed Design (MG07 through MG12)
 - Implementation (MG13 through MG18)
 - System Testing (MG19 through MG24)
 - Acceptance Testing (MG25 through MG30)
 - Stability (MG31 through MG35)
 - Sums (MG81 through MG93)
- Development Team's Performance (PF01 through PF40)
 - Design (PF01 through PF10)
 - Implementation (PF11 through PF20)
 - Testing (PF21 through PF30)
 - Overall (PF31 through PF40)
- Development Team's Ability
 - Sums (AB81 through AB92)

A.2.1 EXPERIENCE WITH APPLICATION

| | | | |
|--------------|------------|--------------|------------|
| <u> X </u> | Objective | <u> X </u> | Subjective |
| <u> — </u> | Absolute | <u> X </u> | Relative |
| <u> — </u> | Explicit | <u> X </u> | Derived |
| <u> X </u> | Static | <u> — </u> | Dynamic |
| <u> X </u> | Predictive | <u> — </u> | Explanator |

This category measures how familiar the development team is with the application. Development personnel are a part of the development environment. These measures are scaled values derived from objective data. For example, Participation in Design (AP11) is computed by scaling the percentage of the development team that participated in design as

follows. Fifty-percent participation is assigned a value of 0, 60-percent participation is assigned a value of 10, 70-percent participation is assigned a value of 20, and so on. They are static as long as the method of derivation remains unchanged. They are predictive measures as long as most development team members stay with the team.

The remainder of this subsection contains tables and figures that describe the Experience With Application measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.2.1-1)
- Values of the measures for 25 systems (Table A.2.1-2), where large values indicate more experience
- Summary statistics for 11 projects (Table A.2.1-3)
- Cluster map for 11 projects (Figure A.2.1-1)
- Summary statistics for 20 independent systems (Table A.2.1-4)
- Cluster map for 20 independent systems (Figure A.2.1-2)
- Summary statistics for 9 large systems (Table A.2.1-5)
- Cluster map for 9 large systems (Figure A.2.1-3)
- Summary statistics for 11 small systems (Table A.2.1-6)
- Cluster map for 11 small systems (Figure A.2.1-4)

Table A.2.1-1. Experience With Application: Description of Measures

| Code | Measure | Range | | Description |
|------|----------|-------|------|--|
| | | Low | High | |
| AP01 | EXPERT1 | 00 | 50 | Expert 1 |
| AP02 | EXPERT2 | 00 | 50 | Expert 2 |
| AP03 | EXPERT3 | 00 | 50 | Expert 3 |
| AP04 | EXPERT4 | 00 | 50 | Expert 4 |
| AP05 | EXPERT5 | 00 | 50 | Expert 5 |
| AP06 | PROJMGR | 00 | 50 | Project Manager |
| AP07 | PROJLEAD | 00 | 50 | Project Leader |
| AP08 | PROGRMER | 00 | 50 | Programmers |
| AP09 | ANALYSTS | 00 | 50 | Analysts |
| AP10 | REQSPART | 00 | 50 | Participation in Requirements Definition |
| AP11 | DSGNPART | 00 | 50 | Participation in Design |
| AP12 | TINTERAC | 00 | 50 | Team Interactions Before Project |
| AP13 | | 00 | 00 | Not Defined |
| AP14 | | 00 | 00 | Not Defined |
| AP15 | | 00 | 00 | Not Defined |
| AP81 | EXPERTS | 000 | 250 | Sum AP01 Through AP05 |
| AP82 | TEAMEXP | 000 | 150 | Sum AP06 Through AP08 |
| AP83 | TEAMFAML | 000 | 150 | Sum AP10 Through AP12 |
| AP84 | TOTAL | 000 | 600 | Sum AP01 Through AP12 |

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Table A.2.1-2. Experience With Application: Values of the Measures for 25 Systems

| PRCD | APO1 | APO2 | APO3 | APO4 | APO5 | APO6 | APO7 | APO8 | APO9 | AP 10 |
|------|------|------|------|------|------|------|------|------|------|-------|
| 0100 | 10 | 0 | 50 | 40 | 0 | 50 | 20 | 30 | 40 | 10 |
| 0200 | 0 | 0 | 0 | 0 | 40 | 40 | 20 | 30 | 50 | 30 |
| 0300 | 5 | 0 | 30 | 5 | 0 | 30 | 20 | 25 | 40 | 30 |
| 0400 | 0 | 0 | 0 | 0 | 0 | 40 | 20 | 30 | 30 | 30 |
| 0500 | 0 | 0 | 50 | 50 | 40 | 30 | 20 | 50 | 40 | 0 |
| 0600 | 0 | 0 | 50 | 50 | 0 | 30 | 30 | 40 | 30 | 0 |
| 0700 | 0 | 0 | 40 | 0 | 40 | 40 | 20 | 35 | 50 | 10 |
| 0800 | 0 | 0 | 50 | 0 | 50 | 50 | 30 | 50 | 50 | 30 |
| 0900 | 0 | 0 | 10 | 0 | 20 | 30 | 10 | 50 | 40 | 0 |
| 1000 | 0 | 0 | 25 | 10 | 10 | 40 | 30 | 40 | 40 | 0 |
| 1100 | 0 | 0 | 25 | 0 | 10 | 40 | 10 | 20 | 40 | 0 |
| 9000 | 0 | 0 | 20 | 5 | 15 | 35 | 20 | 40 | 40 | 0 |
| 0610 | 0 | 0 | 50 | 50 | 0 | 30 | 30 | 40 | 30 | 0 |
| 0620 | 0 | 0 | 30 | 30 | 0 | 30 | 30 | 50 | 30 | 0 |
| 0630 | 0 | 0 | 40 | 40 | 0 | 40 | 30 | 40 | 30 | 0 |
| 0631 | 0 | 0 | 50 | 50 | 0 | 30 | 30 | 40 | 30 | 0 |
| 0632 | 0 | 0 | 10 | 10 | 0 | 50 | 10 | 10 | 30 | 0 |
| 0710 | 0 | 0 | 30 | 0 | 20 | 40 | 20 | 40 | 50 | 10 |
| 0720 | 0 | 0 | 30 | 0 | 50 | 40 | 20 | 50 | 50 | 10 |
| 0730 | 0 | 0 | 40 | 0 | 20 | 40 | 30 | 20 | 50 | 10 |
| 0740 | 0 | 0 | 20 | 0 | 20 | 40 | 20 | 0 | 50 | 10 |
| 0750 | 0 | 0 | 20 | 0 | 20 | 40 | 20 | 0 | 50 | 10 |
| 0760 | 0 | 0 | 30 | 0 | 50 | 40 | 20 | 50 | 50 | 10 |
| 0770 | 0 | 0 | 20 | 0 | 20 | 40 | 20 | 50 | 50 | 10 |
| 0780 | 0 | 0 | 30 | 0 | 0 | 40 | 10 | 30 | 50 | 0 |

| PRCD | AP 11 | AP 12 | AP81 | AP82 | AP83 | AP84 |
|------|-------|-------|------|------|------|------|
| 0100 | 30 | 20 | 100 | 100 | 60 | 260 |
| 0200 | 20 | 20 | 40 | 90 | 70 | 200 |
| 0300 | 20 | 30 | 40 | 75 | 80 | 195 |
| 0400 | 20 | 50 | 0 | 90 | 100 | 190 |
| 0500 | 50 | 40 | 140 | 100 | 90 | 330 |
| 0600 | 10 | 20 | 100 | 100 | 30 | 230 |
| 0700 | 10 | 30 | 80 | 95 | 50 | 225 |
| 0800 | 10 | 0 | 100 | 130 | 40 | 270 |
| 0900 | 20 | 10 | 30 | 90 | 30 | 150 |
| 1000 | 20 | 50 | 45 | 110 | 70 | 225 |
| 1100 | 50 | 30 | 35 | 70 | 80 | 185 |
| 9000 | 25 | 30 | 40 | 95 | 55 | 190 |
| 0610 | 20 | 20 | 100 | 100 | 40 | 240 |
| 0620 | 50 | 30 | 60 | 110 | 80 | 250 |
| 0630 | 30 | 10 | 80 | 110 | 40 | 230 |
| 0631 | 30 | 10 | 100 | 100 | 40 | 240 |
| 0632 | 50 | 10 | 20 | 70 | 60 | 150 |
| 0710 | 30 | 10 | 50 | 100 | 50 | 200 |
| 0720 | 50 | 30 | 80 | 110 | 90 | 280 |
| 0730 | 30 | 0 | 60 | 90 | 40 | 190 |
| 0740 | 50 | 0 | 40 | 60 | 60 | 160 |
| 0750 | 10 | 0 | 40 | 60 | 20 | 120 |
| 0760 | 30 | 0 | 80 | 110 | 40 | 230 |
| 0770 | 30 | 10 | 40 | 110 | 50 | 200 |
| 0780 | 30 | 0 | 30 | 80 | 30 | 140 |

Table A.2.1-3. Experience With Application: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| AP01 | EXPERT1 | 0 | 50 | 0 | 0 | 0 | 0 | 10 | 1.4 | 3.2 | -1.9 | 4.6 |
| AP02 | EXPERT2 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| AP03 | EXPERT3 | 0 | 50 | 0 | 10 | 30 | 50 | 50 | 30.0 | 19.9 | 10.1 | 49.9 |
| AP04 | EXPERT4 | 0 | 50 | 0 | 0 | 0 | 40 | 50 | 14.1 | 21.3 | -7.2 | 35.4 |
| AP05 | EXPERT5 | 0 | 50 | 0 | 0 | 10 | 40 | 50 | 19.1 | 19.7 | -0.6 | 38.8 |
| AP06 | PROJMGR | 0 | 50 | 30 | 30 | 40 | 40 | 50 | 38.2 | 7.5 | 30.7 | 45.7 |
| AP07 | PROJLEAD | 0 | 50 | 10 | 20 | 20 | 30 | 30 | 20.9 | 7.0 | 13.9 | 27.9 |
| AP08 | PROGRMER | 0 | 50 | 20 | 30 | 35 | 50 | 50 | 36.4 | 10.5 | 25.9 | 46.9 |
| AP09 | ANALYSTS | 0 | 50 | 30 | 40 | 40 | 50 | 50 | 40.9 | 7.0 | 33.9 | 47.9 |
| AP10 | REQSPART | 0 | 50 | 0 | 0 | 10 | 30 | 30 | 12.7 | 14.2 | -1.5 | 26.9 |
| AP11 | DSGNPART | 0 | 50 | 10 | 10 | 20 | 30 | 50 | 23.6 | 14.3 | 9.3 | 38.0 |
| AP12 | TINTERAC | 0 | 50 | 0 | 20 | 30 | 40 | 50 | 27.3 | 15.6 | 11.7 | 42.8 |
| AP81 | EXPERTS | 0 | 250 | 0 | 35 | 45 | 100 | 140 | 64.5 | 41.9 | 22.7 | 106.4 |
| AP82 | TEAMEXP | 0 | 150 | 70 | 90 | 95 | 100 | 130 | 95.5 | 16.2 | 79.3 | 111.6 |
| AP83 | TEAMFAML | 0 | 150 | 30 | 40 | 70 | 80 | 100 | 63.6 | 23.8 | 39.9 | 87.4 |
| AP84 | TOTAL | 0 | 600 | 150 | 190 | 225 | 260 | 330 | 223.6 | 49.2 | 174.4 | 272.9 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|-------|-------|-------|---|---|---|---|---|-------|---|---|
| | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| | 1 | 6 | 7 | 0 | 8 | 5 | 2 | 3 | 1 | 4 | 9 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | * |
| 9 | ***** | * | * | * | * | * | * | * | ***** | * | * |
| 8 | ***** | | ***** | * | * | * | * | * | ***** | * | * |
| 7 | ***** | | ***** | * | * | * | * | * | ***** | * | * |
| 6 | ***** | | ***** | * | * | * | * | * | ***** | * | * |
| 5 | ***** | ***** | ***** | * | * | * | * | * | ***** | * | * |
| 4 | ***** | ***** | ***** | * | * | * | * | * | ***** | * | * |
| 3 | ***** | ***** | ***** | * | * | * | * | * | ***** | * | * |
| 2 | ***** | ***** | ***** | * | * | * | * | * | ***** | * | * |
| 1 | ***** | ***** | ***** | * | * | * | * | * | ***** | * | * |

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Figure A.2.1-1. Experience With Application: Cluster Map for 11 Projects

Table A.2.1-4. Experience With Application: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| AP01 | EXPERT1 | 0 | 50 | 0 | 0 | 0 | 0 | 10 | 0.8 | 2.4 | -1.7 | 3.2 |
| AP02 | EXPERT2 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| AP03 | EXPERT3 | 0 | 50 | 0 | 20 | 30 | 40 | 50 | 29.0 | 15.1 | 13.9 | 44.1 |
| AP04 | EXPERT4 | 0 | 50 | 0 | 0 | 0 | 25 | 50 | 11.3 | 18.8 | -7.5 | 30.0 |
| AP05 | EXPERT5 | 0 | 50 | 0 | 0 | 20 | 35 | 50 | 18.5 | 18.4 | 0.1 | 36.9 |
| AP06 | PROJMgr | 0 | 50 | 30 | 33 | 40 | 40 | 50 | 38.5 | 5.9 | 32.6 | 44.4 |
| AP07 | PROJLEAD | 0 | 50 | 10 | 20 | 20 | 30 | 30 | 21.5 | 6.7 | 14.8 | 28.2 |
| AP08 | PROGRMER | 0 | 50 | 0 | 26 | 40 | 50 | 50 | 34.8 | 15.9 | 18.9 | 50.6 |
| AP09 | ANALYSTS | 0 | 50 | 30 | 40 | 45 | 50 | 50 | 43.0 | 8.0 | 35.0 | 51.0 |
| AP10 | REQSPART | 0 | 50 | 0 | 0 | 10 | 10 | 30 | 10.0 | 11.2 | -1.2 | 21.2 |
| AP11 | DSGNPART | 0 | 50 | 10 | 20 | 30 | 45 | 50 | 30.0 | 13.4 | 16.6 | 43.4 |
| AP12 | TINTERAC | 0 | 50 | 0 | 0 | 15 | 30 | 50 | 18.0 | 16.7 | 1.3 | 34.7 |
| AP81 | EXPERTS | 0 | 250 | 0 | 40 | 48 | 80 | 140 | 59.5 | 33.0 | 26.5 | 92.5 |
| AP82 | TEAMEXP | 0 | 150 | 60 | 83 | 100 | 110 | 130 | 94.8 | 18.5 | 76.3 | 113.2 |
| AP83 | TEAMFAML | 0 | 150 | 20 | 40 | 55 | 80 | 100 | 58.0 | 23.3 | 34.7 | 81.3 |
| AP84 | TOTAL | 0 | 600 | 120 | 186 | 200 | 248 | 330 | 212.3 | 51.2 | 161.0 | 263.5 |

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Figure A.2.1-2. Experience With Application: Cluster Map for 20 Independent Systems

Table A.2.1-5. Experience With Application: Summary Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE | | -ACTUAL-RANGE- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|----------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| APO1 | EXPERT1 | 0 | 50 | 0 | 0 | 0 | 3 | 10 | 1.7 | 3.5 | -1.9 | 5.2 |
| APO2 | EXPERT2 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| APO3 | EXPERT3 | 0 | 50 | 0 | 5 | 30 | 50 | 50 | 28.3 | 20.9 | 7.4 | 49.2 |
| APO4 | EXPERT4 | 0 | 50 | 0 | 0 | 5 | 45 | 50 | 17.2 | 22.5 | -5.3 | 39.7 |
| APC5 | EXPERT5 | 0 | 50 | 0 | 0 | 10 | 30 | 40 | 14.4 | 16.7 | -2.2 | 31.1 |
| APO6 | PROJMGR | 0 | 50 | 30 | 30 | 40 | 40 | 50 | 36.7 | 7.1 | 29.6 | 43.7 |
| APO7 | PROJLEAD | 0 | 50 | 10 | 20 | 20 | 30 | 30 | 22.2 | 6.7 | 15.6 | 28.9 |
| APO8 | PROGRMER | 0 | 50 | 20 | 28 | 30 | 45 | 50 | 35.0 | 10.6 | 24.4 | 45.6 |
| APO9 | ANALYSTS | 0 | 50 | 30 | 35 | 40 | 45 | 50 | 40.0 | 7.1 | 32.9 | 47.1 |
| AP10 | REQSPART | 0 | 50 | 0 | 0 | 10 | 30 | 30 | 12.2 | 13.9 | -1.7 | 26.2 |
| AP11 | DSGNPART | 0 | 50 | 20 | 20 | 20 | 30 | 50 | 25.6 | 10.1 | 15.4 | 35.7 |
| AP12 | TINTERAC | 0 | 50 | 0 | 15 | 20 | 45 | 50 | 26.7 | 17.3 | 9.3 | 44.0 |
| AP81 | EXPERTS | 0 | 250 | 0 | 35 | 45 | 100 | 140 | 61.7 | 43.4 | 18.2 | 105.1 |
| AP82 | TEAMEXP | 0 | 150 | 75 | 90 | 90 | 100 | 110 | 93.9 | 9.9 | 84.0 | 103.8 |
| AP83 | TEAMFAML | 0 | 150 | 30 | 40 | 70 | 85 | 100 | 64.4 | 24.0 | 40.4 | 88.5 |
| AP84 | TOTAL | 0 | 600 | 150 | 190 | 200 | 250 | 330 | 220.0 | 52.3 | 167.7 | 272.3 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | |
|--------------------|-------|---|-------|---|---|---|---|---|---|--|
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | |
| | 1 | 6 | 5 | 2 | 3 | 7 | 0 | 9 | 4 | |
| | 0 | 1 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 9 | * | * | * | * | * | * | * | * | * | |
| 8 | ***** | * | * | * | * | * | * | * | * | |
| 7 | ***** | * | ***** | * | * | * | * | * | * | |
| 6 | ***** | * | ***** | * | * | * | * | * | * | |
| 5 | ***** | * | ***** | * | * | * | * | * | * | |
| 4 | ***** | * | ***** | * | * | * | * | * | * | |
| 3 | ***** | * | ***** | * | * | * | * | * | * | |
| 2 | ***** | * | ***** | * | * | * | * | * | * | |
| 1 | ***** | * | ***** | * | * | * | * | * | * | |

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Figure A.2.1-3. Experience With Application: Cluster Map for 9 Large Systems

Table A.2.1-6. Experience With Application: Summary Statistics for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| AP01 | EXPERT1 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| AP02 | EXPERT2 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| AP03 | EXPERT3 | 0 | 50 | 20 | 20 | 30 | 30 | 50 | 29.5 | 9.1 | 20.5 | 38.6 |
| AP04 | EXPERT4 | 0 | 50 | 0 | 0 | 0 | 0 | 40 | 6.4 | 14.3 | -8.0 | 20.7 |
| AP05 | EXPERT5 | 0 | 50 | 0 | 0 | 20 | 50 | 50 | 21.8 | 19.9 | 1.9 | 41.7 |
| AP06 | PROJMGR | 0 | 50 | 30 | 40 | 40 | 40 | 50 | 40.0 | 4.5 | 35.5 | 44.5 |
| AP07 | PROJLEAD | 0 | 50 | 10 | 20 | 20 | 30 | 30 | 20.9 | 7.0 | 13.9 | 27.9 |
| AP08 | PROGRMER | 0 | 50 | 0 | 20 | 40 | 50 | 50 | 34.5 | 19.7 | 14.9 | 54.2 |
| AP09 | ANALYSTS | 0 | 50 | 30 | 40 | 50 | 50 | 50 | 45.5 | 8.2 | 37.3 | 53.7 |
| AP10 | REQSPART | 0 | 50 | 0 | 0 | 10 | 10 | 30 | 8.2 | 8.7 | -0.6 | 16.9 |
| AP11 | DSGNPART | 0 | 50 | 10 | 30 | 30 | 50 | 50 | 33.6 | 15.0 | 18.6 | 48.7 |
| AP12 | TINTERAC | 0 | 50 | 0 | 0 | 10 | 30 | 30 | 10.9 | 13.0 | -2.1 | 23.9 |
| AP81 | EXPERTS | 0 | 250 | 30 | 40 | 50 | 80 | 100 | 57.7 | 23.6 | 34.1 | 81.3 |
| AP82 | TEAMEXP | 0 | 150 | 60 | 70 | 110 | 110 | 130 | 95.5 | 23.8 | 71.6 | 119.3 |
| AP83 | TEAMFAML | 0 | 150 | 20 | 40 | 50 | 80 | 90 | 52.7 | 22.4 | 30.3 | 75.1 |
| AP84 | TOTAL | 0 | 600 | 120 | 160 | 200 | 250 | 280 | 205.9 | 52.0 | 153.9 | 257.9 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| | 6 | 6 | 7 | 7 | 7 | 7 | 8 | 7 | 1 | 7 | 7 |
| | 2 | 3 | 1 | 7 | 6 | 2 | 0 | 4 | 0 | 5 | 8 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | |
|----|-------|---|-------|---|---|---|---|-------|---|-------|---|
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | ***** | * | * | * | * | * | * | * | * |
| 9 | * | * | ***** | * | * | * | * | ***** | * | * | * |
| 8 | * | * | ***** | * | * | * | * | ***** | * | ***** | * |
| 7 | ***** | * | ***** | * | * | * | * | ***** | * | ***** | * |
| 6 | ***** | * | ***** | * | * | * | * | ***** | * | ***** | * |
| 5 | ***** | * | ***** | * | * | * | * | ***** | * | ***** | * |
| 4 | ***** | * | ***** | * | * | * | * | ***** | * | ***** | * |
| 3 | ***** | * | ***** | * | * | * | * | ***** | * | ***** | * |
| 2 | ***** | * | ***** | * | * | * | * | ***** | * | ***** | * |
| 1 | ***** | * | ***** | * | * | * | * | ***** | * | ***** | * |

Figure A.2.1-4. Experience With Application: Cluster Map for 11 Small Systems

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A.2.2 EFFECTIVENESS OF MANAGEMENT

| | | | | | | |
|----|----|------------|----|----|----|-------------|
| -- | -- | Objective | -- | X | -- | Subjective |
| -- | -- | Absolute | -- | X | -- | Relative |
| -- | -- | Explicit | -- | X | -- | Derived |
| -- | X | Static | -- | -- | -- | Dynamic |
| -- | X | Predictive | -- | -- | -- | Explanatory |

This category measures how well development team managers direct the project. Development team managers are a part of the development environment. These measures are subjective because they are simple relative ratings of each type of manager. They are static as long as no extreme new cases are added to the sample. They are predictive as long as the managers maintain their same level of performance. The stability subcategory (MG31 through MG35) is explanatory because it measures the number of managers involved with the project; however, typical, average, or trend predictive values can be extracted from the samples.

The remainder of this subsection contains tables and figures that describe the Effectiveness of Management measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.2.2-1)
- Values of the measures for 25 systems (Table A.2.2-2), where large values indicate better management
- Summary statistics for 11 projects (Table A.2.2-3)
- Cluster map for 11 projects (Figure A.2.2-1)
- Summary statistics for 20 independent systems (Table A.2.2-4)
- Cluster map for 20 independent systems (Figure A.2.2-2)

- Summary statistics for 9 large systems
(Table A.2.2-5)
- Cluster map for 9 large systems (Figure A.2.2-3)
- Summary statistics for 11 small systems
(Table A.2.2-6)
- Cluster map for 11 small systems (Figure A.2.2-4)

Table A.2.2-1. Effectiveness of Management: Description of Measures (1 of 2)

| Code | Measure | Range | | Description |
|--------------------|----------|-------|------|---------------------|
| | | Low | High | |
| Preliminary Design | | | | |
| MG01 | PDPJMGR | 00 | 50 | Project Manager |
| MG02 | PDPJLEAD | 00 | 50 | Project Leader |
| MG03 | PDANMGR | 00 | 50 | Analysis Manager |
| MG04 | PDANLEAD | 00 | 50 | Analysis Leader |
| MG05 | PDDVMGR | 00 | 50 | Development Manager |
| MG06 | PDDVLEAD | 00 | 50 | Development Leader |
| Detailed Design | | | | |
| MG07 | DDPJMGR | 00 | 50 | Project Manager |
| MG08 | DDPJLEAD | 00 | 50 | Project Leader |
| MG09 | DDANMGR | 00 | 50 | Analysis Manager |
| MG10 | DDANLEAD | 00 | 50 | Analysis Leader |
| MG11 | DDDVMGR | 00 | 50 | Development Manager |
| MG12 | DDDVLEAD | 00 | 50 | Development Leader |
| Implementation | | | | |
| MG13 | IMPJMGR | 00 | 50 | Project Manager |
| MG14 | IMPJLEAD | 00 | 50 | Project Leader |
| MG15 | IMANMGR | 00 | 50 | Analysis Manager |
| MG16 | IMANLEAD | 00 | 50 | Analysis Leader |
| MG17 | IMDVMGR | 00 | 50 | Development Manager |
| MG18 | IMDVLEAD | 00 | 50 | Development Leader |
| System Testing | | | | |
| MG19 | STPJMGR | 00 | 50 | Project Manager |
| MG20 | STPJLEAD | 00 | 50 | Project Leader |
| MG21 | STANMGR | 00 | 50 | Analysis Manager |
| MG22 | STANLEAD | 00 | 50 | Analysis Leader |
| MG23 | STDVMGR | 00 | 50 | Development Manager |
| MG24 | STDVLEAD | 00 | 50 | Development Leader |

Table A.2.2-1. Effectiveness of Management: Description of Measures (2 of 2)

| Code | Measure | Range | | Description |
|------|----------|-------|------|----------------------------------|
| | | Low | High | |
| | | | | Acceptance Testing |
| MG25 | ATPJMGR | 00 | 50 | Project Manager |
| MG26 | ATPJLEAD | 00 | 50 | Project Leader |
| MG27 | ATANMGR | 00 | 50 | Analysis Manager |
| MG28 | ATANLEAD | 00 | 50 | Analysis Leader |
| MG29 | ATDVMGR | 00 | 50 | Development Manager |
| MG30 | ATDVLEAD | 00 | 50 | Development Leader |
| | | | | Stability |
| MG31 | SBPJMGR | 00 | 50 | Project Manager |
| MG32 | SBPJLEAD | 00 | 50 | Project Leader |
| MG33 | SBANMGR | 00 | 50 | Analysis Manager |
| MG34 | SBANLEAD | 00 | 50 | Analysis Leader |
| MG35 | SBOTHER | 00 | 50 | Other Changes |
| MG81 | PRELIMD | 000 | 300 | Sum MG01 Through MG06 |
| MG82 | DETAILD | 000 | 300 | Sum MG07 Through MG12 |
| MG83 | IMPLMENT | 000 | 300 | Sum MG13 Through MG18 |
| MG84 | SYSTEM | 000 | 300 | Sum MG19 Through MG24 |
| MG85 | ACCEPT | 000 | 300 | Sum MG25 Through MG30 |
| MG86 | STABILTY | 000 | 250 | Sum MG31 Through MG35 |
| MG87 | PROJMGR | 000 | 250 | Sum MG01, MG07, MG13, MG19, MG25 |
| MG88 | PROJLEAD | 000 | 250 | Sum MG02, MG08, MG14, MG20, MG26 |
| MG89 | ANLYSMGR | 000 | 250 | Sum MG03, MG09, MG15, MG21, MG27 |
| MG90 | ANLYSLED | 000 | 250 | Sum MG04, MG10, MG16, MG22, MG28 |
| MG91 | DEVPMGR | 000 | 250 | Sum MG05, MG11, MG17, MG23, MG29 |
| MG92 | DEVLEAD | 000 | 250 | Sum MG06, MG12, MG18, MG24, MG30 |
| MG93 | TOTAL | 0000 | 1750 | Sum MG01 Through MG35 |

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Table A.2.2-2. Effectiveness of Management: Values of the Measures for 25 Systems (1 of 3)

| PRCD | MG01 | MG02 | MG03 | MG04 | MG05 | MG06 | MG07 | MG08 | MG09 | MG10 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 20 | 30 | 30 | 25 | 40 | 40 | 40 | 50 | 20 | 25 |
| 0200 | 0 | 30 | 40 | 40 | 20 | 20 | 0 | 30 | 40 | 40 |
| 0300 | 0 | 0 | 0 | 40 | 20 | 30 | 0 | 0 | 0 | 40 |
| 0400 | 0 | 0 | 0 | 0 | 20 | 40 | 15 | 30 | 0 | 40 |
| 0500 | 50 | 50 | 0 | 30 | 50 | 50 | 50 | 50 | 0 | 30 |
| 0600 | 50 | 50 | 10 | 40 | 40 | 40 | 50 | 50 | 10 | 20 |
| 0700 | 50 | 40 | 0 | 30 | 40 | 40 | 50 | 40 | 10 | 35 |
| 0800 | 50 | 50 | 0 | 40 | 50 | 50 | 50 | 50 | 0 | 40 |
| 0900 | 50 | 20 | 0 | 40 | 50 | 50 | 50 | 20 | 0 | 40 |
| 1000 | 50 | 50 | 0 | 40 | 50 | 50 | 50 | 30 | 0 | 40 |
| 1100 | 50 | 20 | 0 | 40 | 40 | 40 | 50 | 20 | 0 | 40 |
| 9000 | 50 | 35 | 0 | 40 | 50 | 50 | 50 | 25 | 0 | 40 |
| 0610 | 50 | 50 | 10 | 40 | 40 | 40 | 50 | 50 | 10 | 20 |
| 0620 | 50 | 50 | 10 | 40 | 40 | 40 | 50 | 40 | 10 | 20 |
| 0630 | 50 | 40 | 20 | 40 | 20 | 20 | 40 | 40 | 20 | 40 |
| 0631 | 50 | 50 | 20 | 40 | 20 | 20 | 50 | 50 | 20 | 40 |
| 0632 | 50 | 50 | 20 | 40 | 40 | 40 | 40 | 40 | 20 | 40 |
| 0710 | 50 | 30 | 0 | 30 | 40 | 40 | 50 | 30 | 10 | 35 |
| 0720 | 50 | 50 | 0 | 30 | 40 | 40 | 50 | 50 | 10 | 35 |
| 0730 | 50 | 35 | 0 | 30 | 40 | 40 | 50 | 35 | 10 | 35 |
| 0740 | 50 | 30 | 0 | 30 | 40 | 40 | 50 | 30 | 10 | 35 |
| 0750 | 50 | 30 | 0 | 30 | 40 | 40 | 50 | 30 | 10 | 35 |
| 0760 | 50 | 50 | 0 | 30 | 40 | 40 | 50 | 50 | 10 | 35 |
| 0770 | 50 | 30 | 0 | 30 | 40 | 40 | 50 | 30 | 10 | 35 |
| 0780 | 30 | 35 | 20 | 40 | 40 | 40 | 30 | 35 | 20 | 40 |

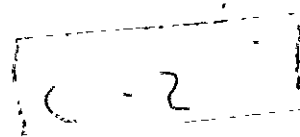
| PRCD | MG11 | MG12 | MG13 | MG14 | MG15 | MG16 | MG17 | MG18 | MG19 | MG20 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 40 | 40 | 40 | 50 | 20 | 25 | 40 | 40 | 50 | 50 |
| 0200 | 20 | 20 | 0 | 30 | 40 | 40 | 10 | 10 | 30 | 30 |
| 0300 | 20 | 30 | 30 | 15 | 0 | 40 | 30 | 40 | 50 | 30 |
| 0400 | 20 | 30 | 30 | 30 | 0 | 40 | 10 | 20 | 30 | 30 |
| 0500 | 50 | 50 | 50 | 50 | 0 | 40 | 40 | 40 | 50 | 50 |
| 0600 | 40 | 40 | 50 | 50 | 15 | 20 | 30 | 40 | 50 | 50 |
| 0700 | 40 | 40 | 50 | 40 | 20 | 40 | 40 | 40 | 50 | 40 |
| 0800 | 50 | 50 | 50 | 50 | 20 | 40 | 50 | 50 | 50 | 50 |
| 0900 | 50 | 50 | 0 | 20 | 20 | 40 | 40 | 30 | 30 | 20 |
| 1000 | 50 | 40 | 30 | 40 | 20 | 40 | 40 | 30 | 50 | 40 |
| 1100 | 40 | 40 | 20 | 20 | 20 | 40 | 40 | 40 | 50 | 20 |
| 9000 | 50 | 45 | 15 | 30 | 20 | 40 | 40 | 30 | 40 | 30 |
| 0610 | 40 | 40 | 50 | 50 | 15 | 20 | 30 | 40 | 50 | 50 |
| 0620 | 40 | 40 | 50 | 40 | 15 | 20 | 30 | 40 | 50 | 40 |
| 0630 | 20 | 20 | 40 | 40 | 20 | 40 | 20 | 20 | 40 | 40 |
| 0631 | 20 | 20 | 50 | 50 | 20 | 40 | 20 | 20 | 50 | 50 |
| 0632 | 50 | 50 | 40 | 40 | 20 | 40 | 50 | 50 | 40 | 40 |
| 0710 | 40 | 40 | 50 | 30 | 20 | 40 | 40 | 40 | 50 | 30 |
| 0720 | 40 | 40 | 50 | 50 | 20 | 40 | 40 | 40 | 50 | 50 |
| 0730 | 40 | 40 | 50 | 35 | 20 | 40 | 40 | 40 | 50 | 35 |
| 0740 | 40 | 40 | 50 | 30 | 20 | 40 | 40 | 40 | 50 | 30 |
| 0750 | 40 | 40 | 50 | 30 | 20 | 40 | 40 | 40 | 50 | 30 |
| 0760 | 40 | 40 | 50 | 50 | 20 | 40 | 40 | 40 | 50 | 50 |
| 0770 | 40 | 40 | 50 | 30 | 20 | 40 | 40 | 40 | 50 | 30 |
| 0780 | 40 | 40 | 50 | 35 | 20 | 40 | 40 | 40 | 50 | 35 |

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Table A.2.2-2. Effectiveness of Management: Values of the Measures for 25 Systems (2 of 3)

| PRCD | MG21 | MG22 | MG23 | MG24 | MG25 | MG26 | MG27 | MG28 | MG29 | MG30 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 10 | 25 | 40 | 40 | 50 | 50 | 20 | 30 | 40 | 40 |
| 0200 | 0 | 40 | 0 | 0 | 30 | 30 | 0 | 40 | 0 | 0 |
| 0300 | 0 | 20 | 40 | 50 | 50 | 30 | 10 | 30 | 40 | 50 |
| 0400 | 0 | 40 | 0 | 10 | 30 | 30 | 10 | 40 | 0 | 0 |
| 0500 | 0 | 40 | 40 | 40 | 50 | 50 | 0 | 40 | 40 | 40 |
| 0600 | 20 | 30 | 20 | 30 | 50 | 50 | 30 | 40 | 20 | 20 |
| 0700 | 20 | 40 | 30 | 30 | 50 | 40 | 20 | 40 | 30 | 30 |
| 0800 | 40 | 40 | 50 | 50 | 50 | 50 | 40 | 40 | 50 | 50 |
| 0900 | 30 | 30 | 40 | 10 | 30 | 20 | 30 | 30 | 40 | 10 |
| 1000 | 30 | 30 | 40 | 30 | 50 | 40 | 30 | 30 | 40 | 30 |
| 1100 | 30 | 40 | 40 | 40 | 50 | 20 | 30 | 40 | 40 | 40 |
| 9000 | 30 | 30 | 40 | 20 | 40 | 30 | 30 | 30 | 40 | 20 |
| 0610 | 20 | 30 | 20 | 30 | 50 | 50 | 30 | 40 | 20 | 20 |
| 0620 | 20 | 30 | 10 | 20 | 50 | 40 | 30 | 40 | 10 | 10 |
| 0630 | 20 | 40 | 0 | 0 | 40 | 40 | 20 | 40 | 10 | 10 |
| 0631 | 20 | 40 | 0 | 0 | 50 | 50 | 20 | 40 | 10 | 10 |
| 0632 | 20 | 40 | 50 | 50 | 40 | 40 | 20 | 40 | 50 | 50 |
| 0710 | 20 | 40 | 30 | 30 | 50 | 30 | 20 | 40 | 30 | 30 |
| 0720 | 20 | 40 | 30 | 30 | 50 | 50 | 20 | 40 | 30 | 30 |
| 0730 | 20 | 40 | 30 | 30 | 50 | 35 | 20 | 40 | 30 | 30 |
| 0740 | 20 | 40 | 30 | 30 | 50 | 30 | 20 | 40 | 30 | 30 |
| 0750 | 20 | 40 | 30 | 30 | 50 | 30 | 20 | 40 | 30 | 30 |
| 0760 | 20 | 40 | 30 | 30 | 50 | 50 | 20 | 40 | 30 | 30 |
| 0770 | 20 | 40 | 30 | 30 | 50 | 30 | 20 | 40 | 30 | 30 |
| 0780 | 20 | 40 | 40 | 40 | 50 | 35 | 20 | 40 | 40 | 40 |

| PRCD | MG31 | MG32 | MG33 | MG34 | MG35 |
|------|------|------|------|------|------|
| 0100 | 0 | 50 | 0 | 50 | 0 |
| 0200 | 0 | 50 | 0 | 50 | 25 |
| 0300 | 20 | 10 | 50 | 0 | 20 |
| 0400 | 40 | 40 | 50 | 40 | 20 |
| 0500 | 50 | 50 | 50 | 20 | 20 |
| 0600 | 50 | 50 | 10 | 0 | 20 |
| 0700 | 50 | 50 | 30 | 10 | 25 |
| 0800 | 50 | 50 | 20 | 20 | 20 |
| 0900 | 30 | 50 | 20 | 20 | 15 |
| 1000 | 30 | 20 | 20 | 20 | 0 |
| 1100 | 30 | 50 | 20 | 20 | 10 |
| 9000 | 30 | 35 | 20 | 20 | 10 |
| 0610 | 50 | 50 | 10 | 0 | 20 |
| 0620 | 50 | 50 | 10 | 0 | 20 |
| 0630 | 50 | 50 | 50 | 50 | 35 |
| 0631 | 50 | 50 | 50 | 50 | 35 |
| 0632 | 50 | 50 | 50 | 50 | 35 |
| 0710 | 50 | 50 | 30 | 10 | 25 |
| 0720 | 50 | 50 | 30 | 10 | 25 |
| 0730 | 50 | 50 | 30 | 10 | 25 |
| 0740 | 50 | 50 | 30 | 10 | 25 |
| 0750 | 50 | 50 | 30 | 10 | 25 |
| 0760 | 50 | 50 | 30 | 10 | 25 |
| 0770 | 50 | 50 | 30 | 10 | 25 |
| 0780 | 50 | 50 | 50 | 50 | 35 |



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Table A.2.2-2. Effectiveness of Management: Values of the Measures for 25 Systems (3 of 3)

| PRCO | MG81 | MG82 | MG83 | MG84 | MG85 | MG86 | MG87 | MG88 | MG89 | MG90 | MG91 | MG92 | MG93 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 185 | 215 | 215 | 215 | 230 | 100 | 200 | 230 | 100 | 130 | 160 | 200 | 1160 |
| 0200 | 150 | 150 | 130 | 100 | 100 | 125 | 60 | 150 | 120 | 200 | 40 | 50 | 755 |
| 0300 | 90 | 90 | 155 | 190 | 210 | 100 | 130 | 75 | 10 | 170 | 120 | 200 | 835 |
| 0400 | 60 | 135 | 130 | 110 | 110 | 190 | 105 | 120 | 10 | 160 | 40 | 100 | 735 |
| 0500 | 230 | 230 | 220 | 220 | 220 | 190 | 250 | 250 | 0 | 180 | 180 | 220 | 1310 |
| 0600 | 230 | 210 | 205 | 200 | 210 | 130 | 250 | 250 | 85 | 150 | 120 | 170 | 1185 |
| 0700 | 200 | 215 | 230 | 210 | 210 | 165 | 250 | 200 | 70 | 185 | 140 | 180 | 1230 |
| 0800 | 240 | 240 | 260 | 280 | 280 | 160 | 250 | 250 | 100 | 200 | 200 | 250 | 1460 |
| 0900 | 210 | 210 | 150 | 160 | 160 | 135 | 160 | 100 | 80 | 180 | 180 | 150 | 1025 |
| 1000 | 240 | 210 | 200 | 220 | 220 | 90 | 220 | 200 | 80 | 180 | 180 | 180 | 1180 |
| 1100 | 190 | 190 | 180 | 220 | 220 | 130 | 220 | 100 | 80 | 200 | 160 | 200 | 1130 |
| 9000 | 225 | 210 | 175 | 190 | 190 | 115 | 195 | 150 | 80 | 180 | 180 | 165 | 1105 |
| 0610 | 230 | 210 | 205 | 200 | 210 | 130 | 250 | 250 | 85 | 150 | 120 | 170 | 1185 |
| 0620 | 230 | 200 | 195 | 170 | 180 | 130 | 250 | 210 | 85 | 150 | 100 | 150 | 1105 |
| 0630 | 190 | 180 | 180 | 140 | 160 | 235 | 210 | 200 | 100 | 200 | 50 | 70 | 1085 |
| 0631 | 200 | 200 | 200 | 160 | 180 | 235 | 250 | 250 | 100 | 200 | 50 | 70 | 1175 |
| 0632 | 240 | 240 | 240 | 240 | 240 | 235 | 210 | 210 | 100 | 200 | 190 | 240 | 1435 |
| 0710 | 190 | 205 | 220 | 200 | 200 | 165 | 250 | 150 | 70 | 185 | 140 | 180 | 1180 |
| 0720 | 210 | 225 | 240 | 220 | 220 | 165 | 250 | 250 | 70 | 185 | 140 | 180 | 1280 |
| 0730 | 195 | 210 | 225 | 205 | 205 | 165 | 250 | 175 | 70 | 185 | 140 | 180 | 1205 |
| 0740 | 190 | 205 | 220 | 200 | 200 | 165 | 250 | 150 | 70 | 185 | 140 | 180 | 1180 |
| 0750 | 190 | 205 | 220 | 200 | 200 | 165 | 250 | 150 | 70 | 185 | 140 | 180 | 1180 |
| 0760 | 210 | 225 | 240 | 220 | 220 | 165 | 250 | 250 | 70 | 185 | 140 | 180 | 1280 |
| 0770 | 190 | 205 | 220 | 200 | 200 | 165 | 250 | 150 | 70 | 185 | 140 | 180 | 1180 |
| 0780 | 205 | 205 | 225 | 225 | 225 | 235 | 210 | 175 | 100 | 200 | 160 | 200 | 1320 |

Table A.2.2-3. Effectiveness of Management: Summary Statistics
for 11 Projects (1 of 2)

| CODE | NAME | --ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|-----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| MG01 | PDPJMGR | 0 | 50 | 0 | 0 | 50 | 50 | 50 | 33.6 | 23.4 | 10.3 | 57.0 |
| MG02 | PDPJLEAD | 0 | 50 | 0 | 20 | 30 | 50 | 50 | 30.9 | 19.2 | 11.7 | 50.1 |
| MG03 | PDANMGR | 0 | 50 | 0 | 0 | 0 | 10 | 40 | 7.3 | 14.2 | -6.9 | 21.5 |
| MG04 | PDANLEAD | 0 | 50 | 0 | 30 | 40 | 40 | 40 | 33.2 | 12.3 | 20.9 | 45.5 |
| MG05 | PDDVMGR | 0 | 50 | 20 | 20 | 40 | 50 | 50 | 38.2 | 12.5 | 25.7 | 50.7 |
| MG06 | PDDVLEAD | 0 | 50 | 20 | 40 | 40 | 50 | 50 | 40.9 | 9.4 | 31.5 | 50.3 |
| MG07 | DDPJMGR | 0 | 50 | 0 | 15 | 50 | 50 | 50 | 36.8 | 21.0 | 15.8 | 57.8 |
| MG08 | DDPJLEAD | 0 | 50 | 0 | 20 | 30 | 50 | 50 | 33.6 | 16.3 | 17.3 | 49.9 |
| MG09 | DDANMGR | 0 | 50 | 0 | 0 | 0 | 10 | 40 | 7.3 | 12.7 | -5.4 | 20.0 |
| MG10 | DDANLEAD | 0 | 50 | 20 | 30 | 40 | 40 | 40 | 35.5 | 7.2 | 28.2 | 42.7 |
| MG11 | DDDVMGR | 0 | 50 | 20 | 20 | 40 | 50 | 50 | 38.2 | 12.5 | 25.7 | 50.7 |
| MG12 | DDDVLEAD | 0 | 50 | 20 | 30 | 40 | 50 | 50 | 39.1 | 9.4 | 29.7 | 48.5 |
| MG13 | IMPJMGR | 0 | 50 | 0 | 20 | 30 | 50 | 50 | 31.8 | 18.9 | 12.9 | 50.7 |
| MG14 | IMPJLEAD | 0 | 50 | 15 | 20 | 40 | 50 | 50 | 35.9 | 13.6 | 22.3 | 49.5 |
| MG15 | IMANMGR | 0 | 50 | 0 | 0 | 20 | 20 | 40 | 15.9 | 12.0 | 3.9 | 27.9 |
| MG16 | IMANLEAD | 0 | 50 | 20 | 40 | 40 | 40 | 40 | 36.8 | 7.2 | 29.7 | 44.0 |
| MG17 | IMDVMGR | 0 | 50 | 10 | 30 | 40 | 40 | 50 | 33.6 | 12.9 | 20.8 | 46.5 |
| MG18 | IMDVLEAD | 0 | 50 | 10 | 30 | 40 | 40 | 50 | 34.5 | 11.3 | 23.3 | 45.8 |
| MG19 | STPJMGR | 0 | 50 | 30 | 30 | 50 | 50 | 50 | 44.5 | 9.3 | 35.2 | 53.9 |
| MG20 | STPJLEAD | 0 | 50 | 20 | 30 | 40 | 50 | 50 | 37.3 | 11.9 | 25.4 | 49.2 |
| MG21 | STANMGR | 0 | 50 | 0 | 0 | 20 | 30 | 40 | 16.4 | 15.0 | 1.3 | 31.4 |
| MG22 | STANLEAD | 0 | 50 | 20 | 30 | 40 | 40 | 40 | 34.1 | 7.4 | 26.7 | 41.4 |
| MG23 | STDVMGR | 0 | 50 | 0 | 20 | 40 | 40 | 50 | 30.9 | 17.0 | 13.9 | 47.9 |
| MG24 | STDVLEAD | 0 | 50 | 0 | 10 | 30 | 40 | 50 | 30.0 | 16.7 | 13.3 | 46.7 |
| MG25 | ATPJMGR | 0 | 50 | 30 | 30 | 50 | 50 | 50 | 44.5 | 9.3 | 35.2 | 53.9 |
| MG26 | ATPJLEAD | 0 | 50 | 20 | 30 | 40 | 50 | 50 | 37.3 | 11.9 | 25.4 | 49.2 |
| MG27 | ATANMGR | 0 | 50 | 0 | 10 | 20 | 30 | 40 | 20.0 | 13.4 | 6.6 | 33.4 |
| MG28 | ATANLEAD | 0 | 50 | 30 | 30 | 40 | 40 | 40 | 36.4 | 5.0 | 31.3 | 41.4 |
| MG29 | ATDVMGR | 0 | 50 | 0 | 20 | 40 | 40 | 50 | 30.9 | 17.0 | 13.9 | 47.9 |
| MG30 | ATDVLEAD | 0 | 50 | 0 | 10 | 30 | 40 | 50 | 28.2 | 18.3 | 9.8 | 46.5 |
| MG31 | SBPJMGR | 0 | 50 | 0 | 20 | 30 | 50 | 50 | 31.8 | 18.9 | 12.9 | 50.7 |
| MG32 | SBPJLEAD | 0 | 50 | 10 | 40 | 50 | 50 | 50 | 42.7 | 14.2 | 28.5 | 56.9 |
| MG33 | SBANMGR | 0 | 50 | 0 | 10 | 20 | 50 | 50 | 24.5 | 18.6 | 5.9 | 43.2 |
| MG34 | SBANLEAD | 0 | 50 | 0 | 10 | 20 | 40 | 50 | 22.7 | 17.4 | 5.4 | 40.1 |
| MG35 | SBOTHR | 0 | 50 | 0 | 10 | 20 | 20 | 25 | 15.9 | 8.9 | 7.0 | 24.8 |
| MG81 | PRELIMD | 0 | 300 | 60 | 150 | 200 | 230 | 240 | 184.1 | 60.7 | 123.4 | 244.8 |
| MG82 | DETAILD | 0 | 300 | 90 | 150 | 210 | 215 | 240 | 190.5 | 46.0 | 144.4 | 236.5 |
| MG83 | IMPLMENT | 0 | 300 | 130 | 150 | 200 | 220 | 260 | 188.6 | 43.0 | 145.7 | 231.6 |
| MG84 | SYSTEM | 0 | 300 | 100 | 160 | 210 | 220 | 280 | 193.2 | 52.2 | 141.0 | 245.3 |
| MG85 | ACCEPT | 0 | 300 | 100 | 160 | 210 | 220 | 280 | 197.3 | 53.3 | 144.0 | 250.6 |
| MG86 | STABILTY | 0 | 250 | 90 | 100 | 130 | 165 | 190 | 137.7 | 34.8 | 102.9 | 172.5 |
| MG87 | PROJMGR | 0 | 250 | 60 | 130 | 220 | 250 | 250 | 191.4 | 67.5 | 123.8 | 258.9 |
| MG88 | PROJLEAD | 0 | 250 | 75 | 100 | 200 | 250 | 250 | 175.0 | 67.9 | 107.1 | 242.9 |
| MG89 | ANLYSMGR | 0 | 250 | 0 | 10 | 80 | 100 | 120 | 66.8 | 41.0 | 25.8 | 107.8 |
| MG90 | ANLYSLED | 0 | 250 | 130 | 160 | 180 | 200 | 200 | 175.9 | 22.2 | 153.7 | 198.1 |

Table A.2.2-3. Effectiveness of Management: Summary Statistics
for 11 Projects (2 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|---------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| MG91 | DEVMGR | 0 | 250 | 40 | 120 | 160 | 180 | 200 | 138.2 | 54.7 | 83.4 | 192.9 |
| MG92 | DEVLEAD | 0 | 250 | 50 | 150 | 180 | 200 | 250 | 172.7 | 56.1 | 116.7 | 228.8 |
| MG93 | TOTAL | 0 | 1750 | 735 | 835 | 1160 | 1230 | 1460 | 1091.4 | 231.5 | 859.8 | 1322.9 |

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| NUMBER OF CLUSTERS | PRCD | | | | | | | | | | |
|--------------------|-------|-------|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | 1 | 6 | 7 | 0 | 9 | 1 | 5 | 8 | 2 | 4 | 3 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | ***** | * | * | * | * | * | * | * | * | * |
| 9 | * | ***** | * | * | * | * | * | * | * | * | * |
| 8 | ***** | ***** | * | * | * | * | * | * | * | * | * |
| 7 | ***** | ***** | * | * | * | * | * | * | * | * | * |
| 6 | ***** | ***** | * | * | * | * | * | * | * | * | * |
| 5 | ***** | ***** | * | * | * | * | * | * | * | * | * |
| 4 | ***** | ***** | * | * | * | * | * | * | * | * | * |
| 3 | ***** | ***** | * | * | * | * | * | * | * | * | * |
| 2 | ***** | ***** | * | * | * | * | * | * | * | * | * |
| 1 | ***** | ***** | * | * | * | * | * | * | * | * | * |

Figure A.2.2-1. Effectiveness of Management: Cluster Map for 11 Projects .

Table A.2.2-4. Effectiveness of Management: Summary Statistics for 20 Independent Systems (1 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| MG01 | PDPJMGR | 0 | 50 | 0 | 35 | 50 | 50 | 50 | 40.0 | 18.9 | 21.1 | 58.9 |
| MG02 | PDPJLEAD | 0 | 50 | 0 | 30 | 33 | 50 | 50 | 34.0 | 15.6 | 18.4 | 49.6 |
| MG03 | PDANMGR | 0 | 50 | 0 | 0 | 0 | 10 | 40 | 6.5 | 11.8 | -5.3 | 18.3 |
| MG04 | PDANLEAD | 0 | 50 | 0 | 30 | 35 | 40 | 40 | 33.3 | 9.5 | 23.8 | 42.7 |
| MG05 | PDDVMGR | 0 | 50 | 20 | 40 | 40 | 40 | 50 | 38.0 | 10.1 | 27.9 | 48.1 |
| MG06 | PDDVLEAD | 0 | 50 | 20 | 40 | 40 | 40 | 50 | 39.5 | 8.3 | 31.2 | 47.8 |
| MG07 | DDPJMGR | 0 | 50 | 0 | 40 | 50 | 50 | 50 | 41.3 | 16.7 | 24.6 | 57.9 |
| MG08 | DDPJLEAD | 0 | 50 | 0 | 30 | 33 | 50 | 50 | 35.0 | 13.1 | 21.9 | 48.1 |
| MG09 | DDANMGR | 0 | 50 | 0 | 0 | 10 | 10 | 40 | 9.5 | 10.0 | -0.5 | 19.5 |
| MG10 | DDANLEAD | 0 | 50 | 20 | 35 | 35 | 40 | 40 | 35.0 | 6.5 | 28.5 | 41.5 |
| MG11 | DDDVMGR | 0 | 50 | 20 | 40 | 40 | 40 | 50 | 38.0 | 10.1 | 27.9 | 48.1 |
| MG12 | DDDVLEAD | 0 | 50 | 20 | 40 | 40 | 40 | 50 | 38.5 | 8.1 | 30.4 | 46.6 |
| MG13 | IMPJMGR | 0 | 50 | 0 | 30 | 50 | 50 | 50 | 39.5 | 16.4 | 23.1 | 55.9 |
| MG14 | IMPJLEAD | 0 | 50 | 15 | 30 | 35 | 50 | 50 | 36.3 | 11.2 | 25.0 | 47.5 |
| MG15 | IMANMGR | 0 | 50 | 0 | 16 | 20 | 20 | 40 | 17.5 | 9.0 | 8.5 | 26.5 |
| MG16 | IMANLEAD | 0 | 50 | 20 | 40 | 40 | 40 | 40 | 37.3 | 6.8 | 30.5 | 44.0 |
| MG17 | IMDVMGR | 0 | 50 | 10 | 30 | 40 | 40 | 50 | 35.0 | 10.5 | 24.5 | 45.5 |
| MG18 | IMDVLEAD | 0 | 50 | 10 | 33 | 40 | 40 | 50 | 36.0 | 9.4 | 26.6 | 45.4 |
| MG19 | STPJMGR | 0 | 50 | 30 | 50 | 50 | 50 | 50 | 46.5 | 7.5 | 39.0 | 54.0 |
| MG20 | STPJLEAD | 0 | 50 | 20 | 30 | 35 | 50 | 50 | 37.0 | 10.2 | 26.8 | 47.2 |
| MG21 | STANMGR | 0 | 50 | 0 | 13 | 20 | 20 | 40 | 18.0 | 11.1 | 6.9 | 29.1 |
| MG22 | STANLEAD | 0 | 50 | 20 | 30 | 40 | 40 | 40 | 36.3 | 6.3 | 30.0 | 42.5 |
| MG23 | STDVMGR | 0 | 50 | 0 | 23 | 30 | 40 | 50 | 28.5 | 15.0 | 13.5 | 43.5 |
| MG24 | STDVLEAD | 0 | 50 | 0 | 23 | 30 | 40 | 50 | 28.5 | 14.2 | 14.3 | 42.7 |
| MG25 | ATPJMGR | 0 | 50 | 30 | 50 | 50 | 50 | 50 | 46.5 | 7.5 | 39.0 | 54.0 |
| MG26 | ATPJLEAD | 0 | 50 | 20 | 30 | 35 | 50 | 50 | 37.0 | 10.2 | 26.8 | 47.2 |
| MG27 | ATANMGR | 0 | 50 | 0 | 20 | 20 | 30 | 40 | 20.5 | 10.0 | 10.5 | 30.5 |
| MG28 | ATANLEAD | 0 | 50 | 30 | 40 | 40 | 40 | 40 | 38.0 | 4.1 | 33.9 | 42.1 |
| MG29 | ATDVMGR | 0 | 50 | 0 | 23 | 30 | 40 | 50 | 29.0 | 14.1 | 14.9 | 43.1 |
| MG30 | ATDVLEAD | 0 | 50 | 0 | 13 | 30 | 40 | 50 | 27.5 | 14.8 | 12.7 | 42.3 |
| MG31 | SBPJMGR | 0 | 50 | 0 | 30 | 50 | 50 | 50 | 40.0 | 16.5 | 23.5 | 56.5 |
| MG32 | SBPJLEAD | 0 | 50 | 10 | 50 | 50 | 50 | 50 | 46.0 | 11.0 | 35.0 | 57.0 |
| MG33 | SBANMGR | 0 | 50 | 0 | 20 | 30 | 45 | 50 | 28.0 | 16.1 | 11.9 | 44.1 |
| MG34 | SBANLEAD | 0 | 50 | 0 | 10 | 15 | 35 | 50 | 20.5 | 17.6 | 2.9 | 38.1 |
| MG35 | SBOTHR | 0 | 50 | 0 | 20 | 23 | 25 | 35 | 20.8 | 9.1 | 11.7 | 29.8 |
| MG81 | PRELIMD | 0 | 300 | 60 | 190 | 193 | 225 | 240 | 191.3 | 45.7 | 145.5 | 237.0 |
| MG82 | DETAILED | 0 | 300 | 90 | 193 | 205 | 214 | 240 | 197.3 | 35.3 | 162.0 | 232.5 |
| MG83 | IMPLMENT | 0 | 300 | 130 | 180 | 218 | 224 | 260 | 201.5 | 36.6 | 164.9 | 238.1 |
| MG84 | SYSTEM | 0 | 300 | 100 | 175 | 200 | 220 | 280 | 194.8 | 41.7 | 153.1 | 236.4 |
| MG85 | ACCEPT | 0 | 300 | 100 | 185 | 208 | 220 | 280 | 198.5 | 40.9 | 157.6 | 239.4 |
| MG86 | STABILTY | 0 | 250 | 90 | 130 | 165 | 165 | 235 | 155.3 | 39.4 | 115.9 | 194.6 |
| MG87 | PROJMGR | 0 | 250 | 60 | 203 | 250 | 250 | 250 | 213.8 | 56.4 | 157.4 | 270.1 |
| MG88 | PROJLEAD | 0 | 250 | 75 | 150 | 175 | 245 | 250 | 179.3 | 56.5 | 122.7 | 235.8 |
| MG89 | ANLYSMGR | 0 | 250 | 0 | 70 | 75 | 96 | 120 | 72.0 | 31.5 | 40.5 | 103.5 |
| MG90 | ANLYSLED | 0 | 250 | 130 | 173 | 185 | 196 | 200 | 179.8 | 19.2 | 160.6 | 198.9 |
| MG91 | DEVMGR | 0 | 250 | 40 | 120 | 140 | 160 | 200 | 133.5 | 45.5 | 88.0 | 179.0 |

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Table A.2.2-4. Effectiveness of Management: Summary Statistics for
20 Independent Systems (2 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|---------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| MG92 | DEVLEAD | 0 | 250 | 50 | 155 | 180 | 200 | 250 | 170.0 | 47.8 | 122.2 | 217.8 |
| MG93 | TOTAL | 0 | 1750 | 735 | 1090 | 1180 | 1261 | 1460 | 1138.5 | 183.6 | 954.9 | 1322.1 |

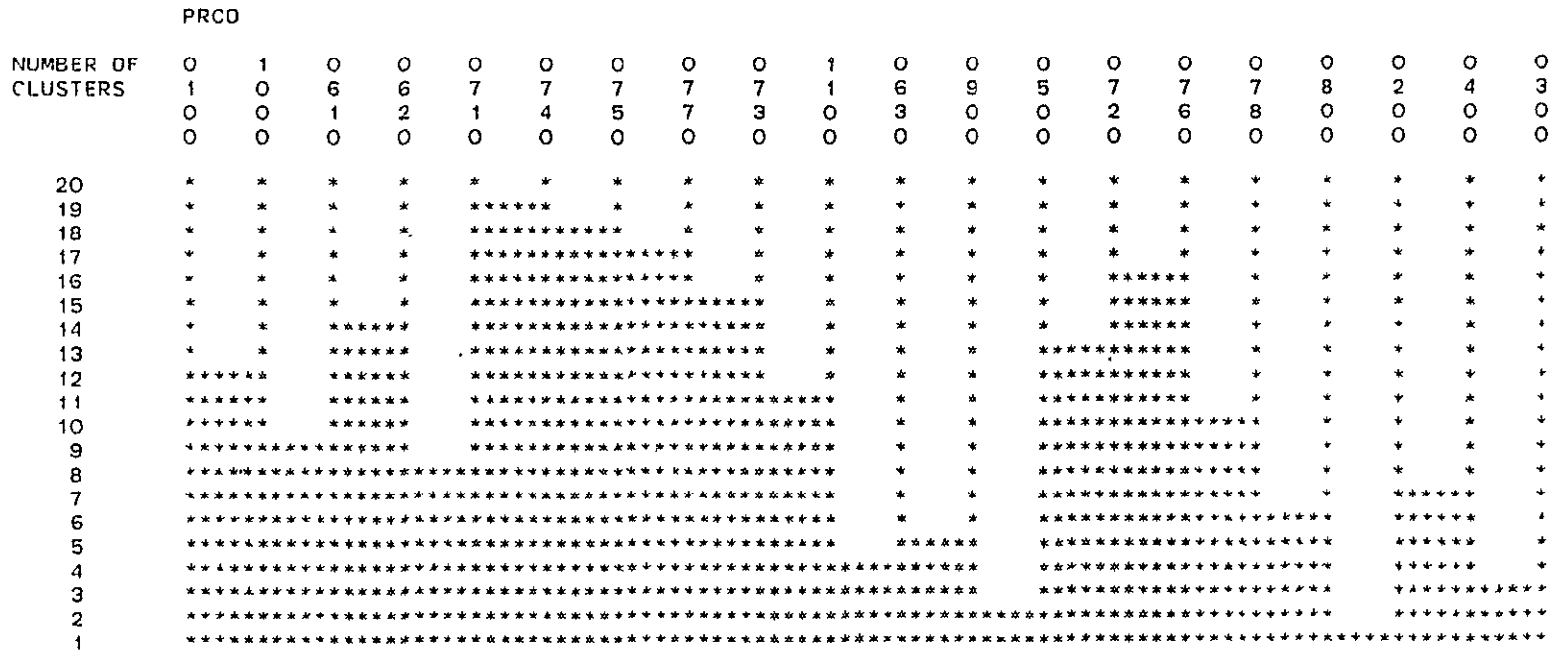


Figure A.2.2-2. Effectiveness of Management: Cluster Map for 20 Independent Systems

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Table A.2.2-5. Effectiveness of Management: Summary Statistics for 9 Large Systems (1 of 2)

| CODE | NAME | -ALLOWED-RANGE | | --ACTUAL-RANGE-- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|-----------|----------------|------|------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| MG01 | PDPJMGR | 0 | 50 | 0 | 0 | 50 | 50 | 50 | 30.0 | 24.5 | 5.5 | 54.5 |
| MG02 | PDPJLEAD | 0 | 50 | 0 | 10 | 30 | 50 | 50 | 29.4 | 19.8 | 9.7 | 49.2 |
| MG03 | PDANMGR | 0 | 50 | 0 | 0 | 0 | 20 | 40 | 8.9 | 15.4 | -6.5 | 24.3 |
| MG04 | PDANLEAD | 0 | 50 | 0 | 28 | 40 | 40 | 40 | 31.7 | 13.2 | 18.4 | 44.9 |
| MG05 | PDDVMGR | 0 | 50 | 20 | 20 | 40 | 50 | 50 | 36.7 | 13.2 | 23.4 | 49.9 |
| MG06 | PDDVLEAD | 0 | 50 | 20 | 35 | 40 | 50 | 50 | 40.0 | 10.0 | 30.0 | 50.0 |
| MG07 | DDPJMGR | 0 | 50 | 0 | 8 | 50 | 50 | 50 | 33.9 | 22.3 | 11.6 | 56.2 |
| MG08 | DDPJLEAD | 0 | 50 | 0 | 25 | 30 | 50 | 50 | 32.8 | 16.4 | 16.4 | 49.2 |
| MG09 | DDANMGR | 0 | 50 | 0 | 0 | 0 | 15 | 40 | 8.9 | 13.6 | -4.8 | 22.5 |
| MG10 | DDANLEAD | 0 | 50 | 20 | 28 | 40 | 40 | 40 | 34.4 | 7.7 | 26.8 | 42.1 |
| MG11 | DDVMGR | 0 | 50 | 20 | 20 | 40 | 50 | 50 | 36.7 | 13.2 | 23.4 | 49.9 |
| MG12 | DDVLEAD | 0 | 50 | 20 | 30 | 40 | 45 | 50 | 37.8 | 9.7 | 28.1 | 47.5 |
| MG13 | IMPJMGR | 0 | 50 | 0 | 15 | 30 | 50 | 50 | 31.1 | 19.6 | 11.5 | 50.8 |
| MG14 | IMPJLEAD | 0 | 50 | 15 | 25 | 35 | 50 | 50 | 35.6 | 13.1 | 22.5 | 48.7 |
| MG15 | IMANMGR | 0 | 50 | 0 | 0 | 20 | 20 | 40 | 15.0 | 13.2 | 1.8 | 28.2 |
| MG16 | IMANLEAD | 0 | 50 | 20 | 33 | 40 | 40 | 40 | 36.1 | 7.8 | 28.3 | 43.9 |
| MG17 | IMDVMGR | 0 | 50 | 10 | 20 | 40 | 40 | 40 | 31.1 | 12.7 | 18.4 | 43.8 |
| MG18 | IMDVLEAD | 0 | 50 | 10 | 25 | 40 | 40 | 40 | 32.2 | 10.9 | 21.3 | 43.2 |
| MG19 | STPJMGR | 0 | 50 | 30 | 30 | 50 | 50 | 50 | 43.3 | 10.0 | 33.3 | 53.3 |
| MG20 | STPJLEAD | 0 | 50 | 20 | 30 | 35 | 50 | 50 | 37.2 | 10.9 | 26.3 | 48.2 |
| MG21 | STANMGR | 0 | 50 | 0 | 0 | 10 | 25 | 30 | 12.2 | 13.0 | -0.8 | 25.2 |
| MG22 | STANLEAD | 0 | 50 | 20 | 28 | 30 | 40 | 40 | 32.8 | 7.5 | 25.2 | 40.3 |
| MG23 | STDVMGR | 0 | 50 | 0 | 10 | 40 | 40 | 40 | 27.8 | 17.2 | 10.6 | 44.9 |
| MG24 | STDVLEAD | 0 | 50 | 0 | 10 | 30 | 40 | 50 | 26.7 | 16.6 | 10.1 | 43.2 |
| MG25 | ATPJMGR | 0 | 50 | 30 | 30 | 50 | 50 | 50 | 43.3 | 10.0 | 33.3 | 53.3 |
| MG26 | ATPJLEAD | 0 | 50 | 20 | 30 | 35 | 50 | 50 | 37.2 | 10.9 | 26.3 | 48.2 |
| MG27 | ATANMGR | 0 | 50 | 0 | 5 | 20 | 30 | 30 | 16.7 | 12.2 | 4.4 | 28.9 |
| MG28 | ATANLEAD | 0 | 50 | 30 | 30 | 40 | 40 | 40 | 35.6 | 5.3 | 30.3 | 40.8 |
| MG29 | ATDVMGR | 0 | 50 | 0 | 10 | 40 | 40 | 40 | 27.8 | 17.2 | 10.6 | 44.9 |
| MG30 | ATDVLEAD | 0 | 50 | 0 | 5 | 30 | 40 | 50 | 24.4 | 18.1 | 6.3 | 42.5 |
| MG31 | SBPJMGR | 0 | 50 | 0 | 10 | 30 | 50 | 50 | 30.0 | 20.0 | 10.0 | 50.0 |
| MG32 | SBPJLEAD | 0 | 50 | 10 | 30 | 50 | 50 | 50 | 41.1 | 15.4 | 25.7 | 56.5 |
| MG33 | SBANMGR | 0 | 50 | 0 | 5 | 20 | 50 | 50 | 25.6 | 20.7 | 4.9 | 46.2 |
| MG34 | SBANLEAD | 0 | 50 | 0 | 5 | 20 | 45 | 50 | 23.3 | 19.4 | 4.0 | 42.7 |
| MG35 | SBOTHER | 0 | 50 | 0 | 8 | 20 | 23 | 25 | 16.1 | 9.6 | 6.5 | 25.7 |
| MG81 | PRELIMD | 0 | 300 | 60 | 120 | 195 | 230 | 240 | 176.7 | 64.3 | 112.4 | 240.9 |
| MG82 | DETAILED | 0 | 300 | 90 | 143 | 210 | 213 | 230 | 184.4 | 47.7 | 136.8 | 232.1 |
| MG83 | IMPLEMENT | 0 | 300 | 130 | 140 | 200 | 218 | 225 | 181.1 | 39.4 | 141.8 | 220.5 |
| MG84 | SYSTEM | 0 | 300 | 100 | 135 | 200 | 218 | 220 | 180.0 | 46.4 | 133.6 | 226.4 |
| MG85 | ACCEPT | 0 | 300 | 100 | 135 | 210 | 220 | 230 | 185.0 | 49.5 | 135.5 | 234.5 |
| MG86 | STABILITY | 0 | 250 | 90 | 100 | 130 | 178 | 190 | 136.1 | 38.0 | 98.1 | 174.1 |
| MG87 | PROJMGR | 0 | 250 | 60 | 118 | 200 | 250 | 250 | 181.7 | 71.2 | 110.5 | 252.8 |
| MG88 | PROJLEAD | 0 | 250 | 75 | 110 | 175 | 240 | 250 | 172.2 | 65.3 | 106.9 | 237.5 |
| MG89 | ANLYSMGR | 0 | 250 | 0 | 10 | 80 | 93 | 120 | 61.7 | 43.7 | 17.9 | 105.4 |
| MG90 | ANLYSLED | 0 | 250 | 130 | 155 | 180 | 183 | 200 | 170.6 | 21.0 | 149.6 | 191.5 |
| MG91 | DEVMGR | 0 | 250 | 40 | 80 | 140 | 180 | 180 | 128.9 | 55.8 | 73.1 | 184.7 |

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Table A.2.2-5. Effectiveness of Management: Summary Statistics for 9 Large Systems (2 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|---------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| MG92 | DEVLEAD | 0 | 250 | 50 | 125 | 180 | 200 | 220 | 161.1 | 54.2 | 106.9 | 215.3 |
| MG93 | TOTAL | 0 | 1750 | 735 | 795 | 1160 | 1195 | 1310 | 1043.3 | 215.5 | 827.8 | 1258.8 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1 | 6 | 7 | 0 | 5 | 2 | 4 | 3 | 9 | 0 |
| | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | * | * | * | * | * | * | * | * | * | * |
| 8 | * | ***** | * | * | * | * | * | * | * | * |
| 7 | * | ***** | ***** | * | * | * | * | * | * | * |
| 6 | ***** | ***** | ***** | * | * | * | * | * | * | * |
| 5 | ***** | ***** | ***** | * | ***** | * | * | * | * | * |
| 4 | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * | * |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |

Figure A.2.2-3. Effectiveness of Management: Cluster Map for 9 Large Systems

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Table A.2.2-6. Effectiveness of Management: Summary Statistics for 11 Small Systems (1 of 2)

| CODE | NAME | -ALLOWED-RANGF | | -----ACTUAL-RANGF----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| MGO1 | PDPJMR | 0 | 50 | 30 | 50 | 50 | 50 | 50 | 48.2 | 6.0 | 42.2 | 54.2 |
| MGO2 | PDPJLEAD | 0 | 50 | 20 | 30 | 35 | 50 | 50 | 37.7 | 10.8 | 26.9 | 48.5 |
| MGO3 | PDANMGR | 0 | 50 | 0 | 0 | 0 | 10 | 20 | 4.5 | 8.2 | -3.7 | 12.7 |
| MGO4 | PDANLEAD | 0 | 50 | 30 | 30 | 30 | 40 | 40 | 34.5 | 5.2 | 29.3 | 39.8 |
| MGO5 | PDDVMGR | 0 | 50 | 20 | 40 | 40 | 40 | 50 | 39.1 | 7.0 | 32.1 | 46.1 |
| MGO6 | PDDVLEAD | 0 | 50 | 20 | 40 | 40 | 40 | 50 | 39.1 | 7.0 | 32.1 | 46.1 |
| MGO7 | DDPJMR | 0 | 50 | 30 | 50 | 50 | 50 | 50 | 47.3 | 6.5 | 40.8 | 53.7 |
| MGO8 | DDPJLEAD | 0 | 50 | 20 | 30 | 35 | 50 | 50 | 36.8 | 10.1 | 26.8 | 46.9 |
| MGO9 | DDANMGR | 0 | 50 | 0 | 10 | 10 | 10 | 20 | 10.0 | 6.3 | 3.7 | 16.3 |
| MG10 | DDANLEAD | 0 | 50 | 20 | 35 | 35 | 40 | 40 | 35.5 | 5.7 | 29.8 | 41.1 |
| MG11 | DDDVMGR | 0 | 50 | 20 | 40 | 40 | 40 | 50 | 39.1 | 7.0 | 32.1 | 46.1 |
| MG12 | DDVLEAD | 0 | 50 | 20 | 40 | 40 | 40 | 50 | 39.1 | 7.0 | 32.1 | 46.1 |
| MG13 | IMPJMR | 0 | 50 | 20 | 50 | 50 | 50 | 50 | 46.4 | 9.2 | 37.1 | 55.6 |
| MG14 | IMPJLEAD | 0 | 50 | 20 | 30 | 35 | 50 | 50 | 36.8 | 10.1 | 26.8 | 46.9 |
| MG15 | IMANMGR | 0 | 50 | 15 | 20 | 20 | 20 | 20 | 19.5 | 1.5 | 18.0 | 21.1 |
| MG16 | IMANLEAD | 0 | 50 | 20 | 40 | 40 | 40 | 40 | 38.2 | 6.0 | 32.2 | 44.2 |
| MG17 | IMDVMGR | 0 | 50 | 20 | 40 | 40 | 40 | 50 | 38.2 | 7.5 | 30.7 | 45.7 |
| MG18 | IMDVLEAD | 0 | 50 | 20 | 40 | 40 | 40 | 50 | 39.1 | 7.0 | 32.1 | 46.1 |
| MG19 | STPJMR | 0 | 50 | 40 | 50 | 50 | 50 | 50 | 49.1 | 3.0 | 46.1 | 52.1 |
| MG20 | STPJLEAD | 0 | 50 | 20 | 30 | 35 | 50 | 50 | 36.8 | 10.1 | 26.8 | 46.9 |
| MG21 | STANMGR | 0 | 50 | 20 | 20 | 20 | 20 | 40 | 22.7 | 6.5 | 16.3 | 29.2 |
| MG22 | STANLEAD | 0 | 50 | 30 | 40 | 40 | 40 | 40 | 39.1 | 3.0 | 36.1 | 42.1 |
| MG23 | STDVMGR | 0 | 50 | 0 | 30 | 30 | 40 | 50 | 29.1 | 13.8 | 15.3 | 42.8 |
| MG24 | STDVLEAD | 0 | 50 | 0 | 30 | 30 | 40 | 50 | 30.0 | 12.6 | 17.4 | 42.6 |
| MG25 | ATPJMR | 0 | 50 | 40 | 50 | 50 | 50 | 50 | 49.1 | 3.0 | 46.1 | 52.1 |
| MG26 | ATPJLEAD | 0 | 50 | 20 | 30 | 35 | 50 | 50 | 36.8 | 10.1 | 26.8 | 46.9 |
| MG27 | ATANMGR | 0 | 50 | 20 | 20 | 20 | 30 | 40 | 23.6 | 6.7 | 16.9 | 30.4 |
| MG28 | ATANLEAD | 0 | 50 | 40 | 40 | 40 | 40 | 40 | 40.0 | 0.0 | 40.0 | 40.0 |
| MG29 | ATDVMGR | 0 | 50 | 10 | 30 | 30 | 40 | 50 | 30.0 | 11.8 | 18.2 | 41.8 |
| MG30 | ATDVLEAD | 0 | 50 | 10 | 30 | 30 | 40 | 50 | 30.0 | 11.8 | 18.2 | 41.8 |
| MG31 | SBPJMR | 0 | 50 | 30 | 50 | 50 | 50 | 50 | 48.2 | 6.0 | 42.2 | 54.2 |
| MG32 | SBPJLEAD | 0 | 50 | 50 | 50 | 50 | 50 | 50 | 50.0 | 0.0 | 50.0 | 50.0 |
| MG33 | SBANMGR | 0 | 50 | 10 | 20 | 30 | 30 | 50 | 30.0 | 11.8 | 18.2 | 41.8 |
| MG34 | SBANLEAD | 0 | 50 | 0 | 10 | 10 | 20 | 50 | 18.2 | 16.6 | 1.6 | 34.8 |
| MG35 | SBOTHR | 0 | 50 | 10 | 20 | 25 | 25 | 35 | 24.5 | 6.9 | 17.7 | 31.4 |
| MG81 | PRELMD | 0 | 300 | 190 | 190 | 190 | 210 | 240 | 203.2 | 17.9 | 185.3 | 221.1 |
| MG82 | DETAILD | 0 | 300 | 180 | 200 | 205 | 225 | 240 | 207.7 | 16.8 | 190.9 | 224.5 |
| MG83 | IMPLMENT | 0 | 300 | 180 | 195 | 220 | 240 | 260 | 218.2 | 24.9 | 193.3 | 243.1 |
| MG84 | SYSTEM | 0 | 300 | 140 | 200 | 200 | 220 | 280 | 206.8 | 34.9 | 171.9 | 241.8 |
| MG85 | ACCEPT | 0 | 300 | 160 | 200 | 200 | 220 | 280 | 209.5 | 30.4 | 179.2 | 239.9 |
| MG86 | STABILTY | 0 | 250 | 130 | 160 | 165 | 165 | 235 | 170.9 | 34.5 | 136.4 | 205.4 |
| MG87 | PROJMR | 0 | 250 | 210 | 220 | 250 | 250 | 250 | 240.0 | 17.3 | 222.7 | 257.3 |
| MG88 | PROJLEAD | 0 | 250 | 100 | 150 | 175 | 250 | 250 | 185.0 | 50.7 | 134.3 | 235.7 |
| MG89 | ANLYSMGR | 0 | 250 | 70 | 70 | 70 | 100 | 100 | 80.5 | 13.5 | 67.0 | 94.0 |
| MG90 | ANLYSLED | 0 | 250 | 150 | 185 | 185 | 200 | 200 | 187.3 | 14.4 | 172.9 | 201.7 |
| MG91 | DEVMR | 0 | 250 | 50 | 140 | 140 | 160 | 200 | 137.3 | 37.4 | 99.8 | 174.7 |

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Table A.2.2-6. Effectiveness of Management: Summary Statistics for 11 Small Systems (2 of 2).

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|---------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| MG92 | DEVLEAD | 0 | 250 | 70 | 180 | 180 | 200 | 250 | 177.3 | 43.1 | 134.1 | 220.4 |
| MG93 | TOTAL | 0 | 1750 | 1085 | 1130 | 1180 | 1280 | 1460 | 1216.4 | 109.8 | 1106.5 | 1326.2 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | 6 | 6 | 7 | 7 | 7 | 7 | 1 | 7 | 7 | 7 | 8 |
| | 2 | 3 | 1 | 4 | 5 | 7 | 0 | 2 | 6 | 8 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | ***** | * | * | * | * | * | * | * | * |
| 9 | * | * | ***** | ***** | * | * | * | * | * | * | * |
| 8 | * | * | ***** | ***** | ***** | * | * | * | * | * | * |
| 7 | * | * | ***** | ***** | ***** | ***** | * | ***** | * | * | * |
| 6 | * | * | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * |
| 5 | * | * | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 4 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |

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Figure A.2.2-4. Effectiveness of Management: Cluster Map for 11 Small Systems

A.2.3 PERFORMANCE OF TEAM

| | | | |
|--------------|------------|--------------|-------------|
| - <u>X</u> - | Objective | - - - | Subjective |
| - - - | Absolute | - <u>X</u> - | Relative |
| - - - | Explicit | - <u>X</u> - | Derived |
| - <u>X</u> - | Static | - - - | Dynamic |
| - <u>X</u> - | Predictive | - - - | Explanatory |

This category measures on-the-job performance of the development team, who are a part of the development environment. These measures are derived from objective data. They are subjective in the sense that the performance of each team member is combined to form a team value. They are static and predictive because they are computed from data available before the design, implementation, and testing phases. They are dynamic and explanatory in the sense that the values for each phase can be updated to be more accurate as each phase is completed, since the composition of the development team may have changed during a phase. Codes ending in 1, 5, 8, and 9 are unique; the others are derived. The overall measures are derived from the phase measures.

The remainder of this subsection contains tables and figures that describe the Performance of Team measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.2.3-1)
- Values of the measures for 25 systems (Table A.2.3-2), where large values indicate better on-the-job performance
- Summary statistics for 11 projects (Table A.2.3-3)
- Cluster map for 11 projects (Figure A.2.3-1)

- Summary statistics for 20 independent systems (Table A.2.3-4)
- Cluster map for 20 independent systems (Figure A.2.3-2)
- Summary statistics for 9 large systems (Table A.2.3-5)
- Cluster map for 9 large systems (Figure A.2.3-3)
- Summary statistics for 11 small systems (Table A.2.3-6)
- Cluster map for 11 small systems (Figure A.2.3-4)

Table A.2.3-1. Performance of Team: Description of Measures (1 of 3)

| Code | Measure | Range | | Description |
|------|----------|-------|------|--|
| | | Low | High | |
| | | | | Design |
| PF01 | DPROG | 003 | 300 | Programmers |
| | | | | Technical Staff |
| PF02 | DTSPROJ | 017 | 309 | Programmers and Project Managers |
| PF03 | DTSANALY | 024 | 314 | Programmers, Project Managers, and Analysis Managers |
| PF04 | DTSDEVEL | 024 | 314 | Programmers and Development Managers |
| | | | | Development Management |
| PF05 | DDMPROJ | 074 | 346 | Project |
| PF06 | DDMANALY | 074 | 346 | Project and Analysis |
| PF07 | DDMDEVEL | 074 | 346 | Development |
| | | | | Interface Management |
| PF08 | DIMANALY | 074 | 346 | Analysis |
| PF09 | DIMDEVEL | 074 | 346 | Development |
| PF10 | D | 000 | 000 | Not Defined |
| | | | | Implementation |
| PF11 | IPROG | 003 | 300 | Programmers |
| | | | | Technical Staff |
| PF12 | ITSPROJ | 017 | 309 | Programmers and Project Managers |
| PF13 | ITSANALY | 024 | 314 | Programmers, Project Managers, and Analysis Managers |
| PF14 | ITSDEVEL | 024 | 314 | Programmers and Development Managers |
| | | | | Development Management |
| PF15 | IDMPROJ | 074 | 346 | Project |
| PF16 | IDMANALY | 074 | 346 | Project and Analysis |
| PF17 | IDMDEVEL | 074 | 346 | Development |

Table A.2.3-1. Performance of Team: Description of Measures (2 of 3)

| Code | Measure | Range | | Description |
|----------------------------|----------|-------|------|--|
| | | Low | High | |
| Implementation (Continued) | | | | |
| Interface Management | | | | |
| PF18 | IIMANALY | 074 | 346 | Analysis |
| PF19 | IIMDEVEL | 074 | 346 | Development |
| PF20 | I | 000 | 000 | Not Defined |
| Test | | | | |
| PF21 | TPROG | 003 | 300 | Programmers |
| Technical Staff | | | | |
| PF22 | TTSPROJ | 017 | 309 | Programmers and Project Managers |
| PF23 | TTSANALY | 024 | 314 | Programmers, Project Managers, and Analysis Managers |
| PF24 | TTSDEVEL | 024 | 314 | Programmers and Development Managers |
| Development Management | | | | |
| PF25 | TDMPROJ | 074 | 346 | Project |
| PF26 | TDMANALY | 074 | 346 | Project and Analysis |
| PF27 | TDMDEVEL | 074 | 346 | Development |
| Interface Management | | | | |
| PF28 | TIMANALY | 074 | 346 | Analysis |
| PF29 | TIMDEVEL | 074 | 346 | Development |
| PF30 | T | 000 | 000 | Not Defined |
| Overall | | | | |
| PF31 | OPROG | 003 | 300 | Programmers |
| Technical Staff | | | | |
| PF32 | OTSPROJ | 017 | 309 | Programmers and Project Managers |
| PF33 | OTSANALY | 024 | 314 | Programmers, Project Managers, and Analysis Managers |

Table A.2.3-1. Performance of Team: Description of Measures (3 of 3)

| Code | Measure | Range | | Description |
|------|----------|-------|------|--|
| | | Low | High | |
| | | | | Overall (Continued) |
| PF34 | OTSDEVEL | 024 | 314 | Technical Staff (Continued) Programmers and Development Managers |
| | | | | Development Management |
| PF35 | ODMPROJ | 074 | 346 | Project |
| PF36 | ODMANALY | 074 | 346 | Project and Analysis |
| PF37 | ODMDEVEL | 074 | 346 | Development |
| | | | | Interface Management |
| PF38 | OIMANALY | 074 | 346 | Analysis |
| PF39 | OIMDEVEL | 074 | 346 | Development |
| PF40 | O | 000 | 000 | Not Defined |

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Table A.2.3-2. Performance of Team: Values of the Measures
for 25 Systems (1 of 2)

| PRCO | PF01 | PF02 | PF03 | PF04 | PF05 | PF06 | PF07 | PF08 | PF09 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 84 | 110 | 122 | 114 | 215 | 211 | 188 | 204 | 132 |
| 0200 | 75 | 99 | 110 | 117 | 193 | 192 | 215 | 192 | 260 |
| 0300 | 70 | 87 | 94 | 98 | 158 | 151 | 163 | 137 | 174 |
| 0400 | 74 | 97 | 107 | 106 | 191 | 184 | 180 | 170 | 156 |
| 0500 | 100 | 117 | 126 | 136 | 188 | 186 | 222 | 183 | 290 |
| 0600 | 99 | 122 | 131 | 129 | 212 | 204 | 197 | 190 | 168 |
| 0700 | 61 | 85 | 113 | 126 | 185 | 178 | 219 | 166 | 288 |
| 0800 | 170 | 182 | 182 | 175 | 227 | 209 | 187 | 172 | 106 |
| 0900 | 84 | 100 | 109 | 108 | 162 | 165 | 161 | 172 | 160 |
| 1000 | 100 | 122 | 129 | 130 | 209 | 197 | 200 | 172 | 183 |
| 1100 | 76 | 92 | 102 | 114 | 159 | 162 | 204 | 167 | 294 |
| 9000 | 95 | 112 | 120 | 122 | 182 | 179 | 184 | 172 | 188 |
| 0610 | 95 | 119 | 128 | 126 | 212 | 204 | 197 | 190 | 168 |
| 0620 | 110 | 127 | 131 | 128 | 173 | 182 | 171 | 201 | 168 |
| 0630 | 112 | 133 | 148 | 139 | 221 | 233 | 202 | 257 | 164 |
| 0631 | 129 | 151 | 164 | 157 | 241 | 247 | 222 | 257 | 184 |
| 0632 | 65 | 84 | 103 | 93 | 160 | 192 | 160 | 257 | 160 |
| 0710 | 55 | 72 | 83 | 95 | 139 | 148 | 188 | 166 | 288 |
| 0720 | 125 | 133 | 137 | 149 | 165 | 165 | 206 | 166 | 288 |
| 0730 | 47 | 65 | 77 | 89 | 137 | 147 | 188 | 166 | 288 |
| 0740 | 56 | 73 | 84 | 96 | 139 | 148 | 188 | 166 | 288 |
| 0750 | 64 | 84 | 94 | 108 | 165 | 164 | 210 | 162 | 300 |
| 0760 | 45 | 62 | 74 | 87 | 133 | 144 | 185 | 166 | 288 |
| 0770 | 45 | 62 | 74 | 87 | 133 | 144 | 185 | 166 | 288 |
| 0780 | 59 | 80 | 92 | 105 | 164 | 167 | 211 | 174 | 305 |

| PRCO | PF11 | PF12 | PF13 | PF14 | PF15 | PF16 | PF17 | PF18 | PF19 |
|------|------|------|------|------|------|------|------|------|------|
| 0300 | 93 | 120 | 131 | 124 | 227 | 219 | 196 | 205 | 136 |
| 0200 | 81 | 108 | 122 | 128 | 217 | 217 | 240 | 216 | 285 |
| 0300 | 73 | 92 | 99 | 103 | 167 | 159 | 174 | 143 | 187 |
| 0400 | 77 | 98 | 108 | 107 | 183 | 180 | 177 | 174 | 166 |
| 0500 | 96 | 117 | 125 | 136 | 199 | 194 | 229 | 183 | 290 |
| 0600 | 124 | 146 | 154 | 152 | 235 | 223 | 217 | 199 | 181 |
| 0700 | 97 | 121 | 127 | 140 | 213 | 197 | 240 | 164 | 295 |
| 0800 | 151 | 168 | 174 | 164 | 238 | 227 | 195 | 206 | 108 |
| 0900 | 93 | 97 | 108 | 104 | 114 | 145 | 131 | 206 | 167 |
| 1000 | 93 | 100 | 111 | 109 | 129 | 155 | 148 | 206 | 186 |
| 1100 | 90 | 93 | 100 | 114 | 105 | 123 | 171 | 161 | 303 |
| 9000 | 93 | 98 | 109 | 109 | 120 | 147 | 146 | 202 | 198 |
| 0610 | 117 | 141 | 149 | 147 | 235 | 223 | 217 | 199 | 181 |
| 0620 | 139 | 152 | 160 | 157 | 204 | 210 | 197 | 221 | 184 |
| 0630 | 98 | 122 | 133 | 128 | 218 | 216 | 200 | 211 | 163 |
| 0631 | 109 | 135 | 124 | 122 | 238 | 229 | 220 | 211 | 184 |
| 0632 | 75 | 92 | 105 | 100 | 159 | 177 | 159 | 211 | 159 |
| 0710 | 95 | 110 | 117 | 130 | 172 | 170 | 213 | 164 | 295 |
| 0720 | 166 | 173 | 172 | 185 | 198 | 187 | 230 | 164 | 295 |
| 0730 | 95 | 112 | 119 | 132 | 181 | 175 | 219 | 164 | 295 |
| 0740 | 70 | 88 | 98 | 111 | 161 | 162 | 206 | 164 | 295 |
| 0750 | 65 | 86 | 97 | 110 | 170 | 172 | 215 | 174 | 305 |
| 0760 | 90 | 109 | 116 | 129 | 185 | 178 | 221 | 164 | 295 |
| 0770 | 108 | 120 | 126 | 139 | 171 | 169 | 212 | 164 | 295 |
| 0780 | 73 | 97 | 107 | 120 | 192 | 187 | 229 | 179 | 303 |

Table A.2.3-2. Performance of Team: Values of the Measures for 25 Systems (2 of 2)

| PRCO | PF21 | PF22 | PF23 | PF24 | PF25 | PF26 | PF27 | PF28 | PF29 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 124 | 154 | 162 | 158 | 273 | 252 | 236 | 209 | 161 |
| 0200 | 95 | 119 | 128 | 138 | 215 | 205 | 240 | 184 | 288 |
| 0300 | 78 | 98 | 107 | 110 | 176 | 175 | 184 | 174 | 201 |
| 0400 | 97 | 117 | 126 | 124 | 198 | 195 | 188 | 188 | 169 |
| 0500 | 101 | 123 | 130 | 142 | 211 | 199 | 237 | 175 | 288 |
| 0600 | 111 | 137 | 146 | 144 | 240 | 226 | 221 | 200 | 184 |
| 0700 | 98 | 124 | 132 | 145 | 228 | 210 | 254 | 174 | 305 |
| 0800 | 153 | 168 | 171 | 165 | 229 | 214 | 192 | 184 | 116 |
| 0900 | 80 | 107 | 119 | 118 | 218 | 211 | 206 | 197 | 182 |
| 1000 | 94 | 117 | 127 | 127 | 209 | 205 | 205 | 196 | 198 |
| 1100 | 80 | 97 | 106 | 119 | 161 | 166 | 209 | 174 | 305 |
| 9000 | 91 | 114 | 124 | 126 | 206 | 202 | 208 | 194 | 212 |
| 0610 | 119 | 143 | 151 | 150 | 240 | 227 | 221 | 200 | 184 |
| 0620 | 118 | 133 | 141 | 139 | 192 | 195 | 190 | 200 | 184 |
| 0630 | 94 | 117 | 128 | 124 | 212 | 209 | 195 | 202 | 160 |
| 0631 | 105 | 130 | 140 | 137 | 231 | 221 | 213 | 202 | 178 |
| 0632 | 72 | 89 | 102 | 97 | 156 | 171 | 156 | 202 | 156 |
| 0710 | 88 | 106 | 114 | 128 | 177 | 176 | 220 | 174 | 305 |
| 0720 | 186 | 192 | 191 | 204 | 214 | 201 | 245 | 174 | 305 |
| 0730 | 92 | 111 | 120 | 133 | 189 | 184 | 227 | 174 | 305 |
| 0740 | 66 | 86 | 97 | 110 | 168 | 170 | 214 | 174 | 305 |
| 0750 | 72 | 92 | 102 | 115 | 172 | 173 | 215 | 175 | 302 |
| 0760 | 186 | 192 | 191 | 204 | 214 | 201 | 245 | 174 | 305 |
| 0770 | 103 | 118 | 125 | 138 | 181 | 179 | 222 | 174 | 305 |
| 0780 | 74 | 97 | 108 | 120 | 191 | 187 | 228 | 179 | 302 |

| PRCO | PF31 | PF32 | PF33 | PF34 | PF35 | PF36 | PF37 | PF38 | PF39 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 100 | 128 | 138 | 132 | 238 | 228 | 206 | 206 | 143 |
| 0200 | 84 | 108 | 120 | 128 | 208 | 205 | 232 | 197 | 278 |
| 0300 | 74 | 92 | 100 | 104 | 167 | 162 | 174 | 151 | 187 |
| 0400 | 82 | 104 | 114 | 112 | 191 | 186 | 182 | 177 | 164 |
| 0500 | 99 | 119 | 127 | 138 | 200 | 193 | 229 | 181 | 289 |
| 0600 | 112 | 135 | 144 | 142 | 229 | 218 | 212 | 196 | 177 |
| 0700 | 85 | 110 | 124 | 137 | 209 | 195 | 238 | 168 | 296 |
| 0800 | 158 | 173 | 176 | 168 | 231 | 217 | 191 | 187 | 110 |
| 0900 | 86 | 101 | 112 | 110 | 164 | 174 | 166 | 192 | 170 |
| 1000 | 96 | 113 | 122 | 122 | 182 | 185 | 184 | 192 | 189 |
| 1100 | 82 | 94 | 103 | 116 | 142 | 150 | 195 | 167 | 301 |
| 9000 | 93 | 108 | 118 | 119 | 169 | 176 | 179 | 189 | 199 |
| 0610 | 111 | 134 | 143 | 141 | 229 | 218 | 212 | 196 | 177 |
| 0620 | 122 | 137 | 144 | 141 | 190 | 196 | 186 | 207 | 179 |
| 0630 | 101 | 124 | 136 | 130 | 217 | 219 | 199 | 223 | 162 |
| 0631 | 114 | 139 | 143 | 139 | 237 | 232 | 218 | 223 | 182 |
| 0632 | 70 | 88 | 103 | 97 | 158 | 180 | 158 | 223 | 158 |
| 0710 | 79 | 96 | 105 | 118 | 163 | 165 | 207 | 168 | 296 |
| 0720 | 159 | 166 | 167 | 179 | 192 | 184 | 227 | 168 | 296 |
| 0730 | 78 | 96 | 105 | 118 | 169 | 169 | 211 | 168 | 296 |
| 0740 | 64 | 82 | 93 | 106 | 156 | 160 | 203 | 168 | 296 |
| 0750 | 67 | 87 | 98 | 111 | 169 | 169 | 213 | 170 | 302 |
| 0760 | 107 | 121 | 127 | 140 | 177 | 174 | 217 | 168 | 296 |
| 0770 | 85 | 100 | 109 | 121 | 161 | 164 | 206 | 168 | 296 |
| 0780 | 69 | 91 | 102 | 115 | 182 | 180 | 222 | 177 | 303 |

Table A.2.3-3. Performance of Team: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| PF01 | DPROG | 3 | 300 | 61 | 74 | 84 | 100 | 170 | 90.3 | 29.4 | 60.8 | 119.7 |
| PF02 | DTSPROJ | 17 | 309 | 85 | 92 | 100 | 122 | 182 | 110.3 | 27.2 | 83.1 | 137.5 |
| PF03 | DTSANALY | 24 | 314 | 94 | 107 | 113 | 129 | 182 | 120.5 | 23.5 | 97.0 | 144.0 |
| PF04 | DTSDEVEL | 24 | 314 | 98 | 108 | 117 | 130 | 175 | 123.0 | 20.7 | 102.3 | 143.7 |
| PF05 | DDMPROJ | 74 | 346 | 158 | 162 | 191 | 212 | 227 | 190.8 | 23.7 | 167.1 | 214.6 |
| PF06 | DDMANALY | 74 | 346 | 151 | 165 | 186 | 204 | 211 | 185.4 | 19.9 | 165.5 | 205.2 |
| PF07 | DDMDEVEL | 74 | 346 | 161 | 180 | 197 | 215 | 222 | 194.2 | 20.8 | 173.4 | 215.0 |
| PF08 | DIMANALY | 74 | 346 | 137 | 167 | 172 | 190 | 204 | 175.0 | 17.5 | 157.5 | 192.5 |
| PF09 | DIMDEVEL | 74 | 346 | 106 | 156 | 174 | 288 | 294 | 201.0 | 68.7 | 132.3 | 269.7 |
| PF11 | IPROG | 3 | 300 | 73 | 81 | 93 | 97 | 151 | 97.1 | 22.3 | 74.8 | 119.4 |
| PF12 | ITSPROJ | 17 | 309 | 92 | 97 | 108 | 121 | 168 | 114.5 | 23.9 | 90.6 | 138.5 |
| PF13 | ITSANALY | 24 | 314 | 99 | 108 | 122 | 131 | 174 | 123.5 | 23.1 | 100.4 | 146.7 |
| PF14 | ITSDEVEL | 24 | 314 | 103 | 107 | 124 | 140 | 164 | 125.5 | 20.6 | 105.0 | 146.1 |
| PF15 | IDMPROJ | 74 | 346 | 105 | 129 | 199 | 227 | 238 | 184.3 | 49.0 | 135.3 | 233.2 |
| PF16 | IDMANALY | 74 | 346 | 123 | 155 | 194 | 219 | 227 | 185.4 | 35.6 | 149.8 | 220.9 |
| PF17 | IDMDEVEL | 74 | 346 | 131 | 171 | 195 | 229 | 240 | 192.5 | 36.4 | 156.1 | 229.0 |
| PF18 | IIMANALY | 74 | 346 | 143 | 164 | 199 | 206 | 216 | 187.5 | 23.9 | 163.6 | 211.5 |
| PF19 | IIMDEVEL | 74 | 346 | 108 | 166 | 186 | 290 | 303 | 209.5 | 70.4 | 139.1 | 279.8 |
| PF21 | TPROG | 3 | 300 | 78 | 80 | 97 | 111 | 153 | 101.0 | 22.0 | 79.0 | 123.0 |
| PF22 | TTSPROJ | 17 | 309 | 97 | 107 | 119 | 137 | 168 | 123.7 | 22.0 | 101.8 | 145.7 |
| PF23 | TTSANALY | 24 | 314 | 106 | 119 | 128 | 146 | 171 | 132.2 | 20.4 | 111.8 | 152.6 |
| PF24 | TTSDEVEL | 24 | 314 | 110 | 119 | 138 | 145 | 165 | 135.5 | 17.4 | 118.1 | 152.8 |
| PF25 | TDMPROJ | 74 | 346 | 161 | 198 | 215 | 229 | 273 | 214.4 | 30.2 | 184.1 | 244.6 |
| PF25 | TDMANALY | 74 | 346 | 166 | 195 | 205 | 214 | 252 | 205.3 | 23.1 | 182.1 | 228.4 |
| PF27 | TDMDEVEL | 74 | 346 | 184 | 192 | 209 | 237 | 254 | 215.6 | 23.5 | 192.1 | 239.2 |
| PF28 | TIMANALY | 74 | 346 | 174 | 174 | 184 | 197 | 209 | 186.8 | 12.3 | 174.6 | 199.1 |
| PF29 | TIMDEVEL | 74 | 346 | 116 | 169 | 198 | 288 | 305 | 217.9 | 66.4 | 151.5 | 284.3 |
| PF31 | OPROG | 3 | 300 | 74 | 82 | 86 | 100 | 158 | 96.2 | 23.2 | 73.0 | 119.3 |
| PF32 | OTSPROJ | 17 | 309 | 92 | 101 | 110 | 128 | 173 | 116.1 | 23.0 | 93.1 | 139.1 |
| PF33 | OTSANALY | 24 | 314 | 100 | 112 | 122 | 138 | 176 | 125.5 | 21.4 | 104.1 | 146.8 |
| PF34 | OTSDEVEL | 24 | 314 | 104 | 112 | 128 | 138 | 168 | 128.1 | 18.2 | 109.8 | 146.3 |
| PF35 | ODMPROJ | 74 | 346 | 142 | 167 | 200 | 229 | 238 | 196.5 | 30.7 | 165.8 | 227.1 |
| PF36 | ODMANALY | 74 | 346 | 150 | 174 | 193 | 217 | 228 | 192.1 | 24.2 | 167.9 | 216.3 |
| PF37 | ODMDEVEL | 74 | 346 | 166 | 182 | 195 | 229 | 238 | 200.8 | 24.5 | 176.3 | 225.3 |
| PF38 | OIMANALY | 74 | 346 | 151 | 168 | 187 | 196 | 206 | 183.1 | 16.2 | 166.9 | 199.3 |
| PF39 | OIMDEVEL | 74 | 346 | 110 | 164 | 187 | 289 | 301 | 209.5 | 68.4 | 141.0 | 277.9 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| | 1 | 6 | 8 | 2 | 5 | 7 | 1 | 3 | 4 | 9 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | * |
| 9 | * | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * | * |

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Figure A.2.3-1. Performance of Team: Cluster Map for 11 Projects

Table A.2.3-4. Performance of Team: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| PF01 | DPROG | 3 | 300 | 45 | 57 | 76 | 100 | 170 | 82.3 | 31.3 | 51.0 | 113.6 |
| PF02 | DTSPROJ | 17 | 309 | 62 | 75 | 98 | 121 | 182 | 100.8 | 30.2 | 70.6 | 131.0 |
| PF03 | DTSANALY | 24 | 314 | 74 | 86 | 108 | 129 | 182 | 110.1 | 28.0 | 82.2 | 138.1 |
| PF04 | DTSEVEL | 24 | 314 | 87 | 97 | 111 | 130 | 175 | 115.3 | 22.8 | 92.6 | 138.1 |
| PF05 | DDMPROJ | 74 | 346 | 133 | 144 | 165 | 205 | 227 | 174.1 | 31.0 | 143.1 | 205.2 |
| PF06 | DDMANALY | 74 | 346 | 144 | 149 | 166 | 196 | 233 | 175.1 | 26.1 | 149.0 | 201.3 |
| PF07 | DDMDEVEL | 74 | 346 | 161 | 185 | 188 | 206 | 222 | 192.5 | 16.6 | 176.0 | 209.1 |
| PF08 | DIMANALY | 74 | 346 | 137 | 166 | 171 | 188 | 257 | 177.4 | 24.0 | 153.5 | 201.4 |
| PF09 | DIMDEVEL | 74 | 346 | 106 | 165 | 274 | 288 | 305 | 229.4 | 69.6 | 159.8 | 299.0 |
| PF11 | IPROG | 3 | 300 | 65 | 78 | 93 | 106 | 166 | 98.1 | 26.8 | 71.3 | 125.0 |
| PF12 | ITSPROJ | 17 | 309 | 86 | 97 | 110 | 122 | 173 | 115.1 | 25.3 | 89.8 | 140.5 |
| PF13 | ITSANALY | 24 | 314 | 97 | 107 | 118 | 133 | 174 | 123.6 | 23.6 | 100.0 | 147.2 |
| PF14 | ITSDEVEL | 24 | 314 | 103 | 110 | 128 | 138 | 185 | 128.8 | 21.6 | 107.3 | 150.4 |
| PF15 | IDMPROJ | 74 | 346 | 105 | 168 | 184 | 214 | 238 | 183.3 | 37.0 | 146.3 | 220.3 |
| PF16 | IDMANALY | 74 | 346 | 123 | 164 | 179 | 215 | 227 | 183.4 | 28.5 | 154.9 | 211.9 |
| PF17 | IDMDEVEL | 74 | 346 | 131 | 182 | 209 | 221 | 240 | 201.0 | 28.5 | 172.5 | 229.5 |
| PF18 | IIMANALY | 74 | 346 | 143 | 164 | 177 | 206 | 221 | 183.4 | 23.0 | 160.4 | 206.4 |
| PF19 | IIMDEVEL | 74 | 346 | 108 | 171 | 288 | 295 | 305 | 236.7 | 69.6 | 167.1 | 306.3 |
| PF21 | TPROG | 3 | 300 | 66 | 80 | 95 | 119 | 186 | 105.0 | 34.5 | 70.5 | 139.5 |
| PF22 | TTSPROJ | 17 | 309 | 86 | 100 | 117 | 141 | 192 | 124.3 | 30.9 | 93.5 | 155.2 |
| PF23 | TTSANALY | 24 | 314 | 97 | 110 | 127 | 149 | 191 | 132.2 | 27.7 | 104.5 | 159.9 |
| PF24 | TTSDEVEL | 24 | 314 | 110 | 119 | 131 | 148 | 204 | 138.3 | 27.0 | 111.3 | 165.3 |
| PF25 | TDMPROJ | 74 | 346 | 161 | 178 | 204 | 215 | 273 | 202.0 | 27.2 | 174.8 | 229.2 |
| PF25 | TDMANALY | 74 | 346 | 166 | 177 | 197 | 208 | 252 | 196.2 | 21.1 | 175.1 | 217.3 |
| PF27 | TDMDEVEL | 74 | 346 | 184 | 198 | 218 | 234 | 245 | 215.9 | 19.5 | 196.5 | 235.4 |
| PF28 | TIMANALY | 74 | 346 | 174 | 174 | 177 | 197 | 209 | 184.0 | 12.1 | 172.0 | 196.1 |
| PF29 | TIMDEVEL | 74 | 346 | 116 | 183 | 288 | 305 | 305 | 243.5 | 67.9 | 175.6 | 311.4 |
| PF31 | DPROG | 3 | 300 | 64 | 78 | 86 | 106 | 159 | 95.1 | 26.5 | 68.7 | 121.6 |
| PF32 | OTSPROJ | 17 | 309 | 82 | 95 | 106 | 127 | 173 | 113.3 | 24.9 | 88.4 | 138.2 |
| PF33 | OTSANALY | 24 | 314 | 93 | 104 | 117 | 138 | 176 | 122.0 | 22.9 | 99.2 | 144.9 |
| PF34 | OTSDEVEL | 24 | 314 | 104 | 113 | 122 | 140 | 179 | 127.5 | 19.6 | 107.9 | 147.1 |
| PF35 | ODMPROJ | 74 | 346 | 142 | 165 | 182 | 206 | 238 | 186.4 | 27.0 | 159.4 | 213.4 |
| PF36 | ODMANALY | 74 | 346 | 150 | 166 | 182 | 203 | 228 | 184.9 | 22.6 | 162.3 | 207.5 |
| PF37 | ODMDEVEL | 74 | 346 | 166 | 187 | 206 | 216 | 232 | 203.1 | 18.4 | 184.7 | 221.5 |
| PF38 | OIMANALY | 74 | 346 | 151 | 168 | 177 | 195 | 223 | 181.5 | 17.9 | 163.7 | 199.4 |
| PF39 | OIMDEVEL | 74 | 346 | 110 | 172 | 284 | 296 | 303 | 236.5 | 68.9 | 167.6 | 305.4 |

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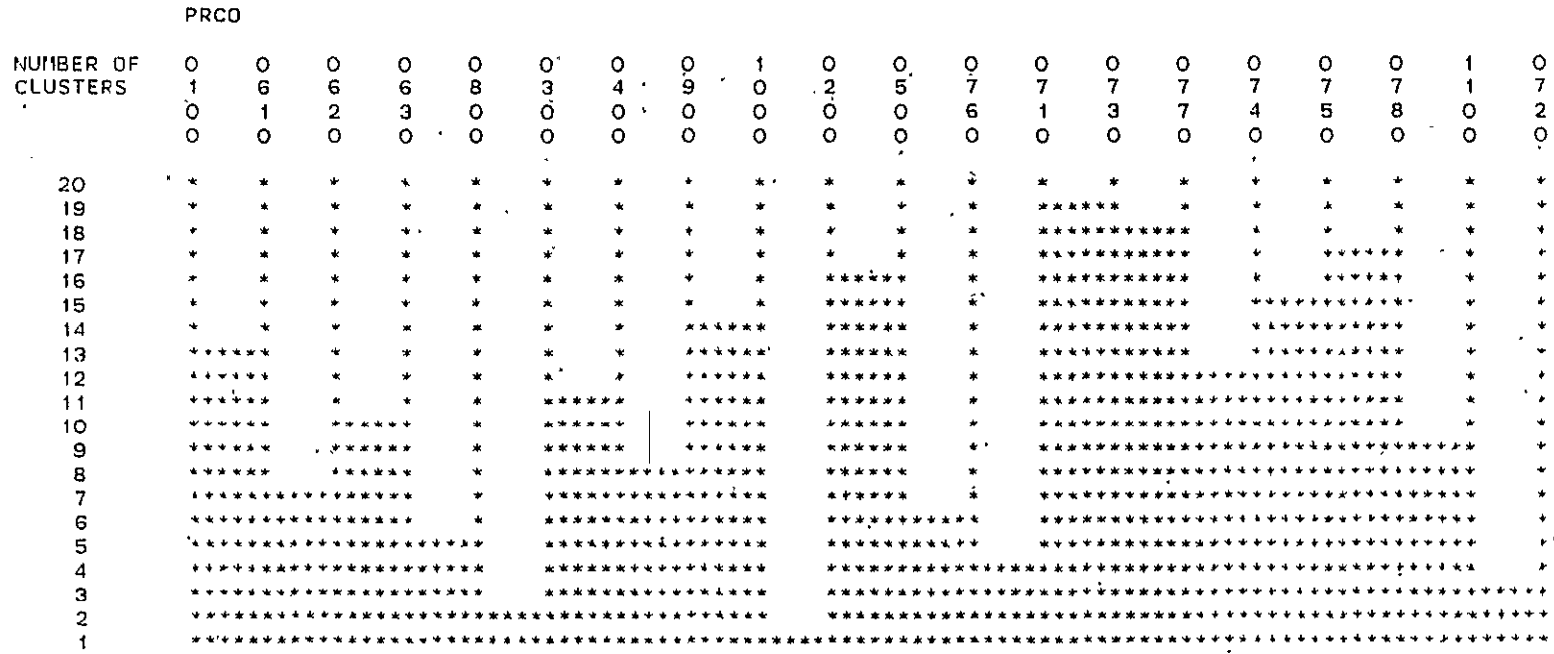


Figure A.2.3-2. Performance of Team: Cluster Map for 20 Independent Systems

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Table A.2.3-5. Performance of Team: Summary Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| PF01 | DPROG | 3 | 300 | 47 | 72 | 84 | 98 | 100 | 81.0 | 16.9 | 64.1 | 97.9 |
| PFO2 | DTS PROJ | 17 | 309 | 65 | 92 | 100 | 118 | 122 | 101.8 | 18.1 | 83.7 | 119.8 |
| PFO3 | DTSANALY | 24 | 314 | 77 | 101 | 110 | 127 | 129 | 111.3 | 17.4 | 93.9 | 128.7 |
| PFO4 | DTSDEVEL | 24 | 314 | 89 | 102 | 114 | 128 | 136 | 113.8 | 15.3 | 98.5 | 129.1 |
| PF05 | DDM PROJ | 74 | 346 | 137 | 160 | 191 | 211 | 215 | 185.0 | 27.1 | 157.9 | 212.1 |
| PFC6 | DDMANALY | 74 | 346 | 147 | 158 | 186 | 201 | 211 | 181.9 | 22.8 | 159.1 | 204.7 |
| PFO7 | DDMDEVEL | 74 | 346 | 161 | 172 | 188 | 208 | 222 | 190.4 | 20.8 | 169.6 | 211.3 |
| PFO8 | DIMANALY | 74 | 346 | 137 | 168 | 172 | 191 | 204 | 176.2 | 19.3 | 156.9 | 195.5 |
| PFO9 | DIMDEVEL | 74 | 346 | 132 | 158 | 174 | 274 | 290 | 201.2 | 60.8 | 140.4 | 262.0 |
| PF11 | I PROG | 3 | 300 | 73 | 79 | 93 | 96 | 117 | 90.9 | 13.0 | 77.9 | 103.9 |
| PF12 | ITSPROJ | 17 | 309 | 92 | 98 | 108 | 119 | 141 | 109.4 | 15.2 | 94.2 | 124.7 |
| PF13 | ITSANALY | 24 | 314 | 99 | 108 | 119 | 128 | 149 | 119.1 | 15.0 | 104.1 | 134.1 |
| PF14 | ITSDEVEL | 24 | 314 | 103 | 106 | 124 | 134 | 147 | 121.1 | 15.9 | 105.2 | 137.1 |
| PF15 | IDM PROJ | 74 | 346 | 114 | 148 | 183 | 222 | 235 | 183.6 | 41.8 | 141.7 | 225.4 |
| PF16 | IDMANALY | 74 | 346 | 145 | 157 | 180 | 218 | 223 | 185.2 | 29.6 | 155.6 | 214.8 |
| PF17 | IDMDEVEL | 74 | 346 | 131 | 161 | 196 | 224 | 240 | 192.3 | 37.5 | 154.8 | 229.8 |
| PF18 | IIMANALY | 74 | 346 | 143 | 169 | 199 | 206 | 216 | 188.4 | 24.1 | 164.3 | 212.6 |
| PF19 | IIMDEVEL | 74 | 346 | 136 | 167 | 186 | 288 | 295 | 210.3 | 61.7 | 148.6 | 272.0 |
| PF21 | T PROJ | 3 | 300 | 78 | 86 | 95 | 110 | 124 | 97.8 | 15.5 | 82.3 | 113.2 |
| PF22 | TTS PROJ | 17 | 309 | 98 | 109 | 117 | 133 | 154 | 121.0 | 17.5 | 103.5 | 138.5 |
| PF23 | TTSANALY | 24 | 314 | 107 | 120 | 127 | 141 | 162 | 130.0 | 16.7 | 113.3 | 146.7 |
| PF24 | TTSDEVEL | 24 | 314 | 110 | 121 | 133 | 146 | 158 | 133.3 | 15.4 | 118.0 | 148.7 |
| PF25 | TDM PROJ | 74 | 346 | 176 | 194 | 211 | 229 | 273 | 214.3 | 28.6 | 185.8 | 242.9 |
| PF25 | TDMANALY | 74 | 346 | 175 | 190 | 205 | 219 | 252 | 205.9 | 22.9 | 183.0 | 228.8 |
| PF27 | TDMDEVEL | 74 | 346 | 184 | 197 | 221 | 237 | 240 | 216.0 | 21.2 | 194.8 | 237.2 |
| PF28 | TIMANALY | 74 | 346 | 174 | 175 | 188 | 199 | 209 | 188.6 | 12.8 | 175.8 | 201.3 |
| PF29 | TIMDEVEL | 74 | 346 | 161 | 176 | 198 | 288 | 305 | 219.6 | 57.2 | 162.4 | 276.7 |
| PF31 | O PROJ | 3 | 300 | 74 | 80 | 86 | 100 | 111 | 90.0 | 12.1 | 77.9 | 102.1 |
| PF32 | OTSPROJ | 17 | 309 | 92 | 99 | 108 | 124 | 134 | 110.6 | 14.3 | 96.3 | 124.8 |
| PF33 | OTSANALY | 24 | 314 | 100 | 109 | 120 | 133 | 143 | 120.1 | 14.3 | 105.8 | 134.4 |
| PF34 | OTSDEVEL | 24 | 314 | 104 | 111 | 122 | 135 | 141 | 122.8 | 12.9 | 109.9 | 135.7 |
| PF35 | DDM PROJ | 74 | 346 | 164 | 168 | 191 | 219 | 238 | 194.2 | 26.9 | 167.3 | 221.1 |
| PF36 | DDMANALY | 74 | 346 | 162 | 172 | 186 | 212 | 228 | 191.1 | 22.3 | 168.8 | 213.4 |
| PF37 | DDMDEVEL | 74 | 346 | 166 | 178 | 206 | 221 | 232 | 199.6 | 23.9 | 175.6 | 223.5 |
| PF38 | OIMANALY | 74 | 346 | 151 | 173 | 192 | 197 | 206 | 184.4 | 17.1 | 167.4 | 201.5 |
| PF39 | OIMDEVEL | 74 | 346 | 143 | 167 | 187 | 284 | 296 | 210.3 | 59.7 | 150.6 | 270.0 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| | 1 | 6 | 3 | 4 | 9 | 0 | 2 | 5 | 7 |
| | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * |

Figure A.2.3-3. Performance of Team: Cluster Map for 9 Large Systems

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41 5044 J1442230
Y71AUP 6009 70

Table A.2.3-6. Performance of Team: Summary Statistics
for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| PFO1 | DPROG | 3 | 300 | 45 | 55 | 64 | 112 | 170 | 83.4 | 40.4 | 43.0 | 123.7 |
| PFO2 | DTSPROJ | 17 | 309 | 62 | 72 | 84 | 133 | 182 | 100.0 | 38.4 | 61.6 | 138.4 |
| PFO3 | DTSANALY | 24 | 314 | 74 | 83 | 94 | 137 | 182 | 109.2 | 35.3 | 73.9 | 144.4 |
| PFO4 | DTSDEVEL | 24 | 314 | 87 | 95 | 108 | 139 | 175 | 116.6 | 28.2 | 88.4 | 144.8 |
| PFO5 | DDMPROJ | 74 | 346 | 133 | 139 | 164 | 173 | 227 | 165.3 | 32.4 | 132.9 | 197.6 |
| PFO6 | DDMANALY | 74 | 346 | 144 | 148 | 164 | 182 | 233 | 169.6 | 28.4 | 141.2 | 198.1 |
| PFO7 | DDMDEVEL | 74 | 346 | 171 | 185 | 188 | 206 | 211 | 194.3 | 12.9 | 181.4 | 207.2 |
| PFO8 | DIMANALY | 74 | 346 | 162 | 166 | 166 | 174 | 257 | 178.5 | 28.1 | 150.3 | 206.6 |
| PFO9 | DIMDEVEL | 74 | 346 | 106 | 168 | 288 | 294 | 305 | 252.5 | 70.3 | 182.1 | 322.8 |
| PF11 | IPROG | 3 | 300 | 65 | 73 | 95 | 139 | 166 | 104.1 | 33.8 | 70.3 | 137.9 |
| PF12 | ITSPROJ | 17 | 309 | 86 | 93 | 110 | 152 | 173 | 119.8 | 31.3 | 88.5 | 151.1 |
| PF13 | ITSANALY | 24 | 314 | 97 | 100 | 117 | 160 | 174 | 127.3 | 29.1 | 98.2 | 156.3 |
| PF14 | ITSDEVEL | 24 | 314 | 110 | 114 | 129 | 157 | 185 | 135.2 | 24.1 | 111.1 | 159.3 |
| PF15 | IDMPROJ | 74 | 346 | 105 | 170 | 185 | 204 | 238 | 183.1 | 34.6 | 148.4 | 217.7 |
| PF16 | IDMANALY | 74 | 346 | 123 | 169 | 178 | 210 | 227 | 181.9 | 28.9 | 153.1 | 210.8 |
| PF17 | IDMDEVEL | 74 | 346 | 171 | 197 | 212 | 221 | 230 | 208.1 | 17.1 | 191.0 | 225.2 |
| PF18 | IIMANALY | 74 | 346 | 161 | 164 | 164 | 206 | 221 | 179.3 | 22.3 | 156.9 | 201.6 |
| PF19 | IIMDEVEL | 74 | 346 | 108 | 184 | 295 | 303 | 305 | 258.3 | 70.8 | 187.5 | 329.1 |
| PF21 | TPROG | 3 | 300 | 66 | 74 | 94 | 153 | 186 | 110.9 | 44.5 | 66.4 | 155.4 |
| PF22 | TTSPROJ | 17 | 309 | 86 | 97 | 117 | 168 | 192 | 127.1 | 39.4 | 87.7 | 166.5 |
| PF23 | TTSANALY | 24 | 314 | 97 | 106 | 125 | 171 | 191 | 134.0 | 35.1 | 98.9 | 169.1 |
| PF24 | TTSDEVEL | 24 | 314 | 110 | 119 | 128 | 165 | 204 | 142.4 | 34.0 | 108.4 | 176.3 |
| PF25 | TDMPROJ | 74 | 346 | 161 | 172 | 191 | 214 | 229 | 191.9 | 22.4 | 169.5 | 214.3 |
| PF25 | TDMANALY | 74 | 346 | 166 | 173 | 187 | 201 | 214 | 188.3 | 16.6 | 171.7 | 204.9 |
| PF27 | TDMDEVEL | 74 | 346 | 190 | 195 | 215 | 228 | 245 | 215.9 | 19.0 | 196.9 | 234.9 |
| PF28 | TIMANALY | 74 | 346 | 174 | 174 | 174 | 184 | 202 | 180.4 | 10.7 | 169.7 | 191.0 |
| PF29 | TIMDEVEL | 74 | 346 | 116 | 184 | 305 | 305 | 305 | 263.1 | 72.2 | 190.9 | 335.3 |
| PF31 | OPROG | 3 | 300 | 64 | 69 | 85 | 122 | 159 | 99.4 | 34.2 | 65.1 | 133.6 |
| PF32 | OTSPROJ | 17 | 309 | 82 | 91 | 100 | 137 | 173 | 115.5 | 31.7 | 83.9 | 147.2 |
| PF33 | OTSANALY | 24 | 314 | 93 | 102 | 109 | 144 | 176 | 123.6 | 28.7 | 94.9 | 152.4 |
| PF34 | OTSDEVEL | 24 | 314 | 106 | 115 | 121 | 141 | 179 | 131.4 | 23.7 | 107.6 | 155.1 |
| PF35 | ODMPROJ | 74 | 346 | 142 | 161 | 177 | 192 | 231 | 180.0 | 26.5 | 153.5 | 206.5 |
| PF36 | ODMANALY | 74 | 346 | 150 | 164 | 174 | 196 | 219 | 179.8 | 22.6 | 157.2 | 202.4 |
| PF37 | ODMDEVEL | 74 | 346 | 186 | 195 | 206 | 217 | 227 | 206.0 | 12.9 | 193.1 | 218.9 |
| PF38 | OIMANALY | 74 | 346 | 167 | 168 | 168 | 187 | 223 | 179.2 | 19.0 | 160.2 | 198.2 |
| PF39 | OIMDEVEL | 74 | 346 | 110 | 179 | 296 | 301 | 303 | 257.9 | 71.0 | 186.9 | 328.9 |

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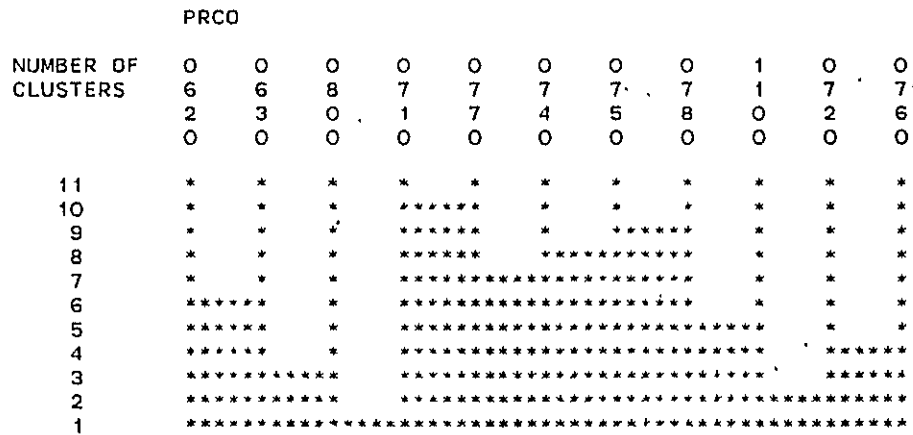


Figure A.2.3-4. Performance of Team: Cluster Map for 11 Small Systems

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A.2.4 ABILITY OF TEAM

| | | | |
|---------------|------------|---------------|-------------|
| - <u>X</u> - | Objective | - <u> </u> - | Subjective |
| - - - | Absolute | - <u>X</u> - | Relative |
| - <u> </u> - | Explicit | - <u>X</u> - | Derived |
| - <u>X</u> - | Static | - - - | Dynamic |
| - <u>X</u> - | Predictive | - - - | Explanatory |

This category comprises weighted sums of the Experience With Application, Effectiveness of Management, and Performance of Team categories.

The remainder of this subsection contains tables and figures that describe the Ability of Team measures with brief phrases, raw numbers, simple statistics, and graphics.

These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.2.4-1)
- Values of the measures for 25 systems (Table A.2.4-2), where large values indicate more development ability
- Summary statistics for 11 projects (Table A.2.4-3)
- Cluster map for 11 projects (Figure A.2.4-1)
- Summary statistics for 20 independent systems (Table A.2.4-4)
- Cluster map for 20 independent systems (Figure A.2.4-2)
- Summary statistics for 9 large systems (Table A.2.4-5)
- Cluster map for 9 large systems (Figure A.2.4-3)
- Summary statistics for 11 small systems (Table A.2.4-6)
- Cluster map for 11 small systems (Figure A.2.4-4)

Table A.2.4-1. Development Team Ability: Description of Measures

| Code | Measure | Range | | Description |
|------|----------|-------|------|---------------------------------------|
| | | Low | High | |
| AB81 | PRDABLTY | 0006 | 1800 | Sum AP84, MG81, MG82, PF01*600/300 |
| AB82 | DPDABLTY | 0033 | 1800 | Sum AP84, MG81, MG82, PF02*600/309 |
| AB83 | DTDABLTY | 0046 | 1800 | Sum AP84, MG81, MG82, PF03*600/314 |
| AB84 | PRIABLTY | 0006 | 1800 | Sum AP84, MG83*2, PF11*600/300 |
| AB85 | DPIABLTY | 0033 | 1800 | Sum AP84, MG83*2, PF12*600/309 |
| AB86 | DTIABLTY | 0046 | 1800 | Sum AP84, MG83*2, PF13*600/314 |
| AB87 | PRTABLTY | 0006 | 1800 | Sum AP84, MG84, MG85, PF21*600/300 |
| AB88 | DPTABLTY | 0033 | 1800 | Sum AP84, MG84, MG85, PF22*600/309 |
| AB89 | DTTABLTY | 0046 | 1800 | Sum AP84, MG84, MG85, PF23*600/314 |
| AB90 | PROABLTY | 0006 | 1800 | Sum AP84, MG93*600/1750, PF31*600/300 |
| AB91 | DPOABLTY | 0033 | 1800 | Sum AP84, MG93*600/1750, PF32*600/309 |
| AB92 | DTOABLTY | 0046 | 1800 | Sum AP84, MG93*600/1750, PF33*600/314 |

Table A.2.4-2. Development Team Ability: Values of the Measures for 25 Systems

| FRCD | AB81 | AB82 | AB83 | AB84 | AB85 | AB86 | AB87 | AB88 | AB89 | AB90 | AB91 | AB92 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 828 | 873 | 893 | 876 | 923 | 940 | 953 | 1004 | 1014 | 854 | 899 | 918 |
| 0200 | 650 | 692 | 710 | 622 | 670 | 693 | 590 | 631 | 644 | 625 | 663 | 686 |
| 0300 | 515 | 544 | 555 | 651 | 683 | 694 | 751 | 785 | 799 | 627 | 655 | 670 |
| 0400 | 533 | 573 | 589 | 604 | 640 | 656 | 604 | 637 | 651 | 604 | 639 | 658 |
| 0500 | 990 | 1017 | 1031 | 962 | 997 | 1009 | 972 | 1009 | 1018 | 973 | 1003 | 1018 |
| 0600 | 868 | 907 | 920 | 888 | 923 | 934 | 862 | 906 | 919 | 857 | 891 | 908 |
| 0700 | 762 | 805 | 856 | 879 | 920 | 928 | 841 | 886 | 897 | 813 | 853 | 880 |
| 0800 | 1090 | 1103 | 1098 | 1092 | 1116 | 1122 | 1136 | 1156 | 1157 | 1082 | 1097 | 1103 |
| 0900 | 738 | 764 | 778 | 636 | 638 | 656 | 630 | 678 | 697 | 670 | 691 | 712 |
| 1000 | 875 | 912 | 921 | 811 | 819 | 837 | 853 | 892 | 908 | 818 | 842 | 859 |
| 1100 | 717 | 743 | 760 | 725 | 725 | 736 | 785 | 813 | 827 | 733 | 749 | 766 |
| 9000 | 815 | 842 | 854 | 726 | 730 | 748 | 752 | 791 | 807 | 752 | 772 | 791 |
| 0610 | 870 | 911 | 924 | 884 | 924 | 935 | 888 | 927 | 938 | 865 | 899 | 916 |
| 0620 | 900 | 926 | 930 | 918 | 935 | 946 | 836 | 858 | 869 | 870 | 887 | 901 |
| 0630 | 824 | 858 | 883 | 786 | 827 | 844 | 718 | 757 | 774 | 801 | 836 | 859 |
| 0631 | 898 | 933 | 953 | 858 | 902 | 877 | 790 | 832 | 847 | 867 | 905 | 913 |
| 0632 | 760 | 793 | 827 | 780 | 808 | 831 | 774 | 803 | 825 | 778 | 806 | 835 |
| 0710 | 705 | 735 | 754 | 830 | 853 | 863 | 776 | 806 | 818 | 759 | 785 | 802 |
| 0720 | 965 | 973 | 977 | 1092 | 1096 | 1089 | 1092 | 1092 | 1085 | 1033 | 1032 | 1034 |
| 0730 | 689 | 721 | 742 | 830 | 857 | 867 | 784 | 815 | 829 | 756 | 783 | 800 |
| 0740 | 667 | 697 | 715 | 740 | 771 | 787 | 692 | 727 | 745 | 689 | 718 | 739 |
| 0750 | 643 | 678 | 695 | 690 | 727 | 745 | 664 | 698 | 715 | 655 | 687 | 708 |
| 0760 | 755 | 785 | 806 | 890 | 921 | 932 | 1042 | 1042 | 1035 | 879 | 896 | 908 |
| 0770 | 685 | 715 | 736 | 856 | 873 | 881 | 806 | 829 | 839 | 771 | 792 | 809 |
| 0780 | 668 | 705 | 726 | 736 | 778 | 794 | 738 | 778 | 796 | 727 | 763 | 784 |

Table A.2.4-3. Development Team Ability: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|---------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| AB81 | PRDABLT | 6 | 1800 | 515 | 650 | 762 | 875 | 1090 | 778.7 | 177.0 | 601.7 | 955.8 |
| AB82 | DPDABLT | 33 | 1800 | 544 | 692 | 805 | 912 | 1103 | 812.1 | 173.2 | 638.9 | 985.3 |
| AB83 | DTDABLT | 46 | 1800 | 555 | 710 | 856 | 921 | 1098 | 828.3 | 170.0 | 658.3 | 998.3 |
| AB84 | PRIABLT | 6 | 1800 | 604 | 636 | 811 | 888 | 1092 | 795.1 | 160.0 | 635.1 | 955.1 |
| AB85 | DPIABLT | 33 | 1800 | 638 | 670 | 819 | 923 | 1116 | 823.1 | 163.1 | 660.0 | 986.1 |
| AB86 | DTIABLT | 46 | 1800 | 656 | 693 | 837 | 940 | 1122 | 836.8 | 160.0 | 676.8 | 996.8 |
| AB87 | PRTABLT | 6 | 1800 | 590 | 630 | 841 | 953 | 1136 | 816.1 | 168.9 | 647.1 | 985.0 |
| AB88 | DPTABLT | 33 | 1800 | 631 | 678 | 886 | 1004 | 1156 | 854.3 | 166.5 | 687.8 | 1020.7 |
| AB89 | DTTABKT | 46 | 1800 | 644 | 697 | 897 | 1014 | 1157 | 866.5 | 162.9 | 703.6 | 1029.3 |
| AB90 | PROABLT | 6 | 1800 | 604 | 627 | 813 | 857 | 1082 | 786.9 | 153.2 | 633.7 | 940.1 |
| AB91 | DPDABLT | 33 | 1800 | 639 | 663 | 842 | 899 | 1097 | 816.5 | 151.4 | 665.1 | 968.0 |
| AB92 | DTDABLT | 46 | 1800 | 658 | 686 | 859 | 918 | 1103 | 834.4 | 148.6 | 685.8 | 982.9 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|-------|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 11 | 1 | 6 | 7 | 0 | 0 | 8 | 2 | 0 | 1 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | * | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * | * |
| 6 | ***** | | | | * | * | * | * | * | * | * |
| 5 | ***** | | | | * | * | * | * | * | * | * |
| 4 | ***** | | | | * | * | * | * | * | * | * |
| 3 | ***** | | | | * | * | * | * | * | * | * |
| 2 | ***** | | | | * | * | * | * | * | * | * |
| 1 | ***** | | | | * | * | * | * | * | * | * |

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Figure A.2.4-1. Development Team Ability: Cluster Map for 11 Projects

Table A.2.4-4. Development Team Ability: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| AB81 | PRDABLY | 6 | 1800 | 515 | 667 | 728 | 874 | 1090 | 765.3 | 150.0 | 615.4 | 915.3 |
| AB82 | DPDABLY | 33 | 1800 | 544 | 699 | 754 | 912 | 1103 | 796.3 | 145.8 | 650.5 | 942.0 |
| AB83 | DTDABLY | 46 | 1800 | 555 | 718 | 769 | 923 | 1098 | 811.1 | 141.7 | 669.4 | 952.9 |
| AB84 | PRIABLY | 6 | 1800 | 604 | 699 | 821 | 889 | 1092 | 811.5 | 141.2 | 670.3 | 952.8 |
| AB85 | DPIABLY | 33 | 1800 | 638 | 726 | 840 | 924 | 1116 | 838.6 | 139.0 | 699.7 | 977.6 |
| AB86 | DTIABLY | 46 | 1800 | 656 | 738 | 854 | 939 | 1122 | 851.3 | 134.7 | 716.6 | 986.0 |
| AB87 | PRTABLY | 6 | 1800 | 590 | 699 | 785 | 937 | 1136 | 815.5 | 157.7 | 657.8 | 973.2 |
| AB88 | DPTABLY | 33 | 1800 | 631 | 735 | 814 | 985 | 1156 | 846.7 | 150.4 | 696.3 | 997.1 |
| AB89 | DTTABKTY | 46 | 1800 | 644 | 752 | 828 | 995 | 1157 | 857.9 | 144.6 | 713.3 | 1002.5 |
| AB90 | PROABLY | 6 | 1800 | 604 | 675 | 765 | 869 | 1082 | 789.5 | 134.5 | 655.1 | 924.0 |
| AB91 | DPOABLY | 33 | 1800 | 639 | 698 | 789 | 898 | 1097 | 815.8 | 129.6 | 686.2 | 945.4 |
| AB92 | DTOABLY | 46 | 1800 | 658 | 719 | 806 | 914 | 1103 | 832.5 | 125.8 | 706.7 | 958.3 |

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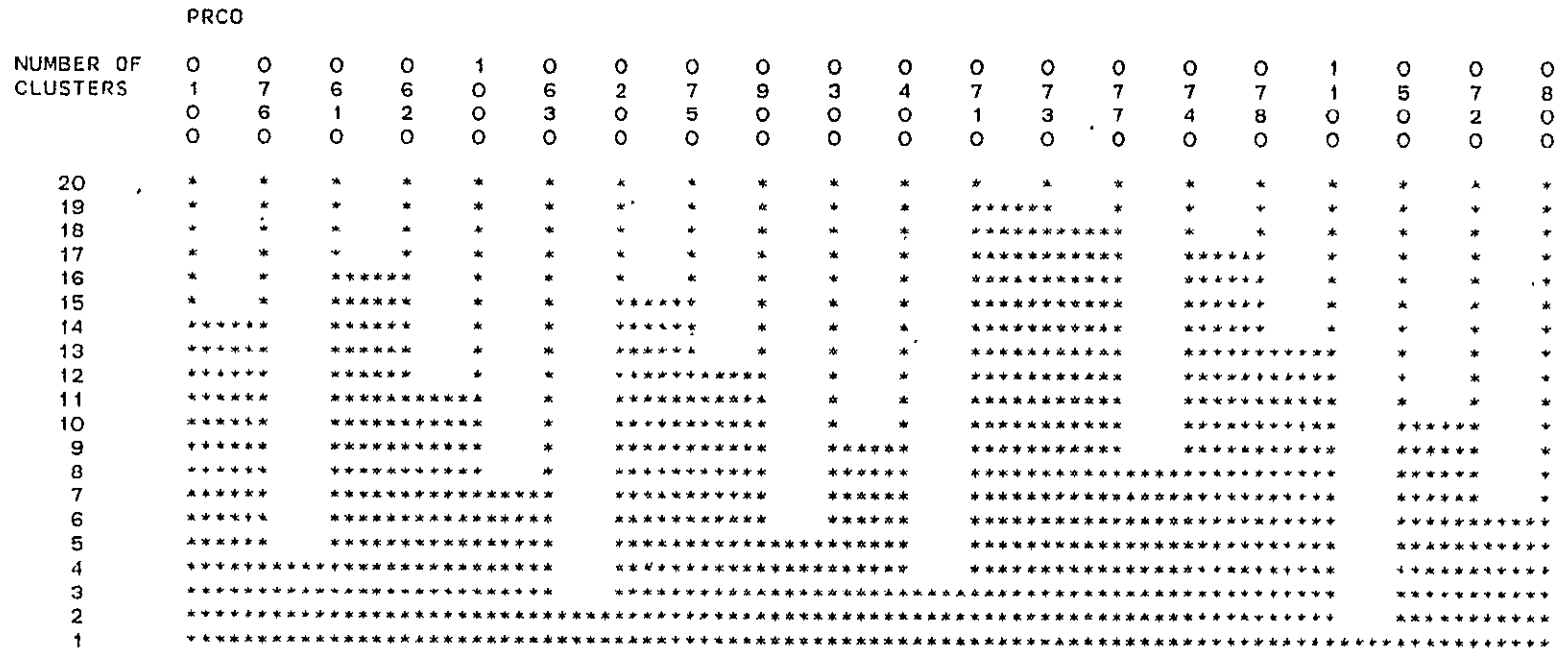


Figure A.2.4-2. Development Team Ability: Cluster Map for 20 Independent Systems

Table A.2.4-5. Development Team Ability: Summary Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| AB81 | PRDABLY | 6 | 1800 | 515 | 592 | 738 | 873 | 990 | 743.1 | 161.8 | 581.3 | 904.9 |
| AB82 | DPDABLY | 33 | 1800 | 544 | 633 | 764 | 912 | 1017 | 778.6 | 161.8 | 616.8 | 940.3 |
| AB83 | DTDABLY | 46 | 1800 | 555 | 650 | 778 | 923 | 1031 | 793.7 | 161.3 | 632.4 | 955.0 |
| AB84 | PRIABLY | 6 | 1800 | 604 | 629 | 811 | 880 | 962 | 764.0 | 135.8 | 628.2 | 899.8 |
| AB85 | DPIABLY | 33 | 1800 | 638 | 655 | 819 | 924 | 997 | 794.6 | 139.2 | 655.3 | 933.8 |
| AB86 | DTIABLY | 46 | 1800 | 656 | 675 | 837 | 938 | 1009 | 809.7 | 137.2 | 672.4 | 946.9 |
| AB87 | PRTABLY | 6 | 1800 | 590 | 617 | 784 | 921 | 972 | 780.6 | 147.6 | 633.0 | 928.1 |
| AB88 | DPTABLY | 33 | 1800 | 631 | 658 | 815 | 966 | 1009 | 819.8 | 148.7 | 671.1 | 968.5 |
| AB89 | DTTABKTY | 46 | 1800 | 644 | 674 | 829 | 976 | 1018 | 833.1 | 146.7 | 686.4 | 979.8 |
| AB90 | PROABLY | 6 | 1800 | 604 | 626 | 756 | 860 | 973 | 754.7 | 130.7 | 623.9 | 885.4 |
| AB91 | DPDABLY | 33 | 1800 | 639 | 659 | 783 | 899 | 1003 | 786.0 | 131.7 | 654.3 | 917.7 |
| AB92 | DTDABLY | 46 | 1800 | 658 | 678 | 800 | 917 | 1018 | 804.1 | 130.4 | 673.7 | 934.5 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | |
|--------------------|-------|---|---|---|---|-------|---|-------|---|
| | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1 | 6 | 0 | 7 | 5 | 2 | 9 | 3 | 4 |
| | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | * | * | * | * | * | * | * | * | * |
| 8 | ***** | | * | * | * | * | * | * | * |
| 7 | ***** | | * | * | * | ***** | * | * | * |
| 6 | ***** | | * | * | * | ***** | * | * | * |
| 5 | ***** | | * | * | * | ***** | | ***** | |
| 4 | ***** | | * | * | * | ***** | | ***** | |
| 3 | ***** | | * | * | * | ***** | | ***** | |
| 2 | ***** | | * | * | * | ***** | | ***** | |
| 1 | ***** | | * | * | * | ***** | | ***** | |

Figure A.2.4-3. Development Team Ability: Cluster Map for 9 Large Systems

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Table A.2.4-6. Development Team Ability: Summary Statistics for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|---------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| AB81 | PRDABLY | 6 | 1800 | 643 | 668 | 717 | 900 | 1090 | 783.5 | 144.9 | 638.7 | 928.4 |
| AB82 | DPDABLY | 33 | 1800 | 678 | 705 | 743 | 926 | 1103 | 810.7 | 137.5 | 673.2 | 948.3 |
| AB83 | DTDABLY | 46 | 1800 | 695 | 726 | 760 | 930 | 1098 | 825.5 | 129.8 | 695.7 | 955.2 |
| AB84 | PRIABLY | 6 | 1800 | 690 | 736 | 830 | 918 | 1092 | 850.5 | 139.4 | 711.1 | 989.8 |
| AB85 | DPIABLY | 33 | 1800 | 725 | 771 | 853 | 935 | 1116 | 874.7 | 134.2 | 740.5 | 1008.9 |
| AB86 | DTIABLY | 46 | 1800 | 736 | 787 | 863 | 946 | 1122 | 885.4 | 128.7 | 756.7 | 1014.0 |
| AB87 | PRTABLY | 6 | 1800 | 664 | 718 | 785 | 1042 | 1136 | 844.1 | 166.8 | 677.3 | 1010.9 |
| AB88 | DPTABLY | 33 | 1800 | 698 | 757 | 813 | 1042 | 1156 | 868.7 | 155.3 | 713.5 | 1024.0 |
| AB89 | DTTABLY | 46 | 1800 | 715 | 774 | 827 | 1035 | 1157 | 878.2 | 146.6 | 731.6 | 1024.8 |
| AB90 | PRDABLY | 6 | 1800 | 655 | 727 | 771 | 879 | 1082 | 818.1 | 136.8 | 681.3 | 954.9 |
| AB91 | DPOABLY | 33 | 1800 | 687 | 749 | 792 | 896 | 1097 | 840.2 | 128.9 | 711.3 | 969.1 |
| AB92 | DTOABLY | 46 | 1800 | 708 | 766 | 809 | 908 | 1103 | 855.7 | 123.1 | 732.7 | 978.8 |

| | PRCO | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|
| NUMBER OF CLUSTERS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | 6 | 7 | 7 | 8 | 6 | 7 | 7 | 7 | 7 | 1 | 7 |
| | 2 | 6 | 2 | 0 | 3 | 1 | 7 | 4 | 8 | 0 | 5 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | * |
| 9 | * | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * | * |

Figure A.2.4-4. Development Team Ability: Cluster Map for 11 Small Systems

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A.3 DIFFICULTY OF PROJECT CLASS OF MEASURES

The Difficulty of Project class measures the degree of

- Complexity of Problem (CP01 through CP15)
 - Constraints (CP01 through CP05)
 - Communications (CP06 through CP08)
 - Other (CP09 through CP15)
 - Sums (CP81 through CP85)
- Internal Influences on Project (IN01 through IN15)
 - Overtime (IN01 through IN03)
 - Staffing Problems (IN04 through IN07)
 - Project Manager (IN08 through IN10)
 - Other (IN11 through IN15)
 - Sums (IN81 through IN84)
- External Influences on Project (EX01 through EX20)
 - Requirements (EX01 and EX02)
 - Support (EX03 through EX06)
 - Outside Development (EX07 through EX09)
 - Simulator (EX10 through EX12)
 - Analysis Leader (EX13 through EX15)
 - Other (EX16 through EX20)
 - Sums (EX81 through EX87)
- Difficulty of Project
 - Sum (DF81)

A.3.1 COMPLEXITY OF PROBLEM

| | | | |
|-------------------------------------|------------|-------------------------------------|-------------|
| <input checked="" type="checkbox"/> | Objective | <input type="checkbox"/> | Subjective |
| <input type="checkbox"/> | Absolute | <input checked="" type="checkbox"/> | Relative |
| <input type="checkbox"/> | Explicit | <input checked="" type="checkbox"/> | Derived |
| <input checked="" type="checkbox"/> | Static | <input type="checkbox"/> | Dynamic |
| <input checked="" type="checkbox"/> | Predictive | <input type="checkbox"/> | Explanatory |

This category measures the complexity of the development problem. These measures are scaled values derived from objective data. For example, Number of Data Sets in

Processing (CP05) is the total number of data sets divided by 0.5. They are relative and dynamic in the sense that an extreme case could change the scaling of the sample. These measures are well known at the end of design, therefore, their predictive value increases from the beginning of the project and peaks shortly after design, when the measures become static.

The remainder of this subsection contains tables and figures that describe the Complexity of Problem measures with brief phrases, raw numbers, simple statistics, and graphics.

These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.3.1-1)
- Values of the measures for 25 systems (Table A.3.1-2), where large values indicate more complexity
- Summary statistics for 11 projects (Table A.3.1-3)
- Cluster map for 11 projects (Figure A.3.1-1)
- Summary statistics for 20 independent systems (Table A.3.1-4)
- Cluster map for 20 independent systems (Figure A.3.1-2)
- Summary statistics for 9 large systems (Table A.3.1-5)
- Cluster map for 9 large systems (Figure A.3.1-3)
- Summary statistics for 11 small systems (Table A.3.1-6)
- Cluster map for 11 small systems (Figure A.3.1-4)

Table A.3.1-1. Complexity of Problem: Description of Measures

| Code | Measure | Range | | Description |
|------|-----------|-------|------|------------------------|
| | | Low | High | |
| | | | | Constraints |
| CP01 | CONMEMRY | 00 | 50 | Memory |
| CP02 | CONTIMNG | 00 | 50 | Timing |
| | | | | Processing |
| CP03 | PAMTDATA | 00 | 50 | Amount of Data in Step |
| CP04 | PDBSIZE | 00 | 50 | Data Base Size |
| CP05 | PNOOFDS | 00 | 50 | Number of Data Sets |
| | | | | Communications |
| CP06 | COMPROGS | 00 | 50 | Number of Programs |
| CP07 | COMSUBS | 00 | 50 | Number of Subsystems |
| CP08 | COMDSETS | 00 | 50 | Number of Data Sets |
| CP09 | OLDCODE | 00 | 50 | Use of Old Code |
| CP10 | ALGORITHM | 00 | 50 | New Algorithms |
| CP11 | SCHEDULE | 00 | 50 | Schedule |
| CP12 | | 00 | 00 | Not Defined |
| CP13 | | 00 | 00 | Not Defined |
| CP14 | | 00 | 00 | Not Defined |
| CP15 | | 00 | 00 | Not Defined |
| CP81 | CNSTRAIN | 000 | 100 | Sum CP01 and CP02 |
| CP82 | PROCESNG | 000 | 150 | Sum CP03 Through CP05 |
| CP83 | COMUNICT | 000 | 150 | Sum CP06 Through CP08 |
| CP84 | EXTRAS | 000 | 150 | Sum CP09 Through CP11 |
| CP85 | TOTAL | 000 | 550 | Sum CP01 Through CP11 |

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Table A.3.1-2. Complexity of Problem: Values of the Measures for 25 Systems

| PRCO | CP01 | CP02 | CP03 | CP04 | CP05 | CP06 | CP07 | CP08 | CP09 | CP10 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 10 | 20 | 10 | 20 | 40 | 20 | 25 | 20 | 20 | 30 |
| 0200 | 10 | 20 | 10 | 10 | 20 | 10 | 20 | 20 | 25 | 20 |
| 0300 | 40 | 10 | 30 | 20 | 30 | 20 | 25 | 25 | 0 | 0 |
| 0400 | 40 | 40 | 50 | 30 | 35 | 50 | 40 | 45 | 25 | 10 |
| 0500 | 10 | 20 | 10 | 10 | 20 | 10 | 20 | 25 | 50 | 10 |
| 0600 | 40 | 10 | 50 | 50 | 50 | 20 | 30 | 50 | 15 | 40 |
| 0700 | 20 | 40 | 10 | 30 | 50 | 40 | 30 | 35 | 40 | 20 |
| 0800 | 20 | 10 | 10 | 20 | 50 | 10 | 10 | 35 | 0 | 0 |
| 0900 | 10 | 40 | 50 | 15 | 20 | 10 | 20 | 20 | 40 | 20 |
| 1000 | 10 | 40 | 50 | 15 | 25 | 20 | 20 | 20 | 30 | 10 |
| 1100 | 30 | 40 | 50 | 10 | 10 | 10 | 15 | 20 | 15 | 10 |
| 9000 | 10 | 40 | 50 | 15 | 20 | 15 | 20 | 20 | 35 | 15 |
| 0610 | 50 | 10 | 50 | 45 | 40 | 20 | 30 | 50 | 15 | 30 |
| 0620 | 20 | 0 | 0 | 20 | 15 | 10 | 10 | 20 | 0 | 20 |
| 0630 | 10 | 0 | 0 | 20 | 10 | 20 | 10 | 15 | 15 | 30 |
| 0631 | 10 | 0 | 0 | 20 | 5 | 20 | 5 | 15 | 50 | 10 |
| 0632 | 10 | 0 | 0 | 5 | 5 | 20 | 5 | 5 | 0 | 20 |
| 0710 | 40 | 40 | 30 | 15 | 5 | 10 | 5 | 10 | 15 | 0 |
| 0720 | 10 | 30 | 10 | 15 | 10 | 20 | 10 | 20 | 30 | 0 |
| 0730 | 10 | 40 | 30 | 15 | 15 | 20 | 15 | 25 | 50 | 10 |
| 0740 | 0 | 10 | 0 | 15 | 15 | 30 | 5 | 20 | 50 | 0 |
| 0750 | 0 | 10 | 0 | 15 | 5 | 40 | 5 | 10 | 0 | 10 |
| 0760 | 0 | 0 | 0 | 5 | 10 | 10 | 10 | 15 | 50 | 0 |
| 0770 | 0 | 0 | 20 | 10 | 10 | 20 | 5 | 20 | 0 | 0 |
| 0780 | 30 | 0 | 20 | 10 | 10 | 10 | 5 | 20 | 0 | 0 |

| PRCO | CP11 | CP81 | CP82 | CP83 | CP84 | CP85 |
|------|------|------|------|------|------|------|
| 0100 | 30 | 30 | 70 | 65 | 80 | 245 |
| 0200 | 45 | 30 | 40 | 50 | 90 | 210 |
| 0300 | 30 | 50 | 80 | 70 | 30 | 230 |
| 0400 | 30 | 80 | 115 | 135 | 65 | 395 |
| 0500 | 50 | 30 | 40 | 55 | 110 | 235 |
| 0600 | 40 | 50 | 150 | 100 | 95 | 395 |
| 0700 | 20 | 60 | 90 | 105 | 80 | 335 |
| 0800 | 10 | 30 | 80 | 55 | 10 | 175 |
| 0900 | 10 | 50 | 85 | 50 | 70 | 255 |
| 1000 | 10 | 50 | 90 | 60 | 50 | 250 |
| 1100 | 10 | 70 | 70 | 45 | 35 | 220 |
| 9000 | 10 | 50 | 85 | 55 | 50 | 250 |
| 0610 | 40 | 60 | 135 | 100 | 85 | 380 |
| 0620 | 10 | 20 | 35 | 40 | 30 | 125 |
| 0630 | 45 | 10 | 30 | 45 | 90 | 175 |
| 0631 | 50 | 10 | 25 | 40 | 110 | 185 |
| 0632 | 30 | 10 | 10 | 30 | 50 | 100 |
| 0710 | 10 | 80 | 50 | 25 | 25 | 180 |
| 0720 | 10 | 40 | 35 | 50 | 40 | 165 |
| 0730 | 10 | 50 | 60 | 60 | 70 | 240 |
| 0740 | 10 | 10 | 30 | 55 | 60 | 155 |
| 0750 | 10 | 10 | 20 | 55 | 20 | 105 |
| 0760 | 30 | 0 | 15 | 35 | 80 | 130 |
| 0770 | 10 | 0 | 40 | 45 | 10 | 95 |
| 0780 | 40 | 30 | 40 | 35 | 40 | 145 |

Table A.3.1-3. Complexity of Problem: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| CP01 | CONMEMRY | 0 | 50 | 10 | 10 | 20 | 40 | 40 | 21.8 | 13.3 | 8.5 | 35.1 |
| CP02 | CONTIMNG | 0 | 50 | 10 | 10 | 20 | 40 | 40 | 26.4 | 13.6 | 12.7 | 40.0 |
| CP03 | PAMTDATA | 0 | 50 | 10 | 10 | 30 | 50 | 50 | 30.0 | 20.0 | 10.0 | 50.0 |
| CP04 | PDBSIZE | 0 | 50 | 10 | 10 | 20 | 30 | 50 | 20.9 | 12.0 | 8.9 | 32.9 |
| CP05 | PNOOFDS | 0 | 50 | 10 | 20 | 30 | 50 | 50 | 31.8 | 14.2 | 17.6 | 46.0 |
| CP06 | COMPROGS | 0 | 50 | 10 | 10 | 20 | 20 | 50 | 20.0 | 13.4 | 6.6 | 33.4 |
| CP07 | COMSUBS | 0 | 50 | 10 | 20 | 20 | 30 | 40 | 23.2 | 8.1 | 15.0 | 31.3 |
| CP08 | COMDSETS | 0 | 50 | 20 | 20 | 25 | 35 | 50 | 28.6 | 11.0 | 17.7 | 39.6 |
| CP09 | OLDCODE | 0 | 50 | 0 | 15 | 25 | 40 | 50 | 23.6 | 16.0 | 7.7 | 39.6 |
| CP10 | ALGORTHM | 0 | 50 | 0 | 10 | 10 | 20 | 40 | 15.5 | 12.1 | 3.3 | 27.6 |
| CP11 | SCHEDULE | 0 | 50 | 10 | 10 | 30 | 40 | 50 | 25.9 | 15.0 | 10.9 | 40.9 |
| CP81 | CNSTRAIN | 0 | 100 | 30 | 30 | 50 | 60 | 80 | 48.2 | 17.2 | 31.0 | 65.4 |
| CP82 | PROCESNG | 0 | 150 | 40 | 70 | 80 | 90 | 150 | 82.7 | 31.1 | 51.6 | 113.8 |
| CP83 | COMUNICT | 0 | 150 | 45 | 50 | 60 | 100 | 135 | 71.8 | 28.8 | 43.0 | 100.7 |
| CP84 | EXTRAS | 0 | 150 | 10 | 35 | 70 | 90 | 110 | 65.0 | 30.7 | 34.3 | 95.7 |
| CP85 | TOTAL | 0 | 550 | 175 | 220 | 245 | 335 | 395 | 267.7 | 73.9 | 193.8 | 341.6 |

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| NUMBER OF CLUSTERS | PRCD | | | | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| | 1 | 2 | 5 | 3 | 1 | 9 | 0 | 8 | 4 | 6 | 7 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | ***** | * | * | * | * | * |
| 9 | * | ***** | * | * | ***** | * | * | * | * | * | * |
| 8 | * | ***** | ***** | ***** | ***** | * | * | * | * | * | * |
| 7 | ***** | ***** | ***** | ***** | ***** | * | * | * | * | * | * |
| 6 | ***** | ***** | ***** | ***** | ***** | * | * | * | * | * | * |
| 5 | ***** | ***** | ***** | ***** | ***** | * | ***** | * | ***** | * | ***** |
| 4 | ***** | ***** | ***** | ***** | ***** | * | ***** | * | ***** | * | ***** |
| 3 | ***** | ***** | ***** | ***** | ***** | * | ***** | * | ***** | * | ***** |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |

Figure A.3.1-1. Complexity of Problem: Cluster Map for 11 Projects

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Table A.3.1-4. Complexity of Problem: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| CP01 | CONMEMRY | 0 | 50 | 0 | 10 | 10 | 30 | 50 | 17.5 | 15.5 | 2.0 | 33.0 |
| CP02 | CONTIMNG | 0 | 50 | 0 | 3 | 15 | 40 | 40 | 19.0 | 16.2 | 2.8 | 35.2 |
| CP03 | PAMTDATA | 0 | 50 | 0 | 3 | 15 | 45 | 50 | 21.5 | 19.5 | 2.0 | 41.0 |
| CP04 | PDBSIZE | 0 | 50 | 5 | 10 | 15 | 20 | 45 | 16.8 | 8.6 | 8.1 | 25.4 |
| CP05 | PNOOFDS | 0 | 50 | 5 | 10 | 15 | 29 | 50 | 19.8 | 12.9 | 6.8 | 32.7 |
| CP06 | COMPROGS | 0 | 50 | 10 | 10 | 20 | 20 | 50 | 18.5 | 10.9 | 7.6 | 29.4 |
| CP07 | COMSUBS | 0 | 50 | 5 | 6 | 13 | 20 | 40 | 15.3 | 9.7 | 5.6 | 24.9 |
| CP08 | COMDSETS | 0 | 50 | 10 | 20 | 20 | 25 | 50 | 22.8 | 10.1 | 12.7 | 32.8 |
| CP09 | OLDCODE | 0 | 50 | 0 | 0 | 18 | 38 | 50 | 21.5 | 18.8 | 2.7 | 40.3 |
| CP10 | ALGORTHM | 0 | 50 | 0 | 0 | 10 | 20 | 30 | 10.5 | 11.0 | -0.5 | 21.5 |
| CP11 | SCHEDULE | 0 | 50 | 10 | 10 | 10 | 38 | 50 | 22.5 | 15.1 | 7.4 | 37.6 |
| CP81 | CNSTRAIN | 0 | 100 | 0 | 13 | 30 | 50 | 80 | 36.5 | 24.6 | 11.9 | 61.1 |
| CP82 | PROCESNG | 0 | 150 | 15 | 35 | 45 | 80 | 135 | 58.0 | 32.0 | 26.0 | 90.0 |
| CP83 | COMUNICT | 0 | 150 | 25 | 45 | 53 | 60 | 135 | 56.5 | 24.1 | 32.4 | 80.6 |
| CP84 | EXTRAS | 0 | 150 | 10 | 30 | 55 | 80 | 110 | 54.5 | 29.5 | 25.0 | 84.0 |
| CP85 | TOTAL | 0 | 550 | 95 | 148 | 195 | 244 | 395 | 205.5 | 79.5 | 126.0 | 285.0 |

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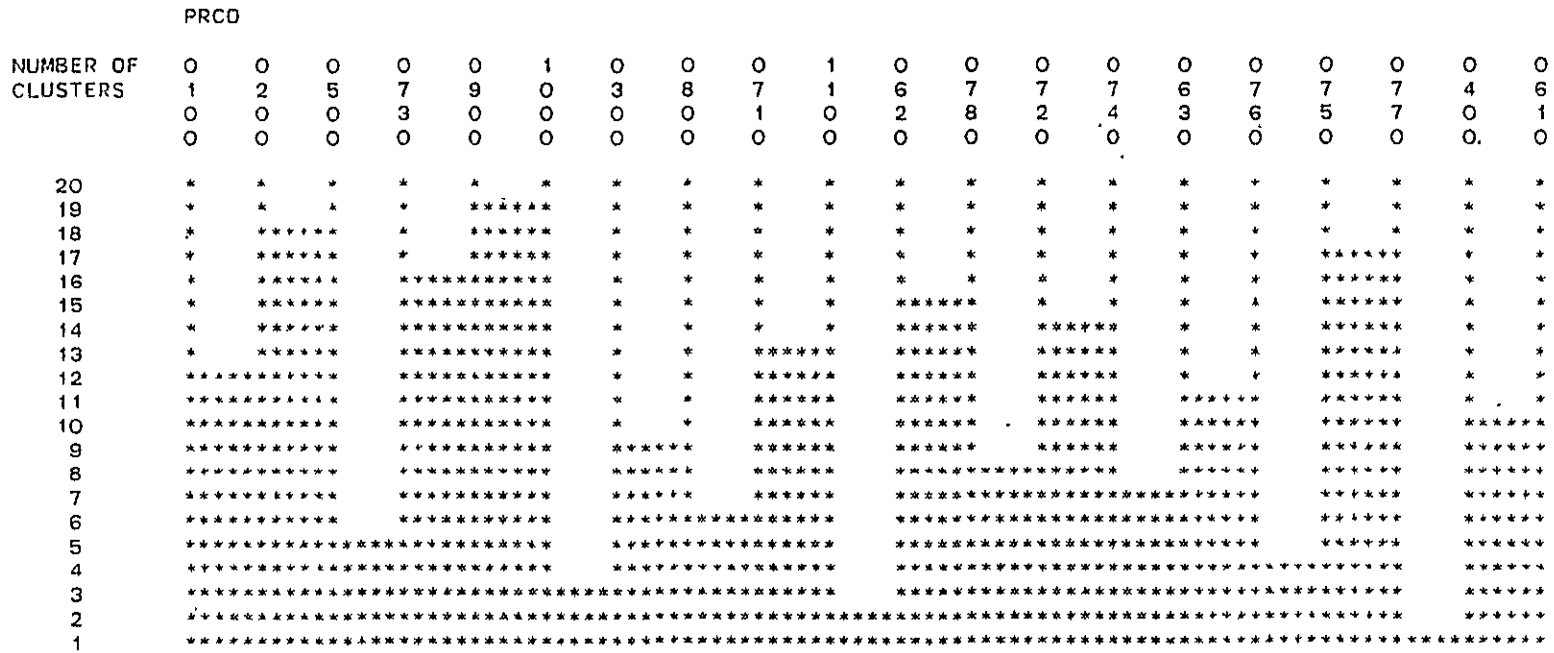


Figure A.3.1-2. Complexity of Problem: Cluster Map for 20 Independent Systems

Table A.3.1-5. Complexity of Problem: Summary Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE- | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|-----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| CP01 | CONMEMRY | 0 | 50 | 10 | 10 | 10 | 40 | 50 | 21.1 | 16.9 | 4.2 | 38.0 |
| CP02 | CONTIMNG | 0 | 50 | 10 | 15 | 20 | 40 | 40 | 26.7 | 13.2 | 13.4 | 39.9 |
| CP03 | PAM1DATA | 0 | 50 | 10 | 10 | 30 | 50 | 50 | 32.2 | 18.6 | 13.7 | 50.8 |
| CP04 | PDBSIZE | 0 | 50 | 10 | 13 | 15 | 25 | 45 | 20.0 | 11.2 | 8.8 | 31.2 |
| CP05 | PNOOFDS | 0 | 50 | 15 | 20 | 25 | 38 | 40 | 27.2 | 9.4 | 17.8 | 36.6 |
| CP06 | COMPROGS | 0 | 50 | 10 | 10 | 20 | 20 | 50 | 20.0 | 12.2 | 7.8 | 32.2 |
| CP07 | COMSUBS | 0 | 50 | 15 | 20 | 20 | 28 | 40 | 23.9 | 7.4 | 16.5 | 31.3 |
| CP08 | COMDSETS | 0 | 50 | 20 | 20 | 25 | 35 | 50 | 27.8 | 11.5 | 16.3 | 39.3 |
| CP09 | OLDCODE | 0 | 50 | 0 | 18 | 25 | 45 | 50 | 28.3 | 16.4 | 11.9 | 44.7 |
| CP10 | ALGORTHM | 0 | 50 | 0 | 10 | 10 | 25 | 30 | 15.6 | 10.1 | 5.4 | 25.7 |
| CP11 | SCHEDULE | 0 | 50 | 10 | 10 | 30 | 43 | 50 | 28.3 | 15.4 | 12.9 | 43.7 |
| CP81 | CNSTRAIN | 0 | 100 | 30 | 30 | 50 | 55 | 80 | 47.8 | 16.4 | 31.4 | 64.2 |
| CP82 | PROCESNG | 0 | 150 | 40 | 50 | 80 | 103 | 135 | 79.4 | 31.8 | 47.7 | 111.2 |
| CP83 | COMUNICT | 0 | 150 | 50 | 53 | 60 | 85 | 135 | 71.7 | 28.2 | 43.5 | 99.8 |
| CP84 | EXTRAS | 0 | 150 | 30 | 58 | 70 | 88 | 110 | 72.2 | 23.2 | 49.0 | 95.4 |
| CP85 | TOTAL | 0 | 550 | 210 | 233 | 245 | 318 | 395 | 271.1 | 67.4 | 203.8 | 338.5 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| | 1 | 2 | 5 | 3 | 7 | 9 | 0 | 4 | 6 | |
| | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 1 | |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 9 | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * |

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Figure A.3.1-3. Complexity of Problem: Cluster Map for 9 Large Systems

Table A.3.1-6. Complexity of Problem: Summary Statistics for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|-----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| CP01 | CONMEMRY | 0 | 50 | 0 | 0 | 10 | 30 | 40 | 14.5 | 14.4 | 0.1 | 28.9 |
| CP02 | CONTIMNG | 0 | 50 | 0 | 0 | 10 | 30 | 40 | 12.7 | 16.2 | -3.5 | 28.9 |
| CP03 | PAMTDATA | 0 | 50 | 0 | 0 | 10 | 20 | 50 | 12.7 | 16.2 | -3.5 | 28.9 |
| CP04 | PDBSIZE | 0 | 50 | 5 | 10 | 15 | 20 | 20 | 14.1 | 4.9 | 9.2 | 19.0 |
| CP05 | PNOOFDS | 0 | 50 | 5 | 10 | 10 | 15 | 50 | 13.6 | 12.5 | 1.2 | 26.1 |
| CP06 | COMPROGS | 0 | 50 | 10 | 10 | 10 | 20 | 40 | 17.3 | 10.1 | 7.2 | 27.4 |
| CP07 | COMSUBS | 0 | 50 | 5 | 5 | 10 | 10 | 15 | 8.2 | 3.4 | 4.8 | 11.6 |
| CP08 | COMDSETS | 0 | 50 | 10 | 15 | 20 | 20 | 35 | 18.6 | 6.7 | 11.9 | 25.4 |
| CP09 | OLDCODE | 0 | 50 | 0 | 0 | 15 | 30 | 50 | 15.9 | 19.5 | -3.6 | 35.4 |
| CP10 | ALGORTHM | 0 | 50 | 0 | 0 | 0 | 10 | 30 | 6.4 | 10.3 | -3.9 | 16.6 |
| CP11 | SCHEDULE | 0 | 50 | 10 | 10 | 10 | 30 | 45 | 17.7 | 13.7 | 4.1 | 31.4 |
| CP81 | CNSTRAIN | 0 | 100 | 0 | 10 | 20 | 40 | 80 | 27.3 | 26.9 | 0.4 | 54.1 |
| CP82 | PROCESNG | 0 | 150 | 15 | 30 | 35 | 50 | 80 | 40.5 | 19.7 | 20.8 | 60.1 |
| CP83 | COMMUNICT | 0 | 150 | 25 | 35 | 45 | 55 | 55 | 44.1 | 9.7 | 34.4 | 53.8 |
| CP84 | EXTRAS | 0 | 150 | 10 | 20 | 35 | 60 | 90 | 40.0 | 26.6 | 13.4 | 66.6 |
| CP85 | TOTAL | 0 | 550 | 95 | 125 | 155 | 175 | 220 | 151.8 | 36.6 | 115.3 | 188.4 |

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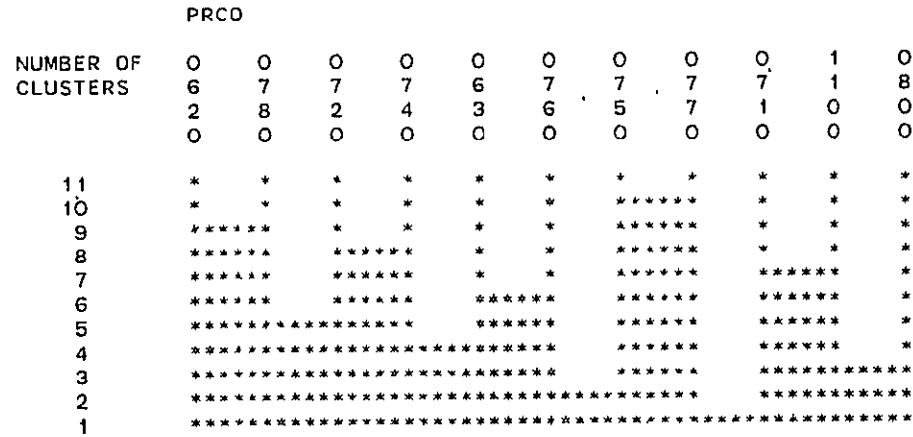


Figure A.3.1-4. Complexity of Problem: Cluster Map for 11 Small Systems

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A.3.2 INTERNAL INFLUENCES ON PROJECT

| | | | |
|--------------|------------|--------------|-------------|
| — <u>X</u> — | Objective | — <u>X</u> — | Subjective |
| — — — | Absolute | — <u>X</u> — | Relative |
| — — — | Explicit | — <u>X</u> — | Derived |
| — — — | Static | — <u>X</u> — | Dynamic |
| — — — | Predictive | — <u>X</u> — | Explanatory |

This category measures internal influences on the project caused by the development environment. These measures are scaled values derived from objective data. For example, Staffing Turnover Problems (IN05) is the number of development team members for which a replacement had to be obtained times 20. They are static and explanatory because, for the most part, they cannot be fully determined until a project is complete. Typical, average, or trend values, however, can be extracted from the samples for prediction.

The remainder of this subsection contains tables and figures that describe the Internal Influences on Project measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.3.2-1)
- Values of the measures for 25 systems (Table A.3.2-2), where large values indicate more adverse influences
- Summary statistics for 11 projects (Table A.3.2-3)
- Cluster map for 11 projects (Figure A.3.2-1)
- Summary statistics for 20 independent systems (Table A.3.2-4)
- Cluster map for 20 independent systems (Figure A.3.2-2)

- Summary statistics for 9 large systems
(Table A.3.2-5)
- Cluster map for 9 large systems (Figure A.3.2-3)
- Summary statistics for 11 small systems
(Table A.3.2-6)
- Cluster map for 11 small systems (Figure A.3.2-4)

Table A.3.2-1. Internal Influences on Project:
Description of Measures

| Code | Measure | Range | | Description |
|------|-----------|-------|------|--|
| | | Low | High | |
| | | | | Overtime |
| IN01 | OTWKENDS | 00 | 50 | Weekends |
| IN02 | OTNITES | 00 | 50 | Nights |
| IN03 | OTEARLY | 00 | 50 | Early Phases |
| | | | | Staffing Problems |
| IN04 | SPDESIGN | 00 | 50 | Design |
| IN05 | SPTURNOV | 00 | 50 | Turnover |
| IN06 | SPDEPART | 00 | 50 | Early Departure (Acceptance Testing) |
| IN07 | SPNEEDS | 00 | 50 | Extra Help Needed |
| | | | | Project Manager |
| IN08 | PMSTART | 00 | 50 | At Start |
| IN09 | PMTURNOV | 00 | 50 | Turnover |
| IN10 | PMEND | 00 | 50 | At End |
| IN11 | ATTITUDE | 00 | 50 | Team Attitude |
| IN12 | PLTURNNOV | 00 | 50 | Project Leader Turnover |
| IN13 | NOOFLEAD | 00 | 50 | Number of Project Managers/ Leaders |
| IN14 | | 00 | 00 | Not Defined |
| IN15 | | 00 | 00 | Not Defined |
| IN81 | OVERTIME | 000 | 150 | Sum IN01 Through IN03 |
| IN82 | STAFFPROB | 000 | 200 | Sum IN04 Through IN07 |
| IN83 | LEADERS | 000 | 250 | Sum IN08 Through IN10 and IN12 and IN13 |
| IN84 | TOTAL | 000 | 650 | Sum IN01 Through IN13 |

Table A.3.2-2. Internal Influences on Project: Values of the Measures for 25 Systems

| PRCO | INO1 | INO2 | INO3 | INO4 | INO5 | INO6 | INO7 | INO8 | INO9 | INO10 |
|------|------|------|------|------|------|------|------|------|------|-------|
| 0100 | 30 | 30 | 0 | 0 | 20 | 30 | 10 | 20 | 50 | 30 |
| 0200 | 20 | 30 | 0 | 10 | 0 | 20 | 20 | 40 | 50 | 30 |
| 0300 | 30 | 30 | 20 | 10 | 20 | 10 | 20 | 40 | 30 | 10 |
| 0400 | 20 | 20 | 0 | 50 | 0 | 10 | 10 | 10 | 10 | 30 |
| 0500 | 20 | 30 | 20 | 0 | 20 | 0 | 0 | 10 | 0 | 10 |
| 0600 | 50 | 50 | 0 | 20 | 40 | 30 | 30 | 10 | 0 | 10 |
| 0700 | 30 | 30 | 0 | 0 | 40 | 0 | 0 | 10 | 0 | 10 |
| 0800 | 10 | 0 | 0 | 20 | 20 | 10 | 0 | 0 | 0 | 0 |
| 0900 | 20 | 30 | 0 | 0 | 0 | 10 | 25 | 10 | 40 | 50 |
| 1000 | 20 | 30 | 0 | 10 | 0 | 0 | 5 | 10 | 20 | 20 |
| 1100 | 0 | 20 | 0 | 0 | 0 | 0 | 5 | 10 | 20 | 25 |
| 9000 | 20 | 30 | 0 | 5 | 0 | 5 | 15 | 10 | 30 | 35 |
| 0610 | 50 | 50 | 0 | 20 | 40 | 30 | 0 | 10 | 0 | 10 |
| 0620 | 10 | 10 | 0 | 10 | 0 | 0 | 0 | 10 | 0 | 10 |
| 0630 | 30 | 30 | 0 | 0 | 0 | 0 | 30 | 10 | 0 | 10 |
| 0631 | 30 | 30 | 0 | 0 | 0 | 0 | 10 | 10 | 0 | 10 |
| 0632 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 20 | 0 | 20 |
| 0710 | 20 | 30 | 0 | 0 | 20 | 0 | 0 | 10 | 0 | 10 |
| 0720 | 30 | 30 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 10 |
| 0730 | 30 | 30 | 0 | 0 | 20 | 0 | 0 | 10 | 0 | 10 |
| 0740 | 20 | 20 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 10 |
| 0750 | 10 | 10 | 0 | 0 | 20 | 0 | 0 | 10 | 0 | 10 |
| 0760 | 30 | 30 | 0 | 0 | 20 | 0 | 0 | 10 | 0 | 10 |
| 0770 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 10 | 0 | 10 |
| 0780 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 10 | 0 | 10 |

| PRCO | IN11 | IN12 | IN13 | IN81 | IN82 | IN83 | IN84 |
|------|------|------|------|------|------|------|------|
| 0100 | 10 | 0 | 30 | 60 | 60 | 130 | 260 |
| 0200 | 10 | 0 | 30 | 50 | 50 | 150 | 260 |
| 0300 | 10 | 40 | 40 | 80 | 60 | 160 | 310 |
| 0400 | 40 | 10 | 40 | 40 | 70 | 100 | 250 |
| 0500 | 10 | 0 | 20 | 70 | 20 | 40 | 140 |
| 0600 | 30 | 0 | 20 | 100 | 120 | 40 | 290 |
| 0700 | 20 | 0 | 20 | 60 | 40 | 40 | 160 |
| 0800 | 0 | 0 | 20 | 10 | 50 | 20 | 80 |
| 0900 | 20 | 0 | 40 | 50 | 35 | 140 | 245 |
| 1000 | 10 | 30 | 40 | 50 | 15 | 120 | 195 |
| 1100 | 0 | 0 | 30 | 20 | 5 | 85 | 110 |
| 9000 | 15 | 15 | 40 | 50 | 25 | 130 | 220 |
| 0610 | 30 | 0 | 20 | 100 | 90 | 40 | 260 |
| 0620 | 10 | 0 | 20 | 20 | 10 | 40 | 80 |
| 0630 | 10 | 0 | 40 | 60 | 30 | 60 | 160 |
| 0631 | 0 | 0 | 20 | 60 | 10 | 40 | 110 |
| 0632 | 10 | 0 | 20 | 0 | 20 | 60 | 90 |
| 0710 | 10 | 0 | 20 | 50 | 20 | 40 | 120 |
| 0720 | 0 | 0 | 10 | 60 | 0 | 30 | 90 |
| 0730 | 0 | 0 | 30 | 60 | 20 | 50 | 130 |
| 0740 | 0 | 0 | 20 | 40 | 0 | 40 | 80 |
| 0750 | 10 | 0 | 20 | 20 | 20 | 40 | 90 |
| 0760 | 0 | 0 | 10 | 60 | 20 | 30 | 110 |
| 0770 | 10 | 0 | 20 | 0 | 20 | 40 | 70 |
| 0780 | 0 | 0 | 30 | 0 | 20 | 50 | 70 |

Table A.3.2-3. Internal Influences on Project: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|-----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| IN01 | DTWKENDS | 0 | 50 | 0 | 20 | 20 | 30 | 50 | 22.7 | 12.7 | 10.0 | 35.4 |
| IN02 | OTNITES | 0 | 50 | 0 | 20 | 30 | 30 | 50 | 27.3 | 11.9 | 15.4 | 39.2 |
| IN03 | OTEARLY | 0 | 50 | 0 | 0 | 0 | 0 | 20 | 3.6 | 8.1 | -4.5 | 11.7 |
| IN04 | SPDESIGN | 0 | 50 | 0 | 0 | 10 | 20 | 50 | 10.9 | 15.1 | -4.2 | 26.0 |
| IN05 | SPTURNOV | 0 | 50 | 0 | 0 | 20 | 20 | 40 | 14.5 | 15.7 | -1.2 | 30.3 |
| IN06 | SPDEPART | 0 | 50 | 0 | 0 | 10 | 20 | 30 | 10.9 | 11.4 | -0.5 | 22.3 |
| IN07 | SPNEEDS | 0 | 50 | 0 | 0 | 10 | 20 | 30 | 11.4 | 10.7 | 0.6 | 22.1 |
| IN08 | PMSTART | 0 | 50 | 0 | 10 | 10 | 20 | 40 | 15.5 | 12.9 | 2.5 | 28.4 |
| IN09 | PMTURNOV | 0 | 50 | 0 | 0 | 20 | 40 | 50 | 20.0 | 20.0 | 0.0 | 40.0 |
| IN10 | PMEND | 0 | 50 | 0 | 10 | 20 | 30 | 50 | 20.5 | 14.2 | 6.2 | 34.7 |
| IN11 | ATTITUDE | 0 | 50 | 0 | 10 | 10 | 20 | 40 | 14.5 | 12.1 | 2.4 | 26.7 |
| IN12 | PLTURNNOV | 0 | 50 | 0 | 0 | 0 | 10 | 40 | 7.3 | 14.2 | -6.9 | 21.5 |
| IN13 | NOOFLEAD | 0 | 50 | 20 | 20 | 30 | 40 | 40 | 30.0 | 8.9 | 21.1 | 38.9 |
| IN81 | OVERTIME | 0 | 150 | 10 | 40 | 50 | 70 | 100 | 53.6 | 25.4 | 28.2 | 79.0 |
| IN82 | STAFPROB | 0 | 200 | 5 | 20 | 50 | 60 | 120 | 47.7 | 31.5 | 16.2 | 79.2 |
| IN83 | LEADERS | 0 | 250 | 20 | 40 | 100 | 140 | 160 | 93.2 | 50.9 | 42.3 | 144.1 |
| IN84 | TOTAL | 0 | 650 | 80 | 140 | 245 | 260 | 310 | 209.1 | 76.6 | 132.4 | 285.7 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|-------|---|---|---|---|---|---|-------|---|---|---|
| | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 1 | 2 | 9 | 4 | 0 | 3 | 6 | 5 | 7 | 8 | 1 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | ***** | | * | * | * | * | * | * | * | * | * |
| 9 | ***** | * | * | * | * | * | * | ***** | * | * | * |
| 8 | ***** | | | * | * | * | * | ***** | * | * | * |
| 7 | ***** | | | | * | * | * | ***** | * | * | * |
| 6 | ***** | | | | * | * | * | ***** | * | * | * |
| 5 | ***** | | | | * | * | * | ***** | * | * | * |
| 4 | ***** | | | | * | * | * | ***** | * | * | * |
| 3 | ***** | | | | * | * | * | ***** | * | * | * |
| 2 | ***** | | | | * | * | * | ***** | * | * | * |
| 1 | ***** | | | | * | * | * | ***** | * | * | * |

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Figure A.3.2-1. Internal Influences on Project: Cluster Map for 11 Projects

Table A.3.2-4. Internal Influences on Project: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|-----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| IN01 | DTWKENDS | 0 | 50 | 0 | 10 | 20 | 30 | 50 | 20.0 | 12.6 | 7.4 | 32.6 |
| IN02 | DTNITES | 0 | 50 | 0 | 13 | 30 | 30 | 50 | 23.0 | 13.0 | 10.0 | 36.0 |
| IN03 | DTEARLY | 0 | 50 | 0 | 0 | 0 | 0 | 20 | 2.0 | 6.2 | -4.2 | 8.2 |
| IN04 | SPDESIGN | 0 | 50 | 0 | 0 | 0 | 10 | 50 | 6.5 | 12.3 | -5.8 | 18.8 |
| IN05 | SPTURNOV | 0 | 50 | 0 | 0 | 10 | 20 | 40 | 11.0 | 12.1 | -1.1 | 23.1 |
| IN06 | SPDEPART | 0 | 50 | 0 | 0 | 0 | 10 | 30 | 6.0 | 9.9 | -3.9 | 15.9 |
| IN07 | SPNEEDS | 0 | 50 | 0 | 0 | 0 | 18 | 30 | 7.3 | 10.1 | -2.8 | 17.3 |
| IN08 | PMSTART | 0 | 50 | 0 | 10 | 10 | 10 | 40 | 13.0 | 9.8 | 3.2 | 22.8 |
| IN09 | PMTURNOV | 0 | 50 | 0 | 0 | 0 | 20 | 50 | 11.0 | 17.7 | -6.7 | 28.7 |
| IN10 | PMEND | 0 | 50 | 0 | 10 | 10 | 24 | 50 | 15.8 | 11.6 | 4.1 | 27.4 |
| IN11 | ATTITUDE | 0 | 50 | 0 | 0 | 10 | 10 | 40 | 9.5 | 10.5 | -1.0 | 20.0 |
| IN12 | PLTURNOV | 0 | 50 | 0 | 0 | 0 | 0 | 40 | 4.0 | 11.0 | -7.0 | 15.0 |
| IN13 | NOOFLEAD | 0 | 50 | 10 | 20 | 25 | 38 | 40 | 26.5 | 9.9 | 16.6 | 36.4 |
| IN81 | OVERTIME | 0 | 150 | 0 | 20 | 50 | 60 | 100 | 45.0 | 26.5 | 18.5 | 71.5 |
| IN82 | STAFFPROB | 0 | 200 | 0 | 16 | 20 | 50 | 90 | 30.8 | 24.7 | 6.1 | 55.4 |
| IN83 | LEADERS | 0 | 250 | 20 | 40 | 45 | 115 | 160 | 70.3 | 45.6 | 24.6 | 115.9 |
| IN84 | TOTAL | 0 | 650 | 70 | 83 | 125 | 249 | 310 | 155.5 | 80.0 | 75.5 | 235.5 |

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Figure A.3.2-2. Internal Influences on Project: Cluster Map for 20 Independent Systems

Table A.3.2-5. Internal Influences on Project: Summary
 Statistics for 9 Large Systems

| CODE | NAME | ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|---------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| IN01 | OTWKENDS | 0 | 50 | 20 | 20 | 20 | 30 | 50 | 26.7 | 10.0 | 16.7 | 36.7 |
| IN02 | OTNITES | 0 | 50 | 20 | 30 | 30 | 30 | 50 | 31.1 | 7.8 | 23.3 | 38.9 |
| IN03 | OTEARLY | 0 | 50 | 0 | 0 | 0 | 10 | 20 | 4.4 | 8.8 | -4.4 | 13.3 |
| IN04 | SPDESIGN | 0 | 50 | 0 | 0 | 10 | 15 | 50 | 11.1 | 16.2 | -5.0 | 27.3 |
| IN05 | SPTURNOV | 0 | 50 | 0 | 0 | 20 | 20 | 40 | 13.3 | 14.1 | -0.8 | 27.5 |
| IN06 | SPDEPART | 0 | 50 | 0 | 0 | 10 | 25 | 30 | 12.2 | 12.0 | 0.2 | 24.2 |
| IN07 | SPNEEDS | 0 | 50 | 0 | 0 | 10 | 20 | 25 | 10.0 | 9.7 | 0.3 | 19.7 |
| IN08 | PMSTART | 0 | 50 | 10 | 10 | 10 | 30 | 40 | 17.8 | 13.0 | 4.8 | 30.8 |
| IN09 | PMTURNOV | 0 | 50 | 0 | 0 | 20 | 45 | 50 | 22.2 | 21.1 | 1.1 | 43.3 |
| IN10 | PMEND | 0 | 50 | 10 | 10 | 20 | 30 | 50 | 22.2 | 13.9 | 8.3 | 36.2 |
| IN11 | ATTITUDE | 0 | 50 | 0 | 10 | 10 | 25 | 40 | 15.6 | 12.4 | 3.2 | 27.9 |
| IN12 | PLTURNOV | 0 | 50 | 0 | 0 | 0 | 20 | 40 | 8.9 | 15.4 | -6.5 | 24.3 |
| IN13 | NOOFLEAD | 0 | 50 | 20 | 25 | 30 | 40 | 40 | 32.2 | 8.3 | 23.9 | 40.6 |
| IN81 | OVERTIME | 0 | 150 | 40 | 50 | 60 | 75 | 100 | 62.2 | 18.6 | 43.7 | 80.8 |
| IN82 | STAFPROB | 0 | 200 | 15 | 20 | 50 | 65 | 90 | 46.7 | 25.9 | 20.8 | 72.5 |
| IN83 | LEADERS | 0 | 250 | 40 | 45 | 120 | 145 | 160 | 103.3 | 48.2 | 55.1 | 151.6 |
| IN84 | TOTAL | 0 | 650 | 130 | 168 | 250 | 260 | 310 | 227.8 | 60.2 | 167.6 | 288.0 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | 1 | 2 | 9 | 4 | 0 | 3 | 6 | 5 | 7 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | |
|---|-------|---|---|---|---|---|---|---|---|
| 9 | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * |
| 7 | ***** | * | * | * | * | * | * | * | * |
| 6 | ***** | * | * | * | * | * | * | * | * |
| 5 | ***** | * | * | * | * | * | * | * | * |
| 4 | ***** | * | * | * | * | * | * | * | * |
| 3 | ***** | * | * | * | * | * | * | * | * |
| 2 | ***** | * | * | * | * | * | * | * | * |
| 1 | ***** | * | * | * | * | * | * | * | * |

Figure A.3.2-3. Internal Influences on Project: Cluster Map for 9 Large Systems

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Table A.3.2-6. Internal Influences on Project: Summary
 Statistics for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|-----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| IN01 | OTWKENDS | 0 | 50 | 0 | 0 | 10 | 30 | 30 | 14.5 | 12.1 | 2.4 | 26.9 |
| IN02 | OTNITES | 0 | 50 | 0 | 0 | 20 | 30 | 30 | 16.4 | 12.9 | 3.5 | 29.9 |
| IN03 | OTEARLY | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| IN04 | SPDESIGN | 0 | 50 | 0 | 0 | 0 | 0 | 20 | 2.7 | 6.5 | -3.7 | 9.2 |
| IN05 | SPTURNOV | 0 | 50 | 0 | 0 | 0 | 20 | 20 | 9.1 | 10.4 | -1.4 | 19.5 |
| IN06 | SPDEPART | 0 | 50 | 0 | 0 | 0 | 0 | 10 | 0.9 | 3.0 | -2.1 | 3.9 |
| IN07 | SPNEEDS | 0 | 50 | 0 | 0 | 0 | 5 | 30 | 5.0 | 10.2 | -5.2 | 15.2 |
| IN08 | PMSTART | 0 | 50 | 0 | 10 | 10 | 10 | 10 | 9.1 | 3.0 | 6.1 | 12.1 |
| IN09 | PMTURNOV | 0 | 50 | 0 | 0 | 0 | 0 | 20 | 1.8 | 6.0 | -4.2 | 7.8 |
| IN10 | PMEND | 0 | 50 | 0 | 10 | 10 | 10 | 25 | 10.5 | 5.7 | 4.8 | 16.1 |
| IN11 | ATTITUDE | 0 | 50 | 0 | 0 | 0 | 10 | 10 | 4.5 | 5.2 | -0.7 | 9.8 |
| IN12 | PLTURNNOV | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| IN13 | NOOFLEAD | 0 | 50 | 10 | 20 | 20 | 30 | 40 | 21.8 | 8.7 | 13.1 | 30.6 |
| IN81 | OVERTIME | 0 | 150 | 0 | 10 | 20 | 60 | 60 | 30.9 | 23.9 | 7.1 | 54.8 |
| IN82 | STAFFPROB | 0 | 200 | 0 | 5 | 20 | 20 | 50 | 17.7 | 14.4 | 3.3 | 32.1 |
| IN83 | LEADERS | 0 | 250 | 20 | 30 | 40 | 50 | 85 | 43.2 | 17.4 | 25.8 | 60.5 |
| IN84 | TOTAL | 0 | 650 | 70 | 80 | 90 | 110 | 160 | 96.4 | 26.9 | 69.4 | 123.3 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 6 | 7 | 7 | 7 | 8 | 6 | 7 | 7 | 7 | 7 | 1 |
| | 2 | 5 | 7 | 8 | 0 | 3 | 1 | 6 | 2 | 4 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | |
|----|---|---|---|---|---|---|---|---|---|---|---|
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | * |
| 9 | * | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * | * |

Figure A.3.2-4. Internal Influences on Project: Cluster Map for 11 Small Systems

A.3.3 EXTERNAL INFLUENCES ON PROJECT

| | | | |
|--------------|------------|--------------|-------------|
| <u> X </u> | Objective | <u> X </u> | Subjective |
| <u> - </u> | Absolute | <u> X </u> | Relative |
| <u> - </u> | Explicit | <u> X </u> | Derived |
| <u> - </u> | Static | <u> X </u> | Dynamic |
| <u> - </u> | Predictive | <u> X </u> | Explanatory |

This category measures external influences on the project caused by the development environment. These measures are scaled values derived from objective data. For example, Requirements Changes (EX01) is computed by subtracting 10 from the total number of authorized requirements changes. These measures are static and explanatory because, for the most part, they cannot be fully determined until a project is complete. Typical, average, or trend values, however, can be extracted from the samples for prediction.

The remainder of this subsection contains tables and figures that describe the External Influences on Project measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.3.3-1)
- Values of the measures for 25 systems (Table A.3.3-2), where large values indicate more adverse influences
- Summary statistics for 11 projects (Table A.3.3-3)
- Cluster map for 11 projects (Figure A.3.3-1)
- Summary statistics for 20 independent systems (Table A.3.3-4)
- Cluster map for 20 independent systems (Figure A.3.3-2)

- Summary statistics for 9 large systems
(Table A.3.3-5)
- Cluster map for 9 large systems (Figure A.3.3-3)
- Summary statistics for 11 small systems
(Table A.3.3-6)
- Cluster map for 11 small systems (Figure A.3.3-4)

Table A.3.3-1. External Influences on Project: Description of Measures (1 of 2)

| Code | Measure | Range | | Description |
|------|-----------|-------|------|---|
| | | Low | High | |
| | | | | Requirements |
| EX01 | REQCHANG | 00 | 50 | Changes |
| EX02 | REQCMPLT | 00 | 50 | Completeness |
| | | | | Support |
| EX03 | SANALYS | 00 | 50 | Analysis |
| EX04 | SMISPROJ | 00 | 50 | Mission Project |
| EX05 | SDEVMGR | 00 | 50 | Development Manager |
| EX06 | SDEVLEAD | 00 | 50 | Development Leader |
| | | | | Outside Development |
| EX07 | ODNOSUBS | 00 | 50 | Number of Subsystems |
| EX08 | ODFRONTS | 00 | 50 | Front-End Processors |
| EX09 | ODONTIME | 00 | 50 | On-Time Delivery |
| | | | | Simulator |
| EX10 | SIMAVAIL | 00 | 50 | Availability |
| EX11 | SIMCRECT | 00 | 50 | Correctness |
| EX12 | SIMDATA | 00 | 50 | Data Support |
| | | | | Analysis Leader |
| EX13 | ALSTART | 00 | 50 | At Start |
| EX14 | ALTURNOV | 00 | 50 | Turnover |
| EX15 | ALEND | 00 | 50 | At End |
| EX16 | NOOFLEAD | 00 | 50 | Number of Analysis Leaders/ Managers |
| | | | | Support |
| EX17 | SWSUPPORT | 00 | 50 | Software |
| EX18 | HWSUPPORT | 00 | 50 | Hardware |
| EX19 | | 00 | 00 | Not Defined |
| EX20 | | 00 | 00 | Not Defined |
| EX81 | REQS | 000 | 100 | Sum EX01 and EX02 |
| EX82 | SUPPORT | 000 | 200 | Sum EX03 Through EX06 |
| EX83 | OUTSIDEV | 000 | 150 | Sum EX07 Through EX09 |

Table A.3.3-1. External Influences on Project: Description of Measures (2 of 2)

| <u>Code</u> | <u>Measure</u> | <u>Range</u> | | <u>Description</u> |
|-------------|----------------|--------------|-------------|-----------------------|
| | | <u>Low</u> | <u>High</u> | |
| EX84 | SIMULATE | 000 | 150 | Sum EX10 Through EX12 |
| EX85 | LEADERS | 000 | 200 | Sum EX13 Through EX16 |
| EX86 | SWHWSUP | 000 | 100 | Sum EX17 and EX18 |
| EX87 | TOTAL | 000 | 900 | Sum EX01 Through EX18 |

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Table A.3.3-2. External Effects on Project: Values of the Measures for 25 Systems (1 of 2)

| PRCD | EX01 | EX02 | EX03 | EX04 | EX05 | EX06 | EX07 | EX08 | EX09 | EX10 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 20 | 0 | 30 | 20 | 10 | 10 | 40 | 0 | 10 | 20 |
| 0200 | 10 | 0 | 0 | 0 | 40 | 0 | 40 | 0 | 20 | 0 |
| 0300 | 20 | 0 | 20 | 10 | 20 | 10 | 0 | 0 | 0 | 0 |
| 0400 | 50 | 0 | 10 | 0 | 50 | 50 | 20 | 0 | 10 | 0 |
| 0500 | 0 | 30 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 |
| 0600 | 20 | 50 | 40 | 50 | 30 | 20 | 40 | 50 | 50 | 40 |
| 0700 | 40 | 20 | 30 | 50 | 20 | 0 | 0 | 0 | 0 | 40 |
| 0800 | 0 | 0 | 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0900 | 30 | 10 | 0 | 0 | 30 | 20 | 0 | 0 | 0 | 0 |
| 1000 | 35 | 0 | 0 | 0 | 30 | 20 | 0 | 0 | 0 | 0 |
| 1100 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 |
| 9000 | 30 | 5 | 0 | 0 | 30 | 20 | 0 | 0 | 0 | 0 |
| 0610 | 10 | 50 | 40 | 50 | 30 | 20 | 40 | 40 | 50 | 40 |
| 0620 | 0 | 30 | 40 | 50 | 30 | 20 | 0 | 0 | 0 | 0 |
| 0630 | 0 | 40 | 40 | 50 | 30 | 20 | 20 | 20 | 50 | 40 |
| 0631 | 0 | 50 | 40 | 50 | 50 | 30 | 20 | 20 | 50 | 40 |
| 0632 | 0 | 10 | 40 | 50 | 0 | 0 | 0 | 0 | 0 | 40 |
| 0710 | 10 | 30 | 30 | 50 | 20 | 0 | 0 | 0 | 0 | 30 |
| 0720 | 0 | 20 | 30 | 50 | 20 | 0 | 0 | 0 | 0 | 40 |
| 0730 | 5 | 20 | 30 | 50 | 20 | 0 | 0 | 0 | 0 | 30 |
| 0740 | 0 | 0 | 30 | 20 | 20 | 0 | 0 | 0 | 0 | 40 |
| 0750 | 0 | 0 | 30 | 20 | 20 | 0 | 0 | 0 | 0 | 50 |
| 0760 | 0 | 0 | 30 | 20 | 20 | 0 | 0 | 0 | 0 | 0 |
| 0770 | 0 | 0 | 30 | 50 | 20 | 0 | 0 | 0 | 0 | 50 |
| 0780 | 0 | 10 | 30 | 50 | 20 | 0 | 0 | 0 | 0 | 0 |

| PRCD | EX11 | EX12 | EX13 | EX14 | EX15 | EX16 | EX17 | EX18 |
|------|------|------|------|------|------|------|------|------|
| 0100 | 20 | 20 | 40 | 0 | 40 | 50 | 0 | 30 |
| 0200 | 0 | 10 | 10 | 0 | 10 | 20 | 0 | 30 |
| 0300 | 50 | 20 | 30 | 50 | 10 | 20 | 0 | 10 |
| 0400 | 0 | 10 | 10 | 10 | 10 | 20 | 20 | 10 |
| 0500 | 0 | 10 | 0 | 30 | 0 | 40 | 20 | 10 |
| 0600 | 20 | 50 | 40 | 50 | 10 | 30 | 40 | 30 |
| 0700 | 50 | 20 | 30 | 40 | 10 | 30 | 20 | 30 |
| 0800 | 0 | 0 | 10 | 30 | 10 | 30 | 0 | 10 |
| 0900 | 0 | 0 | 10 | 50 | 30 | 50 | 30 | 20 |
| 1000 | 0 | 0 | 10 | 50 | 30 | 50 | 30 | 20 |
| 1100 | 0 | 0 | 10 | 30 | 10 | 30 | 20 | 20 |
| 9000 | 0 | 0 | 10 | 50 | 30 | 50 | 30 | 20 |
| 0610 | 20 | 50 | 40 | 50 | 10 | 30 | 40 | 30 |
| 0620 | 0 | 0 | 40 | 50 | 10 | 30 | 40 | 30 |
| 0630 | 20 | 50 | 10 | 0 | 10 | 10 | 20 | 30 |
| 0631 | 20 | 50 | 10 | 0 | 10 | 10 | 20 | 30 |
| 0632 | 20 | 50 | 10 | 0 | 10 | 10 | 20 | 30 |
| 0710 | 50 | 20 | 30 | 40 | 10 | 30 | 20 | 30 |
| 0720 | 50 | 20 | 30 | 40 | 10 | 30 | 20 | 30 |
| 0730 | 50 | 20 | 30 | 40 | 10 | 30 | 20 | 30 |
| 0740 | 50 | 20 | 30 | 40 | 10 | 30 | 20 | 30 |
| 0750 | 50 | 20 | 30 | 40 | 10 | 30 | 20 | 30 |
| 0760 | 0 | 0 | 30 | 40 | 10 | 30 | 20 | 30 |
| 0770 | 50 | 20 | 30 | 40 | 10 | 30 | 20 | 30 |
| 0780 | 0 | 0 | 10 | 0 | 10 | 10 | 20 | 30 |

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Table A.3.3-2. External Effects on Project: Values of the Measures for 25 Systems (2 of 2)

| PRCO | EX81 | EX82 | EX83 | EX84 | EX85 | EX86 | EX87 |
|------|------|------|------|------|------|------|------|
| 0100 | 20 | 70 | 50 | 60 | 130 | 30 | 360 |
| 0200 | 10 | 40 | 60 | 10 | 40 | 30 | 190 |
| 0300 | 20 | 60 | 0 | 70 | 110 | 10 | 270 |
| 0400 | 50 | 110 | 30 | 10 | 50 | 30 | 280 |
| 0500 | 30 | 10 | 0 | 10 | 70 | 30 | 150 |
| 0600 | 70 | 140 | 140 | 110 | 130 | 70 | 660 |
| 0700 | 60 | 100 | 0 | 110 | 110 | 50 | 430 |
| 0800 | 0 | 40 | 0 | 0 | 80 | 10 | 130 |
| 0900 | 40 | 50 | 0 | 0 | 140 | 50 | 280 |
| 1000 | 35 | 50 | 0 | 0 | 140 | 50 | 275 |
| 1100 | 10 | 10 | 0 | 0 | 80 | 40 | 140 |
| 9000 | 35 | 50 | 0 | 0 | 140 | 50 | 275 |
| 0610 | 60 | 140 | 130 | 110 | 130 | 70 | 640 |
| 0620 | 30 | 140 | 0 | 0 | 130 | 70 | 370 |
| 0630 | 40 | 140 | 90 | 110 | 30 | 50 | 460 |
| 0631 | 50 | 170 | 90 | 110 | 30 | 50 | 500 |
| 0632 | 10 | 90 | 0 | 110 | 30 | 50 | 290 |
| 0710 | 40 | 100 | 0 | 100 | 110 | 50 | 400 |
| 0720 | 20 | 100 | 0 | 110 | 110 | 50 | 390 |
| 0730 | 25 | 100 | 0 | 100 | 110 | 50 | 385 |
| 0740 | 0 | 70 | 0 | 110 | 110 | 50 | 340 |
| 0750 | 0 | 70 | 0 | 120 | 110 | 50 | 350 |
| 0760 | 0 | 70 | 0 | 0 | 110 | 50 | 230 |
| 0770 | 0 | 100 | 0 | 120 | 110 | 50 | 380 |
| 0780 | 10 | 100 | 0 | 0 | 30 | 50 | 190 |

Table A.3.3-3. External Influences on Project: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| EX01 | REQCHANG | 0 | 50 | 0 | 0 | 20 | 35 | 50 | 20.5 | 17.1 | 3.4 | 37.6 |
| EX02 | REQCPLT | 0 | 50 | 0 | 0 | 0 | 20 | 50 | 10.9 | 16.4 | -5.5 | 27.3 |
| EX03 | SANALYS | 0 | 50 | 0 | 0 | 10 | 30 | 40 | 15.5 | 16.9 | -1.5 | 32.4 |
| EX04 | SMISPROJ | 0 | 50 | 0 | 0 | 0 | 20 | 50 | 11.8 | 19.9 | -8.1 | 31.7 |
| EX05 | SDEVPMGR | 0 | 50 | 0 | 10 | 20 | 30 | 50 | 22.7 | 14.9 | 7.8 | 37.6 |
| EX06 | SDEVLEAD | 0 | 50 | 0 | 0 | 10 | 20 | 50 | 11.8 | 15.4 | -3.6 | 27.2 |
| EX07 | ODNOSUBS | 0 | 50 | 0 | 0 | 0 | 40 | 40 | 12.7 | 18.5 | -5.8 | 31.2 |
| EX08 | ODFRONTS | 0 | 50 | 0 | 0 | 0 | 0 | 50 | 4.5 | 15.1 | -10.5 | 19.6 |
| EX09 | ODONTIME | 0 | 50 | 0 | 0 | 0 | 10 | 50 | 8.2 | 15.4 | -7.2 | 23.6 |
| EX10 | SIMAVAIL | 0 | 50 | 0 | 0 | 0 | 20 | 40 | 9.1 | 16.4 | -7.3 | 25.5 |
| EX11 | SIMCRECT | 0 | 50 | 0 | 0 | 0 | 20 | 50 | 12.7 | 20.0 | -7.3 | 32.8 |
| EX23 | SIMDATA | 0 | 50 | 0 | 0 | 10 | 20 | 50 | 12.7 | 14.9 | -2.2 | 27.6 |
| EX13 | ALSTART | 0 | 50 | 0 | 10 | 10 | 30 | 40 | 18.2 | 14.0 | 4.2 | 32.2 |
| EX14 | ALTURNOV | 0 | 50 | 0 | 10 | 30 | 50 | 50 | 30.9 | 19.7 | 11.2 | 50.6 |
| EX15 | ALEND | 0 | 50 | 0 | 10 | 10 | 30 | 40 | 15.5 | 12.1 | 3.3 | 27.6 |
| EX16 | NDOFLEAD | 0 | 50 | 20 | 20 | 30 | 50 | 50 | 33.6 | 12.1 | 21.6 | 45.7 |
| EX17 | SWSUPORT | 0 | 50 | 0 | 0 | 20 | 30 | 40 | 16.4 | 14.3 | 2.0 | 30.7 |
| EX18 | HWSUPORT | 0 | 50 | 10 | 10 | 20 | 30 | 30 | 20.0 | 8.9 | 11.1 | 28.9 |
| EX81 | REQS | 0 | 100 | 0 | 10 | 30 | 50 | 70 | 31.4 | 22.1 | 9.2 | 53.5 |
| EX82 | SUPPORT | 0 | 200 | 10 | 40 | 50 | 100 | 140 | 61.8 | 40.7 | 21.1 | 102.5 |
| EX83 | OUTSIDEV | 0 | 150 | 0 | 0 | 0 | 50 | 140 | 25.5 | 44.1 | -18.7 | 69.6 |
| EX84 | SIMULATE | 0 | 150 | 0 | 0 | 10 | 70 | 110 | 34.5 | 44.6 | -10.0 | 79.1 |
| EX85 | LEADERS | 0 | 200 | 40 | 70 | 110 | 130 | 140 | 98.2 | 36.0 | 62.2 | 134.2 |
| EX86 | SWHWSUP | 0 | 100 | 10 | 30 | 30 | 50 | 70 | 36.4 | 18.0 | 18.3 | 54.4 |
| EX87 | TOTAL | 0 | 900 | 130 | 150 | 275 | 360 | 660 | 287.7 | 154.9 | 132.9 | 442.6 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| | 1 | 7 | 2 | 5 | 1 | 8 | 3 | 9 | 0 | 4 | 6 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | ***** | * | * | * |
| 9 | * | * | * | ***** | * | * | * | ***** | * | * | * |
| 8 | * | * | * | ***** | * | * | * | ***** | * | * | * |
| 7 | * | * | * | ***** | * | * | * | ***** | * | * | * |
| 6 | * | * | ***** | ***** | * | * | * | ***** | * | * | * |
| 5 | * | * | ***** | ***** | * | * | * | ***** | * | * | * |
| 4 | ***** | ***** | ***** | ***** | * | * | * | ***** | * | * | * |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |

Figure A.3.3-1. External Influences on Project: Cluster Map for 11 Projects

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Table A.3.3-4. External Influences on Project: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|-----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| EX01 | REQCHANG | 0 | 50 | 0 | 0 | 0 | 18 | 50 | 9.5 | 14.4 | -4.9 | 23.9 |
| EX02 | REQCMLT | 0 | 50 | 0 | 0 | 5 | 28 | 50 | 12.5 | 15.9 | -3.4 | 28.4 |
| EX03 | SANALYS | 0 | 50 | 0 | 3 | 30 | 30 | 40 | 23.0 | 15.3 | 7.7 | 38.3 |
| EX04 | SMISPROJ | 0 | 50 | 0 | 0 | 20 | 50 | 50 | 24.5 | 22.6 | 1.9 | 47.1 |
| EX05 | SDEVLMGR | 0 | 50 | 0 | 20 | 20 | 30 | 50 | 22.5 | 11.2 | 11.3 | 33.7 |
| EX06 | SDEVLEAD | 0 | 50 | 0 | 0 | 0 | 20 | 50 | 8.5 | 13.1 | -4.6 | 21.6 |
| EX07 | ODNOSUBS | 0 | 50 | 0 | 0 | 0 | 15 | 40 | 8.0 | 15.1 | -7.1 | 23.1 |
| EX08 | ODFRONTS | 0 | 50 | 0 | 0 | 0 | 0 | 40 | 3.0 | 9.8 | -6.8 | 12.8 |
| EX09 | ODONTIME | 0 | 50 | 0 | 0 | 0 | 8 | 50 | 7.0 | 15.6 | -8.6 | 22.6 |
| EX10 | SIMAVAIL | 0 | 50 | 0 | 0 | 0 | 40 | 50 | 17.0 | 20.3 | -3.3 | 37.3 |
| EX11 | SIMCRECT | 0 | 50 | 0 | 0 | 10 | 50 | 50 | 20.5 | 23.3 | -2.8 | 43.8 |
| EX23 | SIMDATA | 0 | 50 | 0 | 0 | 15 | 20 | 50 | 14.5 | 15.0 | -0.5 | 29.5 |
| EX13 | ALSTART | 0 | 50 | 0 | 10 | 30 | 30 | 40 | 22.0 | 12.8 | 9.2 | 34.8 |
| EX14 | ALTURNOV | 0 | 50 | 0 | 15 | 40 | 48 | 50 | 31.5 | 18.7 | 12.8 | 50.2 |
| EX15 | ALEND | 0 | 50 | 0 | 10 | 10 | 10 | 40 | 13.0 | 9.2 | 3.8 | 22.2 |
| EX16 | NOOFLEAD | 0 | 50 | 10 | 23 | 30 | 30 | 50 | 30.0 | 11.2 | 18.8 | 41.2 |
| EX17 | SWSUPPORT | 0 | 50 | 0 | 20 | 20 | 20 | 40 | 19.0 | 11.7 | 7.3 | 30.7 |
| EX18 | HWSUPPORT | 0 | 50 | 10 | 20 | 30 | 30 | 30 | 24.5 | 8.3 | 16.2 | 32.8 |
| EX81 | REQS | 0 | 100 | 0 | 3 | 20 | 39 | 60 | 22.0 | 18.3 | 3.7 | 40.3 |
| EX82 | SUPPORT | 0 | 200 | 10 | 50 | 70 | 100 | 140 | 78.5 | 39.2 | 39.3 | 117.7 |
| EX83 | OUTSIDEV | 0 | 150 | 0 | 0 | 0 | 23 | 130 | 18.0 | 36.6 | -18.6 | 54.6 |
| EX84 | SIMULATE | 0 | 150 | 0 | 0 | 35 | 110 | 120 | 52.0 | 52.3 | -0.3 | 104.3 |
| EX85 | LEADERS | 0 | 200 | 30 | 73 | 110 | 125 | 140 | 96.5 | 35.6 | 60.9 | 132.1 |
| EX86 | SWHWSUP | 0 | 100 | 10 | 30 | 50 | 50 | 70 | 43.5 | 16.0 | 27.5 | 59.5 |
| EX87 | TOTAL | 0 | 900 | 130 | 200 | 310 | 384 | 640 | 310.5 | 123.9 | 186.6 | 434.4 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 20 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 19 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 18 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 17 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 16 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 15 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 14 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 13 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 12 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 11 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 9 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |

Figure A.3.3-2. External Influences on Project: Cluster Map for 20 Independent Systems

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Table A.3.3-5. External Influences on Project: Summary Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| EX01 | REQCHANG | 0 | 50 | 0 | 8 | 20 | 33 | 50 | 20.0 | 16.0 | 4.0 | 36.0 |
| EX02 | REOCMPLT | 0 | 50 | 0 | 0 | 0 | 25 | 50 | 12.2 | 17.9 | -5.7 | 30.1 |
| EX03 | SANALYS | 0 | 50 | 0 | 0 | 10 | 30 | 40 | 14.4 | 15.9 | -1.5 | 30.3 |
| EX04 | SMSPROJ | 0 | 50 | 0 | 0 | 0 | 35 | 50 | 14.4 | 21.3 | -6.8 | 35.7 |
| EX05 | SDEVNMR | 0 | 50 | 10 | 15 | 30 | 35 | 50 | 26.7 | 13.2 | 13.4 | 39.9 |
| EX06 | SDEVLEAD | 0 | 50 | 0 | 0 | 10 | 20 | 50 | 14.4 | 15.9 | -1.5 | 30.3 |
| EX07 | ODNOSUBS | 0 | 50 | 0 | 0 | 0 | 40 | 40 | 15.6 | 19.4 | -3.9 | 35.0 |
| EX08 | ODFRONTS | 0 | 50 | 0 | 0 | 0 | 0 | 40 | 4.4 | 13.3 | -8.9 | 17.8 |
| EX09 | ODONTIME | 0 | 50 | 0 | 0 | 0 | 15 | 50 | 10.0 | 16.6 | -6.6 | 26.6 |
| EX10 | SIMAVAIL | 0 | 50 | 0 | 0 | 0 | 25 | 40 | 10.0 | 15.8 | -5.8 | 25.8 |
| EX11 | SIMCRECT | 0 | 50 | 0 | 0 | 0 | 35 | 50 | 15.6 | 21.3 | -5.7 | 36.8 |
| EX23 | SIMDATA | 0 | 50 | 0 | 5 | 10 | 20 | 50 | 15.6 | 15.1 | 0.5 | 30.6 |
| EX13 | ALSTART | 0 | 50 | 0 | 10 | 10 | 35 | 40 | 20.0 | 15.0 | 5.0 | 35.0 |
| EX14 | ALTURNOV | 0 | 50 | 0 | 5 | 40 | 50 | 50 | 31.1 | 22.0 | 9.1 | 53.2 |
| EX15 | ALEND | 0 | 50 | 0 | 10 | 10 | 30 | 40 | 16.7 | 13.2 | 3.4 | 29.9 |
| EX16 | NDOFLEAD | 0 | 50 | 20 | 20 | 30 | 50 | 50 | 34.4 | 13.3 | 21.1 | 47.8 |
| EX17 | SWSUPORT | 0 | 50 | 0 | 0 | 20 | 30 | 40 | 17.8 | 14.8 | 3.0 | 32.6 |
| EX18 | HWSUPORT | 0 | 50 | 10 | 10 | 20 | 30 | 30 | 21.1 | 9.3 | 11.8 | 30.4 |
| EX81 | REQS | 0 | 100 | 10 | 20 | 30 | 45 | 60 | 32.2 | 15.8 | 16.4 | 48.1 |
| EX82 | SUPPORT | 0 | 200 | 10 | 45 | 60 | 105 | 140 | 70.0 | 40.0 | 30.0 | 110.0 |
| EX83 | OUTSIDEV | 0 | 150 | 0 | 0 | 0 | 55 | 130 | 30.0 | 44.4 | -14.4 | 74.4 |
| EX84 | SIMULATE | 0 | 150 | 0 | 5 | 10 | 85 | 110 | 41.1 | 44.3 | -3.2 | 85.4 |
| EX85 | LEADERS | 0 | 200 | 40 | 60 | 110 | 135 | 140 | 102.2 | 39.0 | 63.2 | 141.2 |
| EX86 | SWHWSUP | 0 | 100 | 10 | 30 | 30 | 50 | 70 | 38.9 | 17.6 | 21.3 | 56.5 |
| EX87 | TOTAL | 0 | 900 | 150 | 230 | 280 | 373 | 640 | 314.4 | 142.1 | 172.4 | 456.5 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| | 1 | 7 | 2 | 5 | 3 | 9 | 0 | 4 | 6 |
| | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * |

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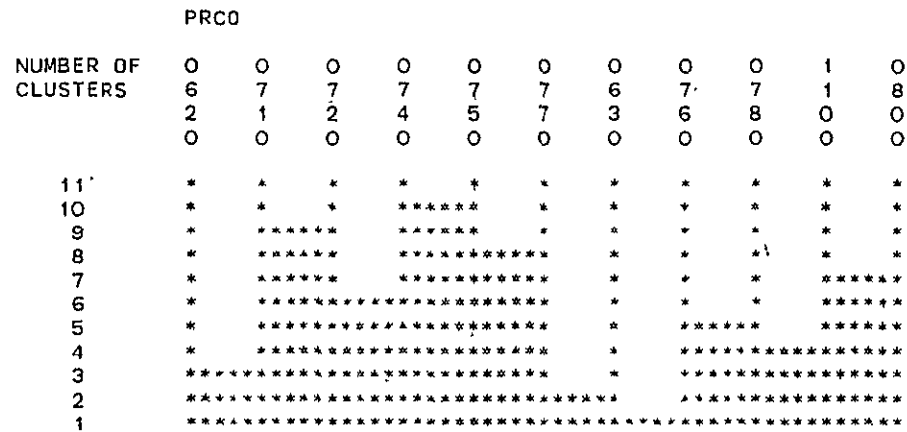
Figure A.3.3-3. External Influences on Project: Cluster Map for 9 Large Systems

Table A.3.3-6. External Influences on Project: Summary Statistics for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|-----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| EX01 | REOCHANG | 0 | 50 | 0 | 0 | 0 | 0 | 10 | 0.9 | 3.0 | -2.1 | 3.9 |
| EX02 | REQCPLT | 0 | 50 | 0 | 0 | 10 | 30 | 40 | 12.7 | 14.9 | -2.2 | 27.6 |
| EX03 | SANALYS | 0 | 50 | 0 | 30 | 30 | 40 | 40 | 30.0 | 11.0 | 19.0 | 41.0 |
| EX04 | SMISPROJ | 0 | 50 | 0 | 20 | 50 | 50 | 50 | 32.7 | 21.0 | 11.7 | 53.7 |
| EX05 | SDEV MGR | 0 | 50 | 0 | 20 | 20 | 20 | 30 | 19.1 | 8.3 | 10.8 | 27.4 |
| EX06 | SDEV LEAD | 0 | 50 | 0 | 0 | 0 | 0 | 20 | 3.6 | 8.1 | -4.5 | 11.7 |
| EX07 | ODNOSUBS | 0 | 50 | 0 | 0 | 0 | 0 | 20 | 1.8 | 6.0 | -4.2 | 7.8 |
| EX08 | ODFRONTS | 0 | 50 | 0 | 0 | 0 | 0 | 20 | 1.8 | 6.0 | -4.2 | 7.8 |
| EX09 | ODONTIME | 0 | 50 | 0 | 0 | 0 | 0 | 50 | 4.5 | 15.1 | -10.5 | 19.6 |
| EX10 | SIMAVAIL | 0 | 50 | 0 | 0 | 30 | 40 | 50 | 22.7 | 22.4 | 0.3 | 45.1 |
| EX11 | SIMCRECT | 0 | 50 | 0 | 0 | 20 | 50 | 50 | 24.5 | 25.0 | -0.5 | 49.6 |
| EX23 | SIMDATA | 0 | 50 | 0 | 0 | 20 | 20 | 50 | 13.6 | 15.7 | -2.0 | 29.3 |
| EX13 | ALSTART | 0 | 50 | 10 | 10 | 30 | 30 | 40 | 23.6 | 11.2 | 12.4 | 34.8 |
| EX14 | ALTURN OV | 0 | 50 | 0 | 30 | 40 | 40 | 50 | 31.8 | 16.6 | 15.2 | 48.4 |
| EX15 | ALEND | 0 | 50 | 10 | 10 | 10 | 10 | 10 | 10.0 | 0.0 | 10.0 | 10.0 |
| EX16 | NOOFLEAD | 0 | 50 | 10 | 30 | 30 | 30 | 30 | 26.4 | 8.1 | 18.3 | 34.5 |
| EX17 | SWSUPPORT | 0 | 50 | 0 | 20 | 20 | 20 | 40 | 20.0 | 8.9 | 11.1 | 28.9 |
| EX18 | HWSUPPORT | 0 | 50 | 10 | 30 | 30 | 30 | 30 | 27.3 | 6.5 | 20.8 | 33.7 |
| EX81 | REQS | 0 | 100 | 0 | 0 | 10 | 30 | 40 | 13.6 | 16.3 | -2.7 | 29.9 |
| EX82 | SUPPORT | 0 | 200 | 10 | 70 | 100 | 100 | 140 | 85.5 | 39.1 | 46.4 | 124.5 |
| EX83 | OUTSIDEV | 0 | 150 | 0 | 0 | 0 | 0 | 90 | 8.2 | 27.1 | -19.0 | 35.3 |
| EX84 | SIMULATE | 0 | 150 | 0 | 0 | 100 | 110 | 120 | 60.9 | 58.6 | 2.4 | 119.5 |
| EX85 | LEADERS | 0 | 200 | 30 | 80 | 110 | 110 | 130 | 91.8 | 33.7 | 58.1 | 125.5 |
| EX86 | SWHWSUP | 0 | 100 | 10 | 50 | 50 | 50 | 70 | 47.3 | 14.2 | 33.1 | 61.5 |
| EX87 | TOTAL | 0 | 900 | 130 | 190 | 350 | 390 | 460 | 307.3 | 114.0 | 193.2 | 421.3 |

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Figure A.3.3-4. External Influences on Project: Cluster Map for 11 Small Systems

A.3.4 DIFFICULTY OF PROJECT

| | | | |
|--------------|------------|--------------|-------------|
| - <u>X</u> - | Objective | - <u>X</u> - | Subjective |
| - - - | Absolute | - <u>X</u> - | Relative |
| - - - | Explicit | - <u>X</u> - | Derived |
| - - - | Static | - <u>X</u> - | Dynamic |
| - - - | Predictive | - <u>X</u> - | Explanatory |

This category comprises the weighted sum of the Complexity of Problem, Internal Influences on Project, and External Influences on Project categories.

The remainder of this subsection contains tables and figures that describe the Difficulty of Project measures with brief phrases, raw numbers, simple statistics, and graphics.

These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.3.4-1)
- Values of the measures for 25 systems (Table A.3.4-2), where large values indicate more difficulty
- Summary statistics for 11 projects (Table A.3.4-3)
- Cluster map for 11 projects (Figure A.3.4-1)
- Summary statistics for 20 independent systems (Table A.3.4-4)
- Cluster map for 20 independent systems (Figure A.3.4-2)
- Summary statistics for 9 large systems (Table A.3.4-5)
- Cluster map for 9 large systems (Figure A.3.4-3)
- Summary statistics for 11 small systems (Table A.3.4-6)
- Cluster map for 11 small systems (Figure A.3.4-4)

70300 0009 70
70300 0009 70

Table A.3.4-1. Difficulty of Project: Description of Measures

| <u>Code</u> | <u>Measure</u> | <u>Range</u> | | <u>Description</u> |
|-------------|----------------|--------------|-------------|---|
| | | <u>Low</u> | <u>High</u> | |
| DF81 | DIFICLTY | 0000 | 1950 | Sum CP85*650/550, IN84, EX87*650/900 |

Table A.3.4-2. Difficulty of Project: Values of the
Measures for 25 Systems

| PRCO | DF81 |
|------|------|
| 0100 | 808 |
| 0200 | 645 |
| 0300 | 776 |
| 0400 | 918 |
| 0500 | 525 |
| 0600 | 1231 |
| 0700 | 865 |
| 0800 | 380 |
| 0900 | 747 |
| 1000 | 688 |
| 1100 | 470 |
| 9000 | 713 |
| 0610 | 1169 |
| 0620 | 494 |
| 0630 | 698 |
| 0631 | 688 |
| 0632 | 417 |
| 0710 | 620 |
| 0720 | 565 |
| 0730 | 690 |
| 0740 | 508 |
| 0750 | 466 |
| 0760 | 429 |
| 0770 | 456 |
| 0780 | 378 |

Table A.3.4-3. Difficulty of Project: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE- | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|-----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| DF81 | DIFICLTY | 0 | 1950 | 380 | 525 | 747 | 865 | 1231 | 732.1 | 235.4 | 496.7 | 967.5 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | ***** | * | * | * | * | * | * | * | * | * |
| 9 | * | ***** | ***** | * | * | * | * | * | * | * | * |
| 8 | * | ***** | ***** | ***** | * | * | * | * | * | * | * |
| 7 | * | ***** | ***** | ***** | ***** | * | * | * | * | * | * |
| 6 | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * | * | * |
| 5 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * | * |
| 4 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |

Figure A.3.4-1. Difficulty of Project: Cluster Map for 11 Projects

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Table A.3.4-4. Difficulty of Project: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| DF81 | DIFICLTY | 0 | 1950 | 378 | 467 | 593 | 735 | 1169 | 621.5 | 198.5 | 423.0 | 820.0 |

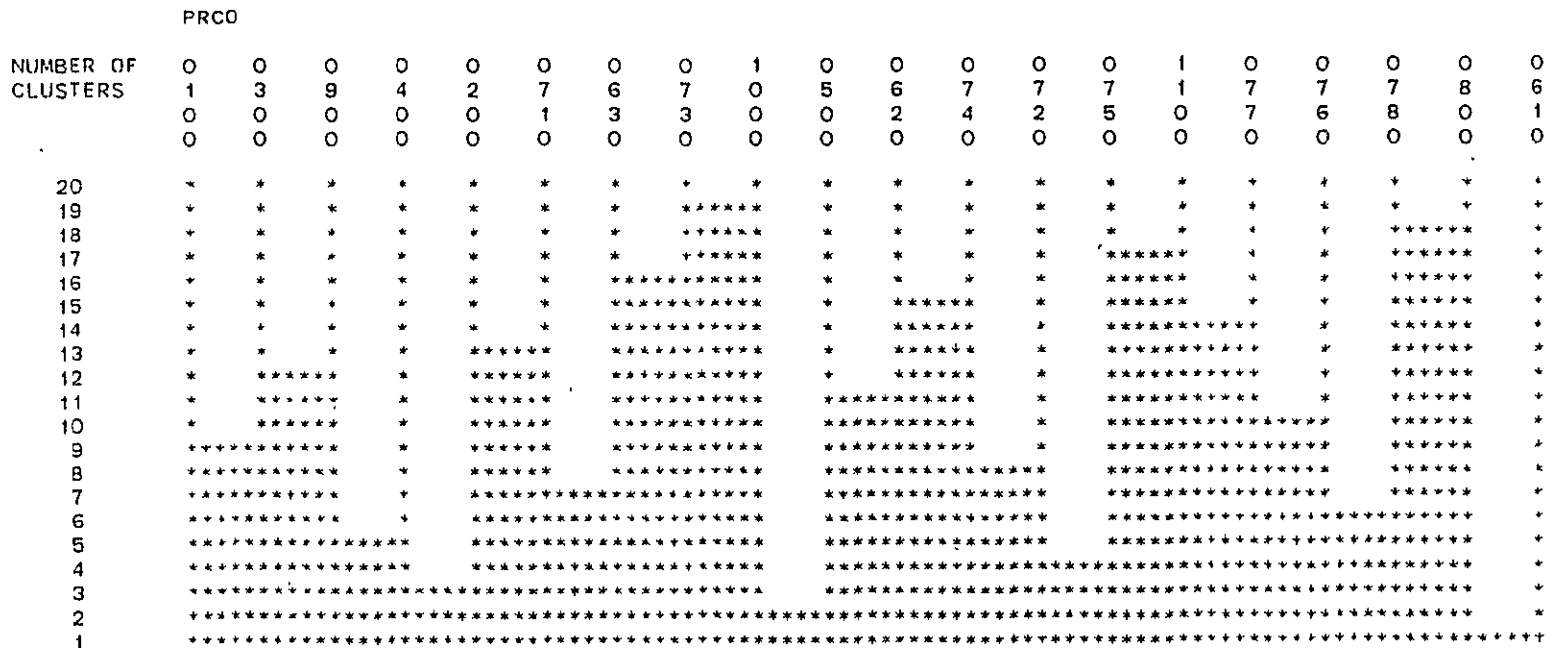


Figure A.3.4-2. Difficulty of Project: Cluster Map for 20 Independent Systems

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Table A.3.4-5. Difficulty of Project: Summary Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| DF81 | DIFICLTY | 0 | 1950 | 525 | 667 | 747 | 863 | 1169 | 774.0 | 184.3 | 589.7 | 958.3 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | 1 | 3 | 9 | 2 | 7 | 0 | 5 | 4 | 6 | |
| | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 1 | |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 9 | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * |

Figure A.3.4-3. Difficulty of Project: Cluster Map for 9 Large Systems

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Table A.3.4-6. Difficulty of Project: Summary Statistics for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| DFB1 | DIFICLTY | 0 | 1950 | 378 | 429 | 470 | 565 | 698 | 496.7 | 98.0 | 398.7 | 594.8 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 6 | 7 | 7 | 1 | 7 | 7 | 7 | 8 | 6 | 7 | 7 |
| | 2 | 4 | 5 | 0 | 7 | 6 | 8 | 0 | 3 | 1 | 2 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | * |
| 9 | * | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * | * |

Figure A.3.4-4. Difficulty of Project: Cluster Map for 11 Small Systems

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A.4 PROCESS AND PRODUCT CHARACTERISTICS CLASS OF MEASURES

The Process and Product Characteristics class measures the quality or degree of

- Resources Available (RA01 through RA20)
 - Development Process Support (RA01 through RA03)
 - Support Software (RA04 through RA06)
 - Computer Support (RA07 through RA15)
 - Personnel (RA16 through RA20)
 - Sums (RA81 through RA85)
- Software Product (PR01 through PR20)
 - Size (PR04 through PR07)
 - Completeness (PR10 through PR12)
 - Meet Requirements (PR13 and PR14)
 - Other
 - Sums (PR81 through PR84)
- Product/Process Performance (PP01 through PP15)
 - Product (PP01 through PP06)
 - Process (PP07 through PP15)
 - Sums (PP81 through PP83)

A.4.1 RESOURCES AVAILABLE

| | | | |
|-------------------------------------|------------|-------------------------------------|-------------|
| <input checked="" type="checkbox"/> | Objective | <input type="checkbox"/> | Subjective |
| <input type="checkbox"/> | Absolute | <input checked="" type="checkbox"/> | Relative |
| <input type="checkbox"/> | Explicit | <input checked="" type="checkbox"/> | Derived |
| <input checked="" type="checkbox"/> | Static | <input type="checkbox"/> | Dynamic |
| <input checked="" type="checkbox"/> | Predictive | <input type="checkbox"/> | Explanatory |

This category measures the degree to which resources are available in the development environment. These measures are scaled values derived from objective data. For example, TSO Computer Support (RA11) indicates the quantity number of TSO terminals available per programmer times 100. For the most part, they are static and predictive since most of the information for these measures is known early in the project.

However, demands to complete a project are dynamic; therefore, the measures may change during the project. The samples in this category illustrate the changing environment (excluding the development team); therefore, the trend values are predictive.

The remainder of this subsection contains tables and figures that describe the Resources Available measures with brief phrases, raw numbers, simple statistics, and graphics.

These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.4.1-1)
- Values of the measures for 25 systems (Table A.4.1-2), where large values indicate a higher degree of availability
- Summary statistics for 11 projects (Table A.4.1-3)
- Cluster map for 11 projects (Figure A.4.1-1)
- Summary statistics for 20 independent systems (Table A.4.1-4)
- Cluster map for 20 independent systems (Figure A.4.1-2)
- Summary statistics for 9 large systems (Table A.4.1-5)
- Cluster map for 9 large systems (Figure A.4.1-3)
- Summary statistics for 11 small systems (Table A.4.1-6)
- Cluster map for 11 small systems (Figure A.4.1-4)

Table A.4.1-1. Resources Available: Description of Measures

| Code | Measure | Range | | Description |
|-----------------------------|-----------|-------|------|--------------------------------|
| | | Low | High | |
| Development Process Support | | | | |
| RA01 | PFORTRAN | 00 | 50 | Formal Training |
| RA02 | PINFTRAN | 00 | 50 | Informal Training |
| RA03 | PDOCUMENT | 00 | 50 | Documentation |
| Support Software | | | | |
| RA04 | SSINSTRC | 00 | 50 | Instruction |
| RA05 | SSMAINT | 00 | 50 | Maintenance |
| RA06 | SSSIMLAT | 00 | 50 | Simulator |
| Computer Support | | | | |
| RA07 | CS75 | 00 | 50 | IBM S/360-75 |
| RA08 | CS95 | 00 | 50 | IBM S/360-95 |
| RA09 | CSOTHERM | 00 | 50 | Other Model |
| RA10 | CSRJP | 00 | 50 | RJP |
| RA11 | CSTSO | 00 | 50 | Timesharing Option (TSO) |
| RA12 | CSOPS | 00 | 50 | Online Processing System (OPS) |
| RA13 | CSSPACE | 00 | 50 | Space |
| RA14 | CSGRPHXD | 00 | 50 | Graphic Device |
| RA15 | | 00 | 00 | Not Defined |
| Personnel | | | | |
| RA16 | PERLIBRA | 00 | 50 | Librarian |
| RA17 | PEREXPRT | 00 | 50 | Dedicated Expert |
| RA18 | PERVNVMT | 00 | 50 | V&V Team |
| RA19 | | 00 | 00 | Not Defined |
| RA20 | | 00 | 00 | Not Defined |
| RA81 | DEVPROCS | 000 | 150 | Sum RA01 Through RA03 |
| RA82 | SUPPORTSW | 000 | 150 | Sum RA04 Through RA06 |
| RA83 | COMPUTER | 000 | 400 | Sum RA07 Through RA14 |
| RA84 | PERSONEL | 000 | 150 | Sum RA16 Through RA18 |
| RA85 | TOTAL | 000 | 850 | Sum RA81 Through RA84 |

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Table A.4.1-2. Resources Available: Values of the Measures for 25 Systems

| PRCD | RA01 | RA02 | RA03 | RA04 | RA05 | RA06 | RA07 | RA08 | RA09 | RA10 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 20 | 30 | 10 | 10 | 50 | 30 | 10 | 0 | 0 | 50 |
| 0200 | 0 | 0 | 10 | 10 | 50 | 40 | 10 | 0 | 0 | 50 |
| 0300 | 0 | 0 | 10 | 10 | 25 | 30 | 20 | 10 | 0 | 50 |
| 0400 | 10 | 0 | 10 | 10 | 25 | 40 | 20 | 10 | 0 | 50 |
| 0500 | 50 | 30 | 30 | 10 | 25 | 40 | 10 | 0 | 0 | 50 |
| 0600 | 50 | 30 | 30 | 20 | 25 | 0 | 30 | 0 | 5 | 25 |
| 0700 | 20 | 20 | 30 | 20 | 25 | 30 | 30 | 0 | 0 | 25 |
| 0800 | 50 | 20 | 50 | 40 | 25 | 50 | 30 | 0 | 0 | 20 |
| 0900 | 10 | 40 | 50 | 40 | 10 | 50 | 50 | 30 | 0 | 20 |
| 1000 | 20 | 40 | 50 | 40 | 0 | 50 | 50 | 30 | 0 | 20 |
| 1100 | 0 | 40 | 50 | 40 | 10 | 50 | 50 | 30 | 0 | 20 |
| 9000 | 15 | 40 | 50 | 40 | 5 | 50 | 50 | 30 | 0 | 20 |
| 0610 | 50 | 30 | 30 | 20 | 25 | 0 | 30 | 0 | 0 | 25 |
| 0620 | 50 | 10 | 30 | 20 | 25 | 50 | 30 | 0 | 0 | 25 |
| 0630 | 30 | 20 | 25 | 20 | 25 | 15 | 30 | 0 | 15 | 25 |
| 0631 | 50 | 30 | 30 | 20 | 25 | 0 | 30 | 0 | 0 | 25 |
| 0632 | 0 | 0 | 10 | 20 | 25 | 50 | 30 | 0 | 50 | 25 |
| 0710 | 0 | 0 | 30 | 20 | 25 | 30 | 30 | 0 | 0 | 25 |
| 0720 | 50 | 20 | 30 | 20 | 25 | 30 | 30 | 0 | 0 | 25 |
| 0730 | 30 | 20 | 30 | 20 | 25 | 30 | 30 | 0 | 0 | 25 |
| 0740 | 0 | 20 | 30 | 20 | 25 | 30 | 30 | 0 | 0 | 25 |
| 0750 | 0 | 10 | 30 | 20 | 25 | 30 | 30 | 0 | 0 | 25 |
| 0760 | 30 | 20 | 30 | 20 | 25 | 50 | 30 | 0 | 0 | 25 |
| 0770 | 30 | 20 | 30 | 20 | 25 | 30 | 30 | 0 | 0 | 25 |
| 0780 | 30 | 20 | 30 | 20 | 10 | 50 | 30 | 0 | 0 | 25 |

| PRCD | RA11 | RA12 | RA13 | RA14 | RA16 | RA17 | RA18 | RA81 | RA82 | RA83 | RA84 | RA85 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 10 | 0 | 10 | 15 | 40 | 20 | 0 | 60 | 90 | 95 | 60 | 305 |
| 0200 | 10 | 0 | 10 | 15 | 40 | 0 | 0 | 10 | 100 | 95 | 40 | 245 |
| 0300 | 15 | 0 | 10 | 0 | 35 | 20 | 0 | 10 | 65 | 105 | 55 | 235 |
| 0400 | 15 | 0 | 10 | 0 | 35 | 0 | 0 | 20 | 75 | 105 | 35 | 235 |
| 0500 | 15 | 0 | 10 | 0 | 35 | 0 | 0 | 110 | 75 | 85 | 35 | 305 |
| 0600 | 20 | 0 | 30 | 15 | 40 | 20 | 0 | 110 | 45 | 125 | 60 | 340 |
| 0700 | 20 | 0 | 30 | 0 | 35 | 20 | 0 | 70 | 75 | 105 | 55 | 305 |
| 0800 | 30 | 50 | 10 | 0 | 10 | 0 | 10 | 120 | 115 | 140 | 20 | 395 |
| 0900 | 50 | 50 | 50 | 0 | 35 | 50 | 50 | 100 | 100 | 250 | 135 | 585 |
| 1000 | 50 | 50 | 40 | 0 | 35 | 20 | 50 | 110 | 90 | 240 | 105 | 545 |
| 1100 | 50 | 50 | 50 | 0 | 35 | 20 | 40 | 90 | 100 | 250 | 95 | 535 |
| 9000 | 50 | 50 | 45 | 0 | 35 | 35 | 50 | 105 | 95 | 245 | 120 | 565 |
| 0610 | 20 | 0 | 30 | 15 | 40 | 0 | 0 | 110 | 45 | 120 | 40 | 315 |
| 0620 | 20 | 0 | 30 | 0 | 35 | 0 | 0 | 90 | 95 | 105 | 35 | 325 |
| 0630 | 20 | 0 | 30 | 15 | 35 | 20 | 0 | 75 | 60 | 135 | 55 | 325 |
| 0631 | 20 | 0 | 30 | 0 | 35 | 20 | 0 | 110 | 45 | 105 | 55 | 315 |
| 0632 | 20 | 0 | 30 | 50 | 50 | 20 | 0 | 10 | 95 | 205 | 70 | 380 |
| 0710 | 20 | 0 | 30 | 0 | 35 | 0 | 0 | 30 | 75 | 105 | 35 | 245 |
| 0720 | 20 | 0 | 30 | 0 | 35 | 0 | 0 | 100 | 75 | 105 | 35 | 315 |
| 0730 | 20 | 0 | 30 | 0 | 35 | 0 | 0 | 80 | 75 | 105 | 35 | 295 |
| 0740 | 20 | 0 | 30 | 0 | 35 | 0 | 0 | 50 | 75 | 105 | 35 | 265 |
| 0750 | 20 | 0 | 30 | 0 | 35 | 0 | 0 | 40 | 75 | 105 | 35 | 255 |
| 0760 | 20 | 0 | 30 | 0 | 35 | 0 | 0 | 80 | 95 | 105 | 35 | 315 |
| 0770 | 20 | 0 | 30 | 0 | 35 | 0 | 0 | 80 | 75 | 105 | 35 | 295 |
| 0780 | 20 | 0 | 30 | 0 | 35 | 20 | 0 | 80 | 80 | 105 | 55 | 320 |

Table A.4.1-3. Resources Available: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| RA01 | PFORTRAN | 0 | 50 | 0 | 0 | 20 | 50 | 50 | 20.9 | 20.2 | 0.7 | 41.1 |
| RA02 | PINFTRAN | 0 | 50 | 0 | 0 | 30 | 40 | 40 | 22.7 | 16.2 | 6.5 | 38.9 |
| RA03 | PDOCUMEN | 0 | 50 | 10 | 10 | 30 | 50 | 50 | 30.0 | 17.9 | 12.1 | 47.9 |
| RA04 | SSINSTRC | 0 | 50 | 10 | 10 | 20 | 40 | 40 | 22.7 | 14.2 | 8.5 | 36.9 |
| RA05 | SSMAINT | 0 | 50 | 0 | 10 | 25 | 25 | 50 | 24.5 | 15.2 | 9.3 | 39.8 |
| RA06 | SSSIMLAT | 0 | 50 | 0 | 30 | 40 | 50 | 50 | 37.3 | 14.9 | 22.4 | 52.2 |
| RA07 | CS75 | 0 | 50 | 10 | 10 | 30 | 50 | 50 | 28.2 | 16.0 | 12.2 | 44.2 |
| RA08 | CS95 | 0 | 50 | 0 | 0 | 0 | 30 | 30 | 10.0 | 13.4 | -3.4 | 23.4 |
| RA09 | CSOTHERM | 0 | 50 | 0 | 0 | 0 | 0 | 5 | 0.5 | 1.5 | -1.1 | 2.0 |
| RA10 | CSRJP | 0 | 50 | 20 | 20 | 25 | 50 | 50 | 34.5 | 14.9 | 19.6 | 49.5 |
| RA11 | CSTSO | 0 | 50 | 10 | 15 | 20 | 50 | 50 | 25.9 | 16.4 | 9.5 | 42.3 |
| RA12 | CSOPS | 0 | 50 | 0 | 0 | 0 | 50 | 50 | 18.2 | 25.2 | -7.0 | 43.4 |
| RA13 | CSSPACE | 0 | 50 | 10 | 10 | 10 | 40 | 50 | 23.6 | 16.9 | 6.7 | 40.5 |
| RA14 | CSGRPHXD | 0 | 50 | 0 | 0 | 0 | 15 | 15 | 4.1 | 7.0 | -2.9 | 11.1 |
| RA16 | PERLIBRA | 0 | 50 | 10 | 35 | 35 | 40 | 40 | 34.1 | 8.3 | 25.8 | 42.4 |
| RA17 | PEREXPRT | 0 | 50 | 0 | 0 | 20 | 20 | 50 | 15.5 | 15.1 | 0.4 | 30.5 |
| RA18 | PERVNVMT | 0 | 50 | 0 | 0 | 0 | 40 | 50 | 13.6 | 21.6 | -7.9 | 35.2 |
| RA81 | DEVPROCS | 0 | 150 | 10 | 20 | 90 | 110 | 120 | 73.6 | 42.7 | 30.9 | 116.4 |
| RA82 | SUPORTSW | 0 | 150 | 45 | 75 | 90 | 100 | 115 | 84.5 | 19.8 | 64.7 | 104.4 |
| RA83 | COMPUTER | 0 | 400 | 85 | 95 | 105 | 240 | 250 | 145.0 | 67.0 | 78.0 | 212.0 |
| RA84 | PERSONEL | 0 | 150 | 20 | 35 | 55 | 95 | 135 | 63.2 | 34.7 | 28.4 | 97.9 |
| RA85 | TOTAL | 0 | 850 | 235 | 245 | 305 | 535 | 585 | 366.4 | 130.5 | 235.9 | 496.8 |

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| NUMBER OF CLUSTERS | PRCD | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| | 1 | 7 | 5 | 6 | 8 | 2 | 3 | 4 | 9 | 0 | 1 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | * |
| 9 | * | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * | * |

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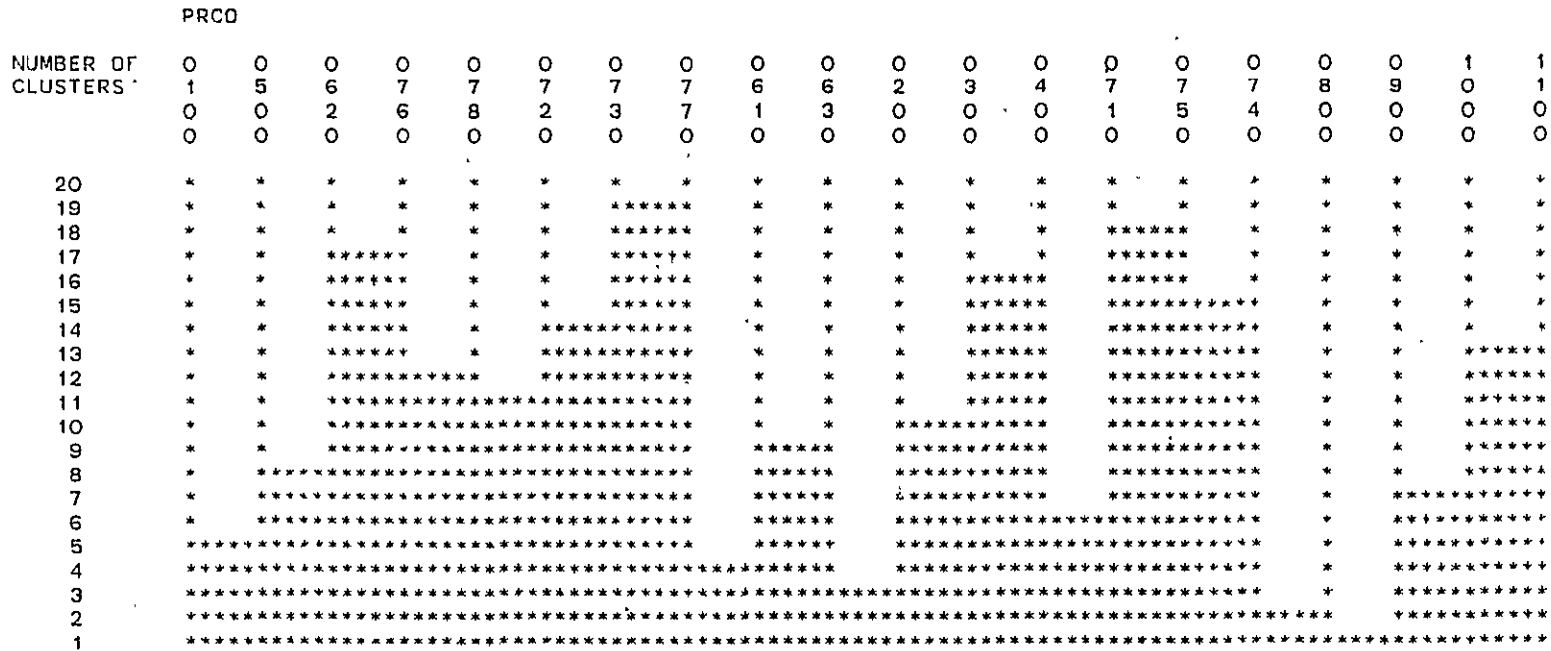
Figure A.4.1-1. Resources Available: Cluster Map for 11 Projects

Table A.4.1-4. Resources Available: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| RA01 | PFORTRAN | 0 | 50 | 0 | 0 | 25 | 45 | 50 | 23.0 | 19.8 | 3.2 | 42.8 |
| RA02 | PINFTRAN | 0 | 50 | 0 | 10 | 20 | 30 | 40 | 19.5 | 13.2 | 6.3 | 32.7 |
| RA03 | PDOCUMEN | 0 | 50 | 10 | 26 | 30 | 30 | 50 | 29.8 | 13.0 | 16.7 | 42.8 |
| RA04 | SSINSTRC | 0 | 50 | 10 | 13 | 20 | 20 | 40 | 21.5 | 10.4 | 11.1 | 31.9 |
| RA05 | SSMAINT | 0 | 50 | 0 | 25 | 25 | 25 | 50 | 24.0 | 11.5 | 12.5 | 35.5 |
| RA06 | SSSIMLAT | 0 | 50 | 0 | 30 | 35 | 50 | 50 | 36.3 | 13.5 | 22.8 | 49.7 |
| RA07 | CS75 | 0 | 50 | 10 | 23 | 30 | 30 | 50 | 29.0 | 11.7 | 17.3 | 40.7 |
| RA08 | CS95 | 0 | 50 | 0 | 0 | 0 | 8 | 30 | 5.5 | 11.0 | -5.5 | 16.5 |
| RA09 | CSOTHERM | 0 | 50 | 0 | 0 | 0 | 0 | 15 | 0.8 | 3.4 | -2.6 | 4.1 |
| RA10 | CSRJP | 0 | 50 | 20 | 25 | 25 | 44 | 50 | 30.3 | 11.9 | 18.4 | 42.1 |
| RA11 | CSTSO | 0 | 50 | 10 | 16 | 20 | 20 | 50 | 23.3 | 12.3 | 11.0 | 35.5 |
| RA12 | CSOPS | 0 | 50 | 0 | 0 | 0 | 0 | 50 | 10.0 | 20.5 | -10.5 | 30.5 |
| RA13 | CSSPACE | 0 | 50 | 10 | 10 | 30 | 30 | 50 | 26.5 | 12.7 | 13.8 | 39.2 |
| RA14 | CSGRPHXD | 0 | 50 | 0 | 0 | 0 | 0 | 15 | 3.0 | 6.2 | -3.2 | 9.2 |
| RA16 | PERLIBRA | 0 | 50 | 10 | 35 | 35 | 35 | 40 | 34.5 | 6.0 | 28.5 | 40.5 |
| RA17 | PEREXPRT | 0 | 50 | 0 | 0 | 0 | 20 | 50 | 8.5 | 13.5 | -5.0 | 22.0 |
| RA18 | PERVNVTM | 0 | 50 | 0 | 0 | 0 | 0 | 50 | 7.5 | 17.1 | -9.6 | 24.6 |
| RA81 | DEVPROCS | 0 | 150 | 10 | 43 | 80 | 100 | 120 | 72.3 | 34.7 | 37.5 | 107.0 |
| RA82 | SUPORTSW | 0 | 150 | 45 | 75 | 75 | 95 | 115 | 81.8 | 16.3 | 65.4 | 98.1 |
| RA83 | COMPUTER | 0 | 400 | 85 | 105 | 105 | 131 | 250 | 128.3 | 52.5 | 75.7 | 180.8 |
| RA84 | PERSONEL | 0 | 150 | 20 | 35 | 35 | 55 | 135 | 50.5 | 28.8 | 21.7 | 79.3 |
| RA85 | TOTAL | 0 | 850 | 235 | 258 | 310 | 325 | 585 | 332.8 | 103.7 | 229.1 | 436.4 |

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Figure A.4.1-2. Resources Available: Cluster Map for 20 Independent Systems

Table A.4.1-5. Resources Available: Summary Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE | | --ACTUAL-RANGE-- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|-----------|----------------|------|------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| RA01 | PFORTRAN | 0 | 50 | 0 | 5 | 20 | 40 | 50 | 21.1 | 19.0 | 2.1 | 40.1 |
| RA02 | PINFTRAN | 0 | 50 | 0 | 0 | 30 | 35 | 40 | 21.1 | 16.9 | 4.2 | 38.0 |
| RA03 | PDOCUMEN | 0 | 50 | 10 | 10 | 30 | 40 | 50 | 25.6 | 16.7 | 8.9 | 42.2 |
| RA04 | SSINSTRC | 0 | 50 | 10 | 10 | 10 | 30 | 40 | 18.9 | 12.7 | 6.2 | 31.6 |
| RA05 | SSMAINT | 0 | 50 | 0 | 18 | 25 | 38 | 50 | 26.1 | 16.2 | 10.0 | 42.3 |
| RA06 | SSSIMLAT | 0 | 50 | 0 | 30 | 40 | 45 | 50 | 34.4 | 15.1 | 19.4 | 49.5 |
| RA07 | CS75 | 0 | 50 | 10 | 10 | 20 | 40 | 50 | 25.6 | 15.9 | 9.7 | 41.5 |
| RA08 | CS95 | 0 | 50 | 0 | 0 | 0 | 20 | 30 | 8.9 | 12.7 | -3.8 | 21.6 |
| RA09 | CSOTHERM | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| RA10 | CSRJP | 0 | 50 | 20 | 23 | 50 | 50 | 50 | 37.8 | 14.6 | 23.2 | 52.4 |
| RA11 | CSTSD | 0 | 50 | 10 | 13 | 15 | 35 | 50 | 22.8 | 15.8 | 6.9 | 38.6 |
| RA12 | CSOPS | 0 | 50 | 0 | 0 | 0 | 25 | 50 | 11.1 | 22.0 | -10.9 | 33.2 |
| RA13 | CSSPACE | 0 | 50 | 10 | 10 | 10 | 35 | 50 | 22.2 | 15.6 | 6.6 | 37.9 |
| RA14 | CSGRPHXD | 0 | 50 | 0 | 0 | 0 | 15 | 15 | 5.0 | 7.5 | -2.5 | 12.5 |
| RA16 | PERLIBRA | 0 | 50 | 35 | 35 | 35 | 40 | 40 | 36.7 | 2.5 | 34.2 | 39.2 |
| RA17 | PEREXPRT | 0 | 50 | 0 | 0 | 0 | 20 | 50 | 12.2 | 17.2 | -4.9 | 29.4 |
| RA18 | PERVNTM | 0 | 50 | 0 | 0 | 0 | 25 | 50 | 11.1 | 22.0 | -10.9 | 33.2 |
| RAB1 | DEVPROCS | 0 | 150 | 10 | 15 | 80 | 110 | 110 | 67.8 | 44.1 | 23.7 | 111.9 |
| RAB2 | SUPPORTSW | 0 | 150 | 45 | 70 | 75 | 95 | 100 | 79.4 | 17.8 | 61.7 | 97.2 |
| RAB3 | COMPUTER | 0 | 400 | 85 | 95 | 105 | 180 | 250 | 133.3 | 64.1 | 69.3 | 197.4 |
| RAB4 | PERSONEL | 0 | 150 | 35 | 35 | 40 | 83 | 135 | 60.0 | 36.0 | 24.0 | 96.0 |
| RAB5 | TOTAL | 0 | 850 | 235 | 240 | 305 | 430 | 585 | 340.6 | 131.4 | 209.1 | 472.0 |

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| NUMBER OF CLUSTERS | PRCD | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1 | 0 | 5 | 7 | 6 | 2 | 3 | 4 | 9 | 0 |
| 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 9 | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * |

Figure A.4.1-3. Resources Available: Cluster Map for 9 Large Systems

Table A.4.1-6. Resources Available: Summary Statistics
for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE- | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|-----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| RA01 | PFORTRAN | 0 | 50 | 0 | 0 | 30 | 50 | 50 | 24.5 | 21.1 | 3.4 | 45.7 |
| RA02 | PINFTRAN | 0 | 50 | 0 | 10 | 20 | 20 | 40 | 18.2 | 9.8 | 8.4 | 28.0 |
| RA03 | PDOCUMEN | 0 | 50 | 25 | 30 | 30 | 30 | 50 | 33.2 | 8.4 | 24.7 | 41.6 |
| RA04 | SSINSTRC | 0 | 50 | 20 | 20 | 20 | 20 | 40 | 23.6 | 8.1 | 15.5 | 31.7 |
| RA05 | SSMAINT | 0 | 50 | 10 | 25 | 25 | 25 | 25 | 22.3 | 6.1 | 16.2 | 28.3 |
| RA06 | SSSIMLAT | 0 | 50 | 15 | 30 | 30 | 50 | 50 | 37.7 | 12.5 | 25.2 | 50.2 |
| RA07 | CS75 | 0 | 50 | 30 | 30 | 30 | 30 | 50 | 31.8 | 6.0 | 25.8 | 37.8 |
| RA08 | CS95 | 0 | 50 | 0 | 0 | 0 | 0 | 30 | 2.7 | 9.0 | -6.3 | 11.8 |
| RA09 | CSOTHERM | 0 | 50 | 0 | 0 | 0 | 0 | 15 | 1.4 | 4.5 | -3.2 | 5.9 |
| RA10 | CSRJP | 0 | 50 | 20 | 25 | 25 | 25 | 25 | 24.1 | 2.0 | 22.1 | 26.1 |
| RA11 | CSTSD | 0 | 50 | 20 | 20 | 20 | 20 | 50 | 23.6 | 9.2 | 14.4 | 32.9 |
| RA12 | CSOPS | 0 | 50 | 0 | 0 | 0 | 0 | 50 | 9.1 | 20.2 | -11.1 | 29.3 |
| RA13 | CSSPACE | 0 | 50 | 10 | 30 | 30 | 30 | 50 | 30.0 | 8.9 | 21.1 | 38.9 |
| RA14 | CSGRPHXD | 0 | 50 | 0 | 0 | 0 | 0 | 15 | 1.4 | 4.5 | -3.2 | 5.9 |
| RA16 | PERLIBRA | 0 | 50 | 10 | 35 | 35 | 35 | 35 | 32.7 | 7.5 | 25.2 | 40.3 |
| RA17 | PEREXPRT | 0 | 50 | 0 | 0 | 0 | 20 | 20 | 5.5 | 9.3 | -3.9 | 14.8 |
| RA18 | PERVNTM | 0 | 50 | 0 | 0 | 0 | 0 | 40 | 4.5 | 12.1 | -7.6 | 16.7 |
| RA81 | DEVPROCS | 0 | 150 | 30 | 50 | 80 | 90 | 120 | 75.9 | 26.5 | 49.4 | 102.4 |
| RA82 | SUPORTSW | 0 | 150 | 60 | 75 | 75 | 95 | 115 | 83.6 | 15.7 | 68.0 | 99.3 |
| RA83 | COMPUTER | 0 | 400 | 105 | 105 | 105 | 135 | 250 | 124.1 | 43.8 | 80.3 | 167.8 |
| RA84 | PERSONEL | 0 | 150 | 20 | 35 | 35 | 55 | 95 | 42.7 | 19.9 | 22.8 | 62.6 |
| RA85 | TOTAL | 0 | 850 | 245 | 265 | 315 | 325 | 535 | 326.4 | 80.6 | 245.7 | 407.0 |

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| | PRCO | | | | | | | | | | |
|--------------------|-------|---|---|---|---|---|-------|---|---|---|---|
| NUMBER OF CLUSTERS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 6 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 8 | 1 |
| | 2 | 6 | 8 | 2 | 7 | 3 | 1 | 5 | 4 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | ***** | * | * | * | * |
| 9 | ***** | * | * | * | * | * | ***** | * | * | * | * |
| 8 | ***** | * | * | * | * | * | ***** | * | * | * | * |
| 7 | ***** | * | * | * | * | * | ***** | * | * | * | * |
| 6 | ***** | * | * | * | * | * | ***** | * | * | * | * |
| 5 | ***** | * | * | * | * | * | ***** | * | * | * | * |
| 4 | ***** | * | * | * | * | * | ***** | * | * | * | * |
| 3 | ***** | * | * | * | * | * | ***** | * | * | * | * |
| 2 | ***** | * | * | * | * | * | ***** | * | * | * | * |
| 1 | ***** | * | * | * | * | * | ***** | * | * | * | * |

Figure A.4.1-4. Resources Available: Cluster Map for 11 Small Systems

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A.4.2 SOFTWARE PRODUCT

| | | | | | | |
|----|----------|------------|----|----------|----|-------------|
| -- | -- | Objective | -- | <u>X</u> | -- | Subjective |
| -- | -- | Absolute | -- | <u>X</u> | -- | Relative |
| -- | -- | Explicit | -- | <u>X</u> | -- | Derived |
| -- | <u>X</u> | Static | -- | -- | -- | Dynamic |
| -- | -- | Predictive | -- | <u>X</u> | -- | Explanatory |

This category measures the quality of the development process and the development product. These measures are subjective because quality is judged, although some rescaled objective measures are included. For example, Completeness (PR10 through PR12) indicates the number of major omissions according to the equation, measure value = 50 - 10 x omissions. These measures are static and explanatory in that most cannot be determined until the project is complete. Typical, average, or trend values of the measures can be extracted from the samples for prediction.

The remainder of this subsection contains tables and figures that describe the Software Product measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.4.2-1)
- Values of the measures for 25 systems (Table A.4.2-2), where large values indicate a higher quality process or product
- Summary statistics for 11 projects (Table A.4.2-3)
- Cluster map for 11 projects (Figure A.4.2-1)
- Summary statistics for 20 independent systems (Table A.4.2-4)
- Cluster map for 20 independent systems (Figure A.4.2-2)

- Summary statistics for 9 large systems
(Table A.4.2-5)
- Cluster map for 9 large systems (Figure A.4.2-3)
- Summary statistics for 11 small systems
(Table A.4.2-6)
- Cluster map for 11 small systems (Figure A.4.2-4)

Table A.4.2-1. Software Product: Description of Measures

| Code | Measure | Range | | Description |
|------|----------|-------|------|--|
| | | Low | High | |
| PR01 | COST | 00 | 50 | Cost of Project |
| PR02 | TIMELY | 00 | 50 | Timeliness of Completion |
| PR03 | CONFIDNC | 00 | 50 | Confidence in Product Size |
| PR04 | SIZNEWSW | 00 | 50 | New Software |
| PR05 | SIZEXTSW | 00 | 50 | Extensively Modified Software |
| PR06 | SIZSLTSW | 00 | 50 | Slightly Modified Software |
| PR07 | SIZOLDSW | 00 | 50 | Old Software |
| PR08 | READABLE | 00 | 50 | Readable |
| PR09 | RELIEDOC | 00 | 50 | Reliable Documentation Completeness |
| PR10 | CMPLDESG | 00 | 50 | Design |
| PR11 | CMPLCODE | 00 | 50 | Code |
| PR12 | CMPLTEST | 00 | 50 | Testing Meet Requirements |
| PR13 | MREQPROS | 00 | 50 | Processing |
| PR14 | MREQMEM | 00 | 50 | Memory |
| PR15 | | 00 | 00 | Not Defined |
| PR16 | | 00 | 00 | Not Defined |
| PR17 | | 00 | 00 | Not Defined |
| PR18 | | 00 | 00 | Not Defined |
| PR19 | | 00 | 00 | Not Defined |
| PR20 | | 00 | 00 | Not Defined |
| PR81 | SIZESW | 000 | 200 | Sum PR04 Through PR07 |
| PR82 | COMPLETE | 000 | 150 | Sum PR10 Through PR12 |
| PR83 | MEETREQS | 000 | 100 | Sum PR13 and PR14 |
| PR84 | PRODUCT | 000 | 700 | Sum PR01 Through PR14 |

Table A.4.2-2. Software Product: Values of the Measures for 25 Systems

| PRCD | PRO1 | PRO2 | PRO3 | PRO4 | PRO5 | PRO6 | PRO7 | PRO8 | PRO9 | PR10 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 45 | 40 | 40 | 20 | 0 | 30 | 40 | 40 | 40 | 40 |
| 0200 | 10 | 30 | 40 | 30 | 10 | 30 | 40 | 40 | 40 | 30 |
| 0300 | 25 | 30 | 30 | 20 | 0 | 10 | 50 | 30 | 30 | 20 |
| 0400 | 25 | 0 | 10 | 40 | 30 | 40 | 40 | 30 | 0 | 20 |
| 0500 | 45 | 50 | 50 | 40 | 0 | 20 | 30 | 40 | 40 | 40 |
| 0600 | 40 | 30 | 40 | 40 | 30 | 50 | 50 | 50 | 50 | 40 |
| 0700 | 35 | 30 | 30 | 40 | 10 | 30 | 40 | 30 | 40 | 40 |
| 0800 | 15 | 40 | 50 | 30 | 50 | 50 | 50 | 50 | 50 | 50 |
| 0900 | 0 | 15 | 20 | 20 | 0 | 40 | 40 | 30 | 30 | 10 |
| 1000 | 5 | 30 | 30 | 30 | 10 | 40 | 40 | 30 | 50 | 30 |
| 1100 | 0 | 30 | 40 | 40 | 40 | 40 | 40 | 30 | 30 | 30 |
| 9000 | 0 | 25 | 25 | 30 | 10 | 40 | 40 | 30 | 40 | 20 |
| 0610 | 45 | 30 | 40 | 40 | 30 | 50 | 50 | 50 | 50 | 40 |
| 0620 | 25 | 30 | 30 | 30 | 30 | 50 | 50 | 40 | 50 | 30 |
| 0630 | 15 | 30 | 40 | 40 | 20 | 50 | 50 | 50 | 50 | 40 |
| 0631 | 0 | 30 | 50 | 40 | 20 | 50 | 50 | 50 | 50 | 40 |
| 0632 | 50 | 30 | 40 | 40 | 50 | 50 | 50 | 40 | 50 | 30 |
| 0710 | 35 | 30 | 40 | 40 | 50 | 50 | 50 | 50 | 50 | 40 |
| 0720 | 50 | 50 | 50 | 40 | 0 | 40 | 30 | 50 | 50 | 50 |
| 0730 | 40 | 30 | 30 | 40 | 0 | 10 | 40 | 30 | 40 | 30 |
| 0740 | 5 | 40 | 40 | 30 | 20 | 40 | 50 | 50 | 50 | 40 |
| 0750 | 0 | 30 | 30 | 40 | 50 | 50 | 40 | 30 | 40 | 30 |
| 0760 | 50 | 20 | 50 | 50 | 20 | 40 | 50 | 30 | 40 | 40 |
| 0770 | 5 | 30 | 40 | 50 | 50 | 50 | 50 | 50 | 40 | 30 |
| 0780 | 25 | 40 | 40 | 40 | 50 | 50 | 50 | 40 | 40 | 40 |

| PRCD | PR11 | PR12 | PR13 | PR14 | PR81 | PR82 | PR83 | PR84 |
|------|------|------|------|------|------|------|------|------|
| 0100 | 40 | 50 | 50 | 50 | 90 | 130 | 100 | 445 |
| 0200 | 50 | 50 | 50 | 50 | 110 | 130 | 100 | 420 |
| 0300 | 30 | 20 | 50 | 30 | 80 | 70 | 80 | 315 |
| 0400 | 0 | 0 | 30 | 20 | 150 | 20 | 50 | 255 |
| 0500 | 50 | 50 | 50 | 50 | 90 | 140 | 100 | 475 |
| 0600 | 40 | 30 | 50 | 50 | 170 | 110 | 100 | 490 |
| 0700 | 50 | 5 | 40 | 40 | 120 | 95 | 80 | 390 |
| 0800 | 50 | 45 | 50 | 40 | 180 | 145 | 90 | 520 |
| 0900 | 10 | 0 | 40 | 40 | 100 | 20 | 80 | 235 |
| 1000 | 30 | 20 | 40 | 40 | 120 | 80 | 80 | 345 |
| 1100 | 30 | 40 | 40 | 40 | 160 | 100 | 80 | 410 |
| 9000 | 20 | 15 | 40 | 40 | 120 | 55 | 80 | 305 |
| 0610 | 40 | 45 | 50 | 50 | 170 | 125 | 100 | 510 |
| 0620 | 30 | 45 | 50 | 50 | 160 | 105 | 100 | 450 |
| 0630 | 50 | 40 | 40 | 50 | 160 | 130 | 90 | 465 |
| 0631 | 50 | 50 | 50 | 50 | 160 | 140 | 100 | 480 |
| 0632 | 40 | 40 | 30 | 50 | 190 | 110 | 80 | 500 |
| 0710 | 50 | 40 | 40 | 20 | 190 | 130 | 60 | 485 |
| 0720 | 50 | 45 | 50 | 50 | 110 | 145 | 100 | 505 |
| 0730 | 30 | 35 | 40 | 50 | 90 | 95 | 90 | 375 |
| 0740 | 50 | 45 | 50 | 50 | 140 | 135 | 100 | 460 |
| 0750 | 40 | 40 | 30 | 50 | 180 | 110 | 80 | 430 |
| 0760 | 50 | 45 | 50 | 50 | 160 | 135 | 100 | 515 |
| 0770 | 40 | 45 | 40 | 50 | 200 | 115 | 90 | 480 |
| 0780 | 50 | 45 | 40 | 50 | 190 | 135 | 90 | 520 |

Table A.4.2-3. Software Product: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE- | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|-----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| PR01 | COST | 0 | 50 | 0 | 5 | 25 | 40 | 45 | 22.3 | 17.4 | 4.9 | 39.6 |
| PR02 | TIMELY | 0 | 50 | 0 | 30 | 30 | 40 | 50 | 29.5 | 13.1 | 16.4 | 42.7 |
| PR03 | CONFIDNC | 0 | 50 | 10 | 30 | 40 | 40 | 50 | 34.5 | 12.1 | 22.4 | 46.7 |
| PR04 | SIZNEWSW | 0 | 50 | 20 | 20 | 30 | 40 | 40 | 31.8 | 8.7 | 23.1 | 40.6 |
| PR05 | SIZEXTSW | 0 | 50 | 0 | 0 | 10 | 30 | 50 | 16.4 | 18.0 | -1.7 | 34.4 |
| PR06 | SIZSLTSW | 0 | 50 | 10 | 30 | 40 | 40 | 50 | 34.5 | 12.1 | 22.4 | 46.7 |
| PR07 | SIZOLDSW | 0 | 50 | 30 | 40 | 40 | 50 | 50 | 41.8 | 6.0 | 35.8 | 47.8 |
| PR08 | READABLE | 0 | 50 | 30 | 30 | 30 | 40 | 50 | 36.4 | 8.1 | 28.3 | 44.5 |
| PR09 | RELIEDOC | 0 | 50 | 0 | 30 | 40 | 50 | 50 | 36.4 | 14.9 | 22.0 | 50.7 |
| PR10 | CMPLDESG | 0 | 50 | 10 | 20 | 30 | 40 | 50 | 31.8 | 11.7 | 20.1 | 43.5 |
| PR11 | CMPLCODE | 0 | 50 | 0 | 30 | 40 | 50 | 50 | 34.5 | 16.9 | 17.6 | 51.5 |
| PR12 | CMPLTEST | 0 | 50 | 0 | 15 | 30 | 50 | 50 | 28.2 | 20.3 | 7.9 | 48.5 |
| PR13 | MREQPROS | 0 | 50 | 30 | 40 | 50 | 50 | 50 | 44.5 | 6.9 | 37.7 | 51.4 |
| PR14 | MREQMEM | 0 | 50 | 20 | 40 | 40 | 50 | 50 | 40.9 | 9.4 | 31.5 | 50.3 |
| PR81 | SIZESW | 0 | 200 | 80 | 90 | 120 | 160 | 180 | 124.5 | 35.0 | 89.5 | 159.6 |
| PR82 | COMPLETE | 0 | 150 | 20 | 70 | 100 | 130 | 145 | 94.5 | 44.0 | 50.6 | 138.5 |
| PR83 | MEETREQS | 0 | 100 | 50 | 80 | 80 | 100 | 100 | 85.5 | 15.1 | 70.4 | 100.5 |
| PR84 | PRODUCT | 0 | 700 | 235 | 315 | 410 | 475 | 520 | 390.9 | 94.0 | 296.9 | 484.9 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| | 1 | 5 | 2 | 6 | 8 | 7 | 0 | 1 | 3 | 4 | 9 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | ***** | * | * | * | * | * | * | * | * | * | * |
| 9 | ***** | * | ***** | * | * | * | * | * | * | * | * |
| 8 | ***** | * | ***** | ***** | ***** | * | * | * | * | * | * |
| 7 | ***** | ***** | ***** | ***** | ***** | * | * | * | * | * | * |
| 6 | ***** | ***** | ***** | ***** | ***** | * | * | * | ***** | * | * |
| 5 | ***** | ***** | ***** | ***** | ***** | ***** | * | * | ***** | ***** | * |
| 4 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |

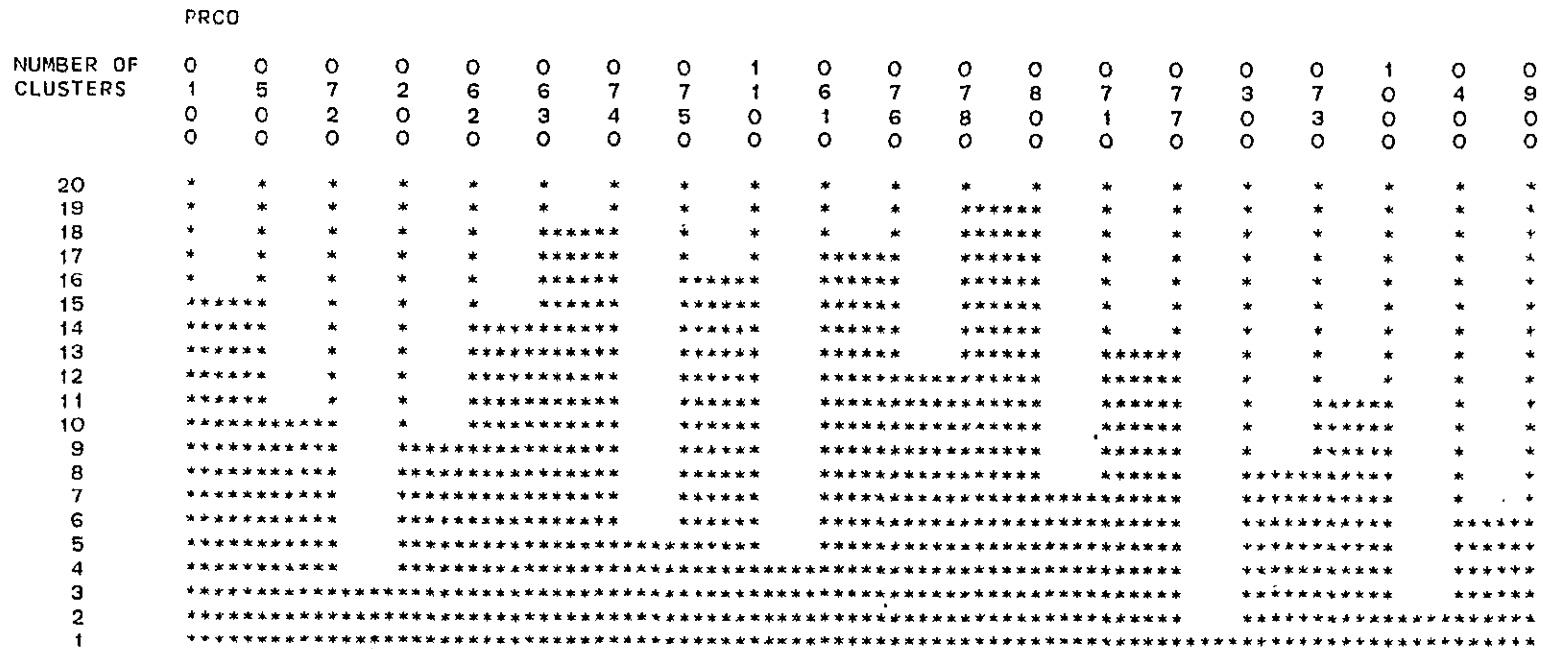
Figure A.4.2-1. Software Product: Cluster Map for 11 Projects

Table A.4.2-4. Software Product: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| PRO1 | COST | 0 | 50 | 0 | 5 | 25 | 44 | 50 | 23.3 | 18.1 | 5.2 | 41.3 |
| PRO2 | TIMELY | 0 | 50 | 0 | 30 | 30 | 40 | 50 | 31.3 | 11.2 | 20.0 | 42.5 |
| PRO3 | CONFIDNC | 0 | 50 | 10 | 30 | 40 | 40 | 50 | 37.0 | 10.3 | 26.7 | 47.3 |
| PRO4 | SIZNEWSW | 0 | 50 | 20 | 30 | 40 | 40 | 50 | 35.5 | 8.9 | 26.6 | 44.4 |
| PRO5 | SIZEXTSW | 0 | 50 | 0 | 0 | 20 | 48 | 50 | 23.0 | 20.0 | 3.0 | 43.0 |
| PRO6 | SIZSLTSW | 0 | 50 | 10 | 33 | 40 | 50 | 50 | 39.0 | 12.9 | 26.1 | 51.9 |
| PRO7 | SIZOLDSW | 0 | 50 | 30 | 40 | 45 | 50 | 50 | 44.0 | 6.8 | 37.2 | 50.8 |
| PRO8 | READABLE | 0 | 50 | 30 | 30 | 40 | 50 | 50 | 39.5 | 8.9 | 30.6 | 48.4 |
| PRO9 | RELIEDOC | 0 | 50 | 0 | 40 | 40 | 50 | 50 | 40.5 | 11.9 | 28.6 | 52.4 |
| PR10 | CMPLDESG | 0 | 50 | 10 | 30 | 35 | 40 | 50 | 34.0 | 9.9 | 24.1 | 43.9 |
| PR11 | CMPLCODE | 0 | 50 | 0 | 30 | 40 | 50 | 50 | 38.5 | 14.2 | 24.3 | 52.7 |
| PR12 | CMPLTEST | 0 | 50 | 0 | 36 | 45 | 45 | 50 | 37.3 | 15.2 | 22.1 | 52.4 |
| PR13 | MREQPROS | 0 | 50 | 30 | 40 | 45 | 50 | 50 | 44.0 | 6.8 | 37.2 | 50.8 |
| PR14 | MREQMEM | 0 | 50 | 20 | 40 | 50 | 50 | 50 | 44.0 | 9.9 | 34.1 | 53.9 |
| PRB1 | SIZESW | 0 | 200 | 80 | 103 | 155 | 178 | 200 | 141.5 | 39.2 | 102.3 | 180.7 |
| PRB2 | COMPLETE | 0 | 150 | 20 | 96 | 128 | 135 | 145 | 109.8 | 37.1 | 72.7 | 146.8 |
| PRB3 | MEETREQS | 0 | 100 | 50 | 80 | 90 | 100 | 100 | 88.0 | 14.0 | 74.0 | 102.0 |
| PRB4 | PRODUCT | 0 | 700 | 235 | 384 | 455 | 500 | 520 | 430.8 | 85.3 | 345.4 | 516.1 |

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Figure A.4.2-2. Software Product: Cluster Map for 20 Independent Systems

Table A.4.2-5. Software Product: Summary Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE- | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|-----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| PRO1 | COST | 0 | 50 | 0 | 8 | 25 | 45 | 45 | 26.7 | 18.2 | 8.5 | 44.9 |
| PRO2 | TIMELY | 0 | 50 | 0 | 23 | 30 | 35 | 50 | 28.3 | 14.1 | 14.2 | 42.5 |
| PRO3 | CONFIDNC | 0 | 50 | 10 | 25 | 30 | 40 | 50 | 32.2 | 12.0 | 20.2 | 44.2 |
| PRO4 | SIZNEWSW | 0 | 50 | 20 | 20 | 30 | 40 | 40 | 31.1 | 9.3 | 21.8 | 40.4 |
| PRO5 | SIZXTSW | 0 | 50 | 0 | 0 | 0 | 20 | 30 | 8.9 | 12.7 | -3.8 | 21.6 |
| PRO6 | SIZSLTSW | 0 | 50 | 10 | 15 | 30 | 40 | 50 | 30.0 | 14.1 | 15.9 | 44.1 |
| PRO7 | SIZOLDSW | 0 | 50 | 30 | 40 | 40 | 45 | 50 | 41.1 | 6.0 | 35.1 | 47.1 |
| PRO8 | READABLE | 0 | 50 | 30 | 30 | 30 | 40 | 50 | 35.6 | 7.3 | 28.3 | 42.8 |
| PRO9 | RELIEDOC | 0 | 50 | 0 | 30 | 40 | 45 | 50 | 35.6 | 15.1 | 20.5 | 50.6 |
| PR10 | CMPLDESG | 0 | 50 | 10 | 20 | 30 | 40 | 40 | 28.9 | 10.5 | 18.3 | 39.4 |
| PR11 | CMPLCODE | 0 | 50 | 0 | 20 | 30 | 45 | 50 | 31.1 | 16.9 | 14.2 | 48.0 |
| PR12 | CMPLTEST | 0 | 50 | 0 | 10 | 35 | 50 | 50 | 30.0 | 20.8 | 9.2 | 50.8 |
| PR13 | MREQPROS | 0 | 50 | 30 | 40 | 50 | 50 | 50 | 44.4 | 7.3 | 37.2 | 51.7 |
| PR14 | MREQMEM | 0 | 50 | 20 | 35 | 50 | 50 | 50 | 42.2 | 10.9 | 31.3 | 53.2 |
| PR81 | SIZESW | 0 | 200 | 80 | 90 | 100 | 135 | 170 | 111.1 | 30.6 | 80.5 | 141.7 |
| PR82 | COMPLETE | 0 | 150 | 20 | 45 | 95 | 130 | 140 | 90.0 | 46.4 | 43.6 | 136.4 |
| PR83 | MEETREQS | 0 | 100 | 50 | 80 | 90 | 100 | 100 | 86.7 | 16.6 | 70.1 | 103.2 |
| PR84 | PRODUCT | 0 | 700 | 235 | 285 | 375 | 460 | 510 | 375.0 | 95.9 | 279.1 | 470.9 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | |
|-----------------------|-------|---|---|---|---|-------|---|-------|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| | 1 | 5 | 2 | 6 | 3 | 7 | 0 | 4 | 9 |
| | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 0 |
| 9 | * | * | * | * | * | * | * | * | * |
| 8 | ***** | * | * | * | * | * | * | * | * |
| 7 | ***** | * | * | * | * | ***** | * | * | * |
| 6 | ***** | * | * | * | * | ***** | * | * | * |
| 5 | ***** | * | * | * | * | ***** | * | * | * |
| 4 | ***** | * | * | * | * | ***** | * | ***** | * |
| 3 | ***** | * | * | * | * | ***** | * | ***** | * |
| 2 | ***** | * | * | * | * | ***** | * | ***** | * |
| 1 | ***** | * | * | * | * | ***** | * | ***** | * |

Figure A.4.2-3. Software Product: Cluster Map for 9 Large Systems

Table A.4.2-6. Software Product: Summary Statistics for
11 Small Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| PRO1 | COST | 0 | 50 | 0 | 5 | 15 | 35 | 50 | 20.5 | 18.4 | 2.1 | 38.8 |
| PRO2 | TIMELY | 0 | 50 | 20 | 30 | 30 | 40 | 50 | 33.6 | 8.1 | 25.5 | 41.7 |
| PRO3 | CONFIDNC | 0 | 50 | 30 | 40 | 40 | 50 | 50 | 40.9 | 7.0 | 33.9 | 47.9 |
| PRO4 | SIZNEWSW | 0 | 50 | 30 | 30 | 40 | 40 | 50 | 39.1 | 7.0 | 32.1 | 46.1 |
| PRO5 | SIZEXTSW | 0 | 50 | 0 | 20 | 40 | 50 | 50 | 34.5 | 17.5 | 17.0 | 52.1 |
| PRO6 | SIZSLTSW | 0 | 50 | 40 | 40 | 50 | 50 | 50 | 46.4 | 5.0 | 41.3 | 51.4 |
| PRO7 | SIZOLDSW | 0 | 50 | 30 | 40 | 50 | 50 | 50 | 46.4 | 6.7 | 39.6 | 53.1 |
| PRO8 | READABLE | 0 | 50 | 30 | 30 | 50 | 50 | 50 | 42.7 | 9.0 | 33.7 | 51.8 |
| PRO9 | RELIEDOC | 0 | 50 | 30 | 40 | 50 | 50 | 50 | 44.5 | 6.9 | 37.7 | 51.4 |
| PR10 | CMPLDESG | 0 | 50 | 30 | 30 | 40 | 40 | 50 | 38.2 | 7.5 | 30.7 | 45.7 |
| PR11 | CMPLCODE | 0 | 50 | 30 | 40 | 50 | 50 | 50 | 44.5 | 8.2 | 36.3 | 52.7 |
| PR12 | CMPLTEST | 0 | 50 | 40 | 40 | 45 | 45 | 45 | 43.2 | 2.5 | 40.7 | 45.7 |
| PR13 | MREQPROS | 0 | 50 | 30 | 40 | 40 | 50 | 50 | 43.6 | 6.7 | 36.9 | 50.4 |
| PR14 | MREQMEM | 0 | 50 | 20 | 40 | 50 | 50 | 50 | 45.5 | 9.3 | 36.1 | 54.8 |
| PR81 | SIZESW | 0 | 200 | 110 | 160 | 160 | 190 | 200 | 166.4 | 25.8 | 140.6 | 192.2 |
| PR82 | COMPLETE | 0 | 150 | 100 | 110 | 130 | 135 | 145 | 125.9 | 15.8 | 110.1 | 141.7 |
| PR83 | MEETREQS | 0 | 100 | 60 | 80 | 90 | 100 | 100 | 89.1 | 12.2 | 76.9 | 101.3 |
| PR84 | PRODUCT | 0 | 700 | 410 | 450 | 480 | 515 | 520 | 476.4 | 37.2 | 439.1 | 513.6 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 6 | 6 | 7 | 7 | 1 | 7 | 7 | 7 | 7 | 8 | 7 |
| | 2 | 3 | 4 | 5 | 0 | 1 | 7 | 6 | 8 | 0 | 2 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | * |
| 9 | * | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * | * |

Figure A.4.2-4. Software Product: Cluster Map for 11 Small Systems

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A.4.3 PRODUCT/PROCESS PERFORMANCE

| | | | | | |
|----|------------|----|---|----|-------------|
| -- | Objective | -- | X | -- | Subjective |
| -- | Absolute | -- | X | -- | Relative |
| -- | Explicit | -- | X | -- | Derived |
| -- | X | -- | | -- | Dynamic |
| -- | Static | -- | | -- | |
| -- | Predictive | -- | X | -- | Explanatory |

This category also measures the quality of the development process and the development product. These measures are subjective because quality is judged relatively. They are dynamic in the sense that an extreme new case could cause a reevaluation of the samples. They are explanatory in that they cannot be determined until the project is complete, although typical, average, or trend values can be extracted from the samples for prediction.

The remainder of this subsection contains tables and figures that describe the Product/Process Performance measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.4.3-1)
- Values of the measures for 25 systems (Table A.4.3-2), where larger values indicate a higher quality process or product
- Summary statistics for 11 projects (Table A.4.3-3)
- Cluster map for 11 projects (Figure A.4.3-1)
- Summary statistics for 20 independent systems (Table A.4.3-4)
- Cluster map for 20 independent systems (Figure A.4.3-2)

- Summary statistics for 9 large systems
(Table A.4.3-5)
- Cluster map for 9 large systems (Figure A.4.3-3)
- Summary statistics for 11 small systems
(Table A.4.3-6)
- Cluster map for 11 small systems (Figure A.4.3-4)

Table A.4.3-1. Product/Process Performance: Description of Measures

| <u>Code</u> | <u>Measure</u> | <u>Range</u> | | <u>Description</u> |
|-------------|----------------|--------------|-------------|----------------------------|
| | | <u>Low</u> | <u>High</u> | |
| Product | | | | |
| PP01 | RELIABLE | 00 | 50 | Reliability |
| PP02 | PERFORMC | 00 | 50 | Performance |
| PP03 | OPCONSID | 00 | 50 | Operational Considerations |
| PP04 | EZTEST | 00 | 50 | Ease of Testing |
| PP05 | | 00 | 00 | Not Defined |
| PP06 | | 00 | 00 | Not Defined |
| Process | | | | |
| PP07 | VISIBILT | 00 | 50 | Visibility |
| PP08 | PLANFOLO | 00 | 50 | Planning and Followthrough |
| PP09 | STABLSCH | 00 | 50 | Stable Schedule |
| PP10 | SWPERTRB | 00 | 50 | Stable With Perturbations |
| PP11 | TIMLYREC | 00 | 50 | Timeliness of Records |
| PP12 | | 00 | 00 | Not Defined |
| PP13 | | 00 | 00 | Not Defined |
| PP14 | | 00 | 00 | Not Defined |
| PP15 | | 00 | 00 | Not Defined |
| PP81 | PRODUCT | 000 | 200 | Sum PP01 Through PP04 |
| PP82 | PROCESS | 000 | 250 | Sum PP07 Through PP11 |
| PP83 | PRODPROS | 000 | 450 | Sum PP81 and PP82 |

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Table A.4.3-2. Product/Process Performance: Values of the Measures for 25 Systems

| PRCD | PP01 | PP02 | PP03 | PP04 | PP07 | PP08 | PP09 | PP10 |
|------|------|------|------|------|------|------|------|------|
| 0100 | 45 | 45 | 35 | 45 | 45 | 45 | 40 | 50 |
| 0200 | 45 | 45 | 35 | 40 | 25 | 30 | 30 | 35 |
| 0300 | 30 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| 0400 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0500 | 50 | 45 | 35 | 45 | 50 | 50 | 50 | 50 |
| 0600 | 40 | 45 | 45 | 45 | 45 | 45 | 40 | 45 |
| 0700 | 35 | 35 | 30 | 30 | 35 | 35 | 30 | 35 |
| 0800 | 50 | 50 | 50 | 50 | 45 | 45 | 50 | 50 |
| 0900 | 30 | 10 | 10 | 0 | 10 | 0 | 0 | 20 |
| 1000 | 35 | 40 | 30 | 35 | 35 | 30 | 30 | 30 |
| 1100 | 40 | 40 | 30 | 40 | 35 | 35 | 30 | 40 |
| 9000 | 35 | 25 | 20 | 20 | 25 | 15 | 15 | 25 |
| 0610 | 40 | 45 | 45 | 45 | 45 | 45 | 40 | 45 |
| 0620 | 30 | 40 | 40 | 35 | 30 | 35 | 30 | 30 |
| 0630 | 35 | 45 | 45 | 45 | 35 | 40 | 40 | 40 |
| 0631 | 40 | 50 | 50 | 50 | 40 | 40 | 50 | 40 |
| 0632 | 30 | 40 | 40 | 35 | 40 | 40 | 30 | 40 |
| 0710 | 40 | 35 | 40 | 40 | 35 | 35 | 30 | 40 |
| 0720 | 50 | 50 | 40 | 50 | 50 | 50 | 50 | 50 |
| 0730 | 30 | 25 | 15 | 20 | 35 | 25 | 30 | 25 |
| 0740 | 40 | 45 | 40 | 45 | 30 | 40 | 40 | 40 |
| 0750 | 30 | 35 | 35 | 30 | 25 | 25 | 30 | 25 |
| 0760 | 50 | 45 | 40 | 40 | 40 | 40 | 30 | 45 |
| 0770 | 30 | 35 | 45 | 35 | 25 | 30 | 30 | 30 |
| 0780 | 45 | 40 | 45 | 40 | 35 | 35 | 50 | 40 |

| PRCD | PP11 | PP81 | PP82 | PP83 |
|------|------|------|------|------|
| 0100 | 35 | 170 | 215 | 385 |
| 0200 | 0 | 165 | 120 | 285 |
| 0300 | 20 | 90 | 110 | 200 |
| 0400 | 0 | 0 | 0 | 0 |
| 0500 | 50 | 175 | 250 | 425 |
| 0600 | 45 | 175 | 220 | 395 |
| 0700 | 30 | 130 | 165 | 295 |
| 0800 | 30 | 200 | 220 | 420 |
| 0900 | 10 | 50 | 40 | 90 |
| 1000 | 30 | 140 | 155 | 295 |
| 1100 | 20 | 150 | 160 | 310 |
| 9000 | 20 | 100 | 100 | 200 |
| 0610 | 50 | 175 | 225 | 400 |
| 0620 | 30 | 145 | 155 | 300 |
| 0630 | 40 | 170 | 195 | 365 |
| 0631 | 45 | 190 | 215 | 405 |
| 0632 | 30 | 145 | 180 | 325 |
| 0710 | 30 | 155 | 170 | 325 |
| 0720 | 30 | 190 | 230 | 420 |
| 0730 | 35 | 90 | 150 | 240 |
| 0740 | 35 | 170 | 185 | 355 |
| 0750 | 25 | 130 | 130 | 260 |
| 0760 | 30 | 175 | 185 | 360 |
| 0770 | 30 | 145 | 145 | 290 |
| 0780 | 35 | 170 | 195 | 365 |

Table A.4.3-3. Product/Process Performance: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| PPO1 | RELIABLE | 0 | 50 | 0 | 30 | 40 | 45 | 50 | 36.4 | 14.0 | 22.4 | 50.3 |
| PPO2 | PERFORMC | 0 | 50 | 0 | 20 | 40 | 45 | 50 | 34.1 | 16.6 | 17.5 | 50.6 |
| PPO3 | OPCONSID | 0 | 50 | 0 | 20 | 30 | 35 | 50 | 29.1 | 14.5 | 14.6 | 43.6 |
| PPO4 | EZTEST | 0 | 50 | 0 | 20 | 40 | 45 | 50 | 31.8 | 17.8 | 14.0 | 49.6 |
| PPO7 | VISIBILT | 0 | 50 | 0 | 20 | 35 | 45 | 50 | 31.4 | 16.0 | 15.4 | 47.3 |
| PPO8 | PLANFOLO | 0 | 50 | 0 | 20 | 35 | 45 | 50 | 30.5 | 17.4 | 13.1 | 47.8 |
| PPO9 | STABLSCH | 0 | 50 | 0 | 30 | 30 | 40 | 50 | 30.0 | 16.7 | 13.3 | 46.7 |
| PP10 | SWPERTRB | 0 | 50 | 0 | 20 | 35 | 50 | 50 | 34.1 | 15.8 | 18.3 | 49.9 |
| PP11 | TIMLYREC | 0 | 50 | 0 | 10 | 30 | 35 | 50 | 24.5 | 16.5 | 8.0 | 41.0 |
| PP81 | PRODUCT | 0 | 200 | 0 | 90 | 150 | 175 | 200 | 131.4 | 61.0 | 70.4 | 192.3 |
| PP82 | PROCESS | 0 | 250 | 0 | 110 | 160 | 220 | 250 | 150.5 | 78.4 | 72.1 | 228.9 |
| PP83 | PRODPROS | 0 | 450 | 0 | 200 | 295 | 395 | 425 | 281.8 | 136.8 | 145.0 | 418.6 |

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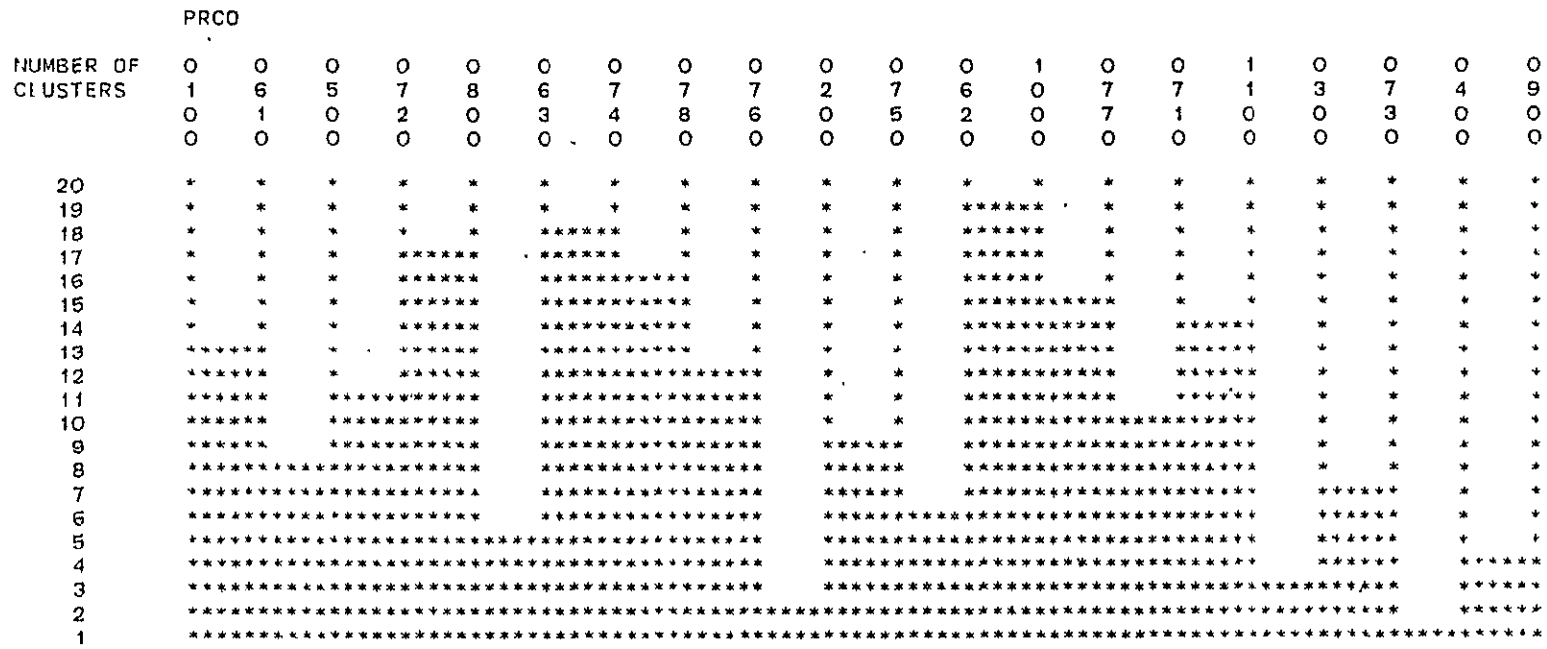
| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| 11 | 1 | 6 | 5 | 8 | 2 | 7 | 0 | 1 | 3 | 4 | 9 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | * | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * | * |

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Figure A.4.3-1. Product/Process Performance: Cluster Map for 11 Projects

Table A.4.3-4. Product/Process Performance: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| PP01 | RELIABLE | 0 | 50 | 0 | 30 | 40 | 45 | 50 | 37.3 | 11.6 | 25.6 | 48.9 |
| PP02 | PERFORMC | 0 | 50 | 0 | 35 | 40 | 45 | 50 | 36.8 | 13.3 | 23.4 | 50.1 |
| PP03 | OPCONSID | 0 | 50 | 0 | 30 | 38 | 44 | 50 | 33.8 | 13.1 | 20.7 | 46.8 |
| PP04 | EZTEST | 0 | 50 | 0 | 31 | 40 | 45 | 50 | 35.0 | 14.5 | 20.5 | 49.5 |
| PP07 | VISIBILT | 0 | 50 | 0 | 25 | 35 | 44 | 50 | 32.5 | 12.7 | 19.8 | 45.2 |
| PP08 | PLANFOLD | 0 | 50 | 0 | 26 | 35 | 44 | 50 | 32.8 | 13.9 | 18.8 | 46.7 |
| PP09 | STABLSCH | 0 | 50 | 0 | 30 | 30 | 40 | 50 | 33.0 | 13.8 | 19.2 | 46.8 |
| PP10 | SWPERTRB | 0 | 50 | 0 | 26 | 40 | 45 | 50 | 35.3 | 12.9 | 22.3 | 48.2 |
| PP11 | TIMLYREC | 0 | 50 | 0 | 21 | 30 | 35 | 50 | 28.3 | 13.3 | 14.9 | 41.6 |
| PP81 | PRODUCT | 0 | 200 | 0 | 133 | 160 | 174 | 200 | 142.8 | 49.7 | 93.0 | 192.5 |
| PP82 | PROCESS | 0 | 250 | 0 | 134 | 165 | 210 | 250 | 161.8 | 62.0 | 99.8 | 223.7 |
| PP83 | PRODPROS | 0 | 450 | 0 | 266 | 318 | 380 | 425 | 304.5 | 109.2 | 195.3 | 413.7 |



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Figure A.4.3-2. Product/Process Performance: Cluster Map for 20 Independent Systems

Table A.4.3-5. Product/Process Performance: Summary Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| PP01 | RELIABLE | 0 | 50 | 0 | 30 | 35 | 45 | 50 | 33.9 | 14.7 | 19.1 | 48.6 |
| PP02 | PERFORMC | 0 | 50 | 0 | 15 | 40 | 45 | 45 | 30.6 | 17.4 | 13.2 | 48.0 |
| PP03 | OPCONSID | 0 | 50 | 0 | 13 | 30 | 35 | 45 | 25.0 | 14.6 | 10.4 | 39.6 |
| PP04 | EZTEST | 0 | 50 | 0 | 10 | 35 | 45 | 45 | 27.8 | 18.6 | 9.2 | 46.3 |
| PP07 | VISIBILT | 0 | 50 | 0 | 15 | 35 | 45 | 50 | 29.4 | 17.0 | 12.4 | 46.5 |
| PP08 | PLANFOLO | 0 | 50 | 0 | 10 | 30 | 45 | 50 | 27.2 | 18.4 | 8.8 | 45.6 |
| PP09 | STABLSCH | 0 | 50 | 0 | 15 | 30 | 40 | 50 | 27.8 | 17.2 | 10.6 | 44.9 |
| PP10 | SWPERTRB | 0 | 50 | 0 | 20 | 30 | 48 | 50 | 30.6 | 16.5 | 14.1 | 47.0 |
| PP11 | TIMLYREC | 0 | 50 | 0 | 5 | 30 | 43 | 50 | 25.6 | 19.3 | 6.3 | 44.8 |
| PP81 | PRODUCT | 0 | 200 | 0 | 70 | 140 | 173 | 175 | 117.2 | 63.3 | 54.0 | 180.5 |
| PP82 | PROCESS | 0 | 250 | 0 | 75 | 150 | 220 | 250 | 140.6 | 83.8 | 56.8 | 224.4 |
| PP83 | PRODPROS | 0 | 450 | 0 | 145 | 285 | 393 | 425 | 257.8 | 143.5 | 114.3 | 401.3 |

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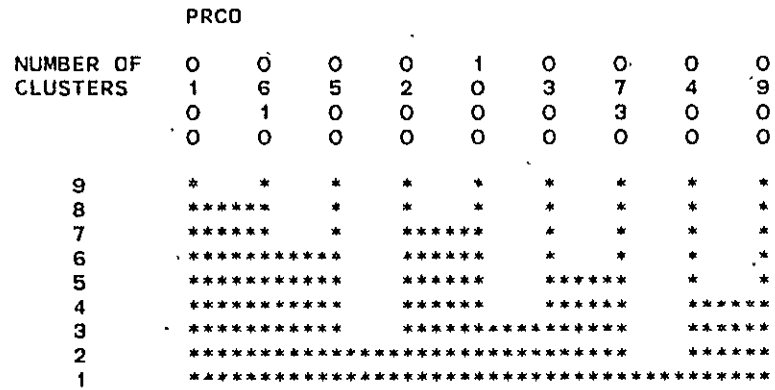


Figure A.4.3-3. Product/Process Performance: Cluster Map for 9 Large Systems

Table A.4.3-6. Product/Process Performance: Summary Statistics for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| PPO1 | RELIABLE | 0 | 50 | 30 | 30 | 40 | 50 | 50 | 40.0 | 8.1 | 31.9 | 48.1 |
| PPO2 | PERFORMC | 0 | 50 | 35 | 35 | 40 | 45 | 50 | 41.8 | 5.6 | 36.2 | 47.4 |
| PPO3 | OPCONSID | 0 | 50 | 30 | 40 | 40 | 45 | 50 | 40.9 | 5.4 | 35.5 | 46.3 |
| PPO4 | EZTEST | 0 | 50 | 30 | 35 | 40 | 45 | 50 | 40.9 | 6.3 | 34.7 | 47.2 |
| PPO7 | VISIBILT | 0 | 50 | 25 | 30 | 35 | 40 | 50 | 35.0 | 7.7 | 27.3 | 42.7 |
| PPO8 | PLANFOLD | 0 | 50 | 25 | 35 | 35 | 40 | 50 | 37.3 | 6.8 | 30.4 | 44.1 |
| PPO9 | STABLSCH | 0 | 50 | 30 | 30 | 30 | 50 | 50 | 37.3 | 9.0 | 28.2 | 46.3 |
| PP10 | SWPERTRB | 0 | 50 | 25 | 30 | 40 | 45 | 50 | 39.1 | 8.0 | 31.1 | 47.1 |
| PP11 | TIMLYREC | 0 | 50 | 20 | 30 | 30 | 35 | 40 | 30.5 | 5.2 | 25.2 | 35.7 |
| PP81 | PRODUCT | 0 | 200 | 130 | 145 | 170 | 175 | 200 | 163.6 | 20.9 | 142.8 | 184.5 |
| PP82 | PROCESS | 0 | 250 | 130 | 155 | 185 | 195 | 230 | 179.1 | 30.7 | 148.4 | 209.8 |
| PP83 | PRODPROS | 0 | 450 | 260 | 300 | 355 | 365 | 420 | 342.7 | 51.2 | 291.5 | 393.9 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 6 | 7 | 7 | 1 | 7 | 6 | 7 | 7 | 7 | 7 | 8 |
| | 2 | 7 | 1 | 0 | 5 | 3 | 4 | 8 | 6 | 2 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | |
|----|-------|-------|---|---|---|-------|---|---|---|-------|---|
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | ***** | * | * | * | * | * | * | * | * | * | * |
| 9 | ***** | * | * | * | * | ***** | * | * | * | * | * |
| 8 | ***** | * | * | * | * | ***** | * | * | * | ***** | * |
| 7 | ***** | * | * | * | * | ***** | * | * | * | ***** | * |
| 6 | ***** | ***** | * | * | * | ***** | * | * | * | ***** | * |
| 5 | ***** | ***** | * | * | * | ***** | * | * | * | ***** | * |
| 4 | ***** | ***** | * | * | * | ***** | * | * | * | ***** | * |
| 3 | ***** | ***** | * | * | * | ***** | * | * | * | ***** | * |
| 2 | ***** | ***** | * | * | * | ***** | * | * | * | ***** | * |
| 1 | ***** | ***** | * | * | * | ***** | * | * | * | ***** | * |

Figure A.4.3-4. Product/Process Performance: Cluster Map for 11 Small Systems

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A.5 DEVELOPMENT TEAM BACKGROUND CLASS OF MEASURES.

The Development Team Background class measures team experience in several ways, including

- Team Rank (RK01 through RK40)
 - Design (RK01 through RK10)
 - Implementation (RK11 through RK20)
 - Testing (RK21 through RK30)
 - Overall (RK31 through RK40)
- Years of Professional Experience (YP01 through YP40)
 - Design (YP01 through YP10)
 - Implementation (YP11 through YP20)
 - Testing (YP21 through YP30)
 - Overall (YP31 through YP40)
- Years of Applicable Experience (YA01 through YA40)
 - Design (YA01 through YA10)
 - Implementation (YA11 through YA20)
 - Testing (YA21 through YA30)
 - Overall (YA31 through YA40)
- Years of Environment Experience (YE01 through YE40)
 - Design (YE01 through YE10)
 - Implementation (YE11 through YE20)
 - Testing (YE21 through YE30)
 - Overall (YE31 through YE40)

A.5.1 TEAM RANK

| | | | |
|---------------|------------|---------------|-------------|
| - <u>X</u> - | Objective | - <u> </u> - | Subjective |
| - <u> </u> - | Absolute | - <u>X</u> - | Relative |
| - <u> </u> - | Explicit | - <u>X</u> - | Derived |
| - <u>X</u> - | Static | - <u> </u> - | Dynamic |
| - <u>X</u> - | Predictive | - <u> </u> - | Explanatory |

This category measures on-the-job experience of the development team, who are a part of the development environment. These measures are derived from objective data by combining

the experience of each team member to form a team value. They are static and predictive because they are computed from data available before the design, implementation, and testing phases. They are dynamic and explanatory in the sense that the values for each phase can be updated to be more accurate as each phase is completed, since the composition of the development team may have changed during a phase. Codes ending in 1, 5, 8, and 9 are unique; the others are derived. The overall measures are derived from the phase measures.

The remainder of this subsection contains tables and figures that describe the Team Rank measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.5.1-1)
- Values of the measures for 25 systems (Table A.5.1-2), where small values indicate a higher rank, i.e., a more skilled team
- Summary statistics for 11 projects (Table A.5.1-3)
- Cluster map for 11 projects (Figure A.5.1-1)
- Summary statistics for 20 independent systems (Table A.5.1-4)
- Cluster map for 20 independent systems (Figure A.5.1-2)
- Summary statistics for 9 large systems (Table A.5.1-5)
- Cluster map for 9 large systems (Figure A.5.1-3)

- Summary statistics for 11 small systems (Table A.5.1-6)
- Cluster map for 11 small systems (Figure A.5.1-4)

Table A.5.1-1. Team Rank: Description of Measures (1 of 3)

| Code | Measure | Range | | Description |
|------|----------|-------|------|---|
| | | Low | High | |
| | | | | Design |
| RK01 | DPROG | 050 | 970 | Programmers Technical Staff |
| RK02 | DTSPROJ | 046 | 844 | Programmers and Project Managers |
| RK03 | DTSANALY | 043 | 787 | Programmers, Project Mana- gers, and Analysis Managers |
| RK04 | DTSDEVEL | 043 | 787 | Programmers and Development Managers |
| | | | | Development Management |
| RK05 | DDMPROJ | 031 | 477 | Project |
| RK06 | DDMANALY | 031 | 477 | Project and Analysis |
| RK07 | DDMDEVEL | 031 | 477 | Development |
| | | | | Interface Management |
| RK08 | DIMANALY | 031 | 477 | Analysis |
| RK09 | DIMDEVEL | 031 | 477 | Development |
| RK10 | D | 000 | 000 | Not Defined |
| | | | | Implementation |
| RK11 | IPROG | 050 | 970 | Programmers Technical Staff |
| RK12 | ITSPROJ | 046 | 844 | Programmers and Project Managers |
| RK13 | ITSANALY | 043 | 787 | Programmers, Project Mana- gers, and Analysis Managers |
| RK14 | ITSDEVEL | 043 | 787 | Programmers and Development Managers |
| | | | | Development Management |
| RK15 | IDMPROJ | 031 | 477 | Project |
| RK16 | IDMANALY | 031 | 477 | Project and Analysis |
| RK17 | IDMDEVEL | 031 | 477 | Development |

Table A.5.1-1. Team Rank: Description of Measures (2 of 3)

| Code | Measure | Range | | Description |
|----------------------------|----------|-------|------|---|
| | | Low | High | |
| Implementation (Continued) | | | | |
| Interface Management | | | | |
| RK18 | IIMANALY | 031 | 477 | Analysis |
| RK19 | IIMDEVEL | 031 | 477 | Development |
| RK20 | I | 000 | 000 | Not Defined |
| Test | | | | |
| RK21 | TPROG | 050 | 970 | Programmers Technical Staff |
| RK22 | TTSPROJ | 046 | 844 | Programmers and Project Managers |
| RK23 | TTSANALY | 043 | 787 | Programmers, Project Mana- gers, and Analysis Managers |
| RK24 | TTSDEVEL | 043 | 787 | Programmers and Development Managers |
| Development Management | | | | |
| RK25 | TDMPROJ | 031 | 477 | Project |
| RK26 | TDMANALY | 031 | 477 | Project and Analysis |
| RK27 | TDMDEVEL | 031 | 477 | Development |
| Interface Management | | | | |
| RK28 | TIMANALY | 031 | 477 | Analysis |
| RK29 | TIMDEVEL | 031 | 477 | Development |
| RK30 | T | 000 | 000 | Not Defined |
| Overall | | | | |
| RK31 | OPROG | 050 | 970 | Programmers Technical Staff |
| RK32 | OTSPROJ | 046 | 844 | Programmers and Project Managers |
| RK33 | OTSANALY | 043 | 787 | Programmers, Project Mana- gers, and Analysis Managers |

Table A.5.1-1. Team Rank: Description of Measures (3 of 3)

| <u>Code</u> | <u>Measure</u> | <u>Range</u> | | <u>Description</u> |
|-------------|----------------|--------------|-------------|---|
| | | <u>Low</u> | <u>High</u> | |
| | | | | Overall (Continued) |
| | | | | Technical Staff (Continued) |
| RK34 | OTSDEVEL | 043 | 787 | Programmers and Development Managers |
| | | | | Development Management |
| RK35 | ODMPROJ | 031 | 477 | Project |
| RK36 | ODMANALY | 031 | 477 | Project and Analysis |
| RK37 | ODMDEVEL | 031 | 477 | Development |
| | | | | Interface Management |
| RK38 | OIMANALY | 031 | 477 | Analysis |
| RK39 | OIMDEVEL | 031 | 477 | Development |
| RK40 | O | 000 | 000 | Not Defined |

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Table A.5.1-2. Team Rank: Values of the Measures for 25 Systems (1 of 2)

| PRCO | RK01 | RK02 | RK03 | RK04 | RK05 | RK06 | RK07 | RK08 | RK09 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 432 | 333 | 295 | 320 | 116 | 121 | 153 | 130 | 267 |
| 0200 | 472 | 372 | 333 | 310 | 145 | 147 | 116 | 147 | 71 |
| 0300 | 497 | 419 | 391 | 375 | 206 | 221 | 196 | 254 | 176 |
| 0400 | 477 | 379 | 343 | 346 | 148 | 159 | 165 | 183 | 210 |
| 0500 | 368 | 310 | 284 | 257 | 153 | 156 | 109 | 160 | 55 |
| 0600 | 372 | 295 | 270 | 275 | 120 | 130 | 139 | 150 | 186 |
| 0700 | 543 | 427 | 323 | 284 | 157 | 169 | 112 | 190 | 56 |
| 0800 | 183 | 162 | 162 | 174 | 103 | 124 | 154 | 179 | 346 |
| 0900 | 432 | 368 | 336 | 340 | 198 | 192 | 200 | 179 | 202 |
| 1000 | 368 | 295 | 275 | 273 | 124 | 139 | 135 | 179 | 160 |
| 1100 | 468 | 399 | 361 | 320 | 204 | 198 | 130 | 188 | 53 |
| 9000 | 387 | 326 | 301 | 295 | 162 | 167 | 159 | 179 | 153 |
| 0610 | 387 | 304 | 278 | 284 | 120 | 130 | 139 | 150 | 186 |
| 0620 | 333 | 281 | 270 | 278 | 177 | 162 | 181 | 134 | 186 |
| 0630 | 326 | 264 | 228 | 249 | 110 | 97 | 133 | 77 | 194 |
| 0631 | 275 | 221 | 194 | 208 | 90 | 85 | 109 | 77 | 159 |
| 0632 | 522 | 432 | 357 | 395 | 202 | 147 | 202 | 77 | 202 |
| 0710 | 577 | 487 | 436 | 387 | 249 | 228 | 153 | 190 | 56 |
| 0720 | 287 | 264 | 254 | 225 | 192 | 192 | 127 | 190 | 56 |
| 0730 | 625 | 522 | 463 | 411 | 254 | 230 | 153 | 190 | 56 |
| 0740 | 571 | 482 | 432 | 383 | 249 | 228 | 153 | 190 | 56 |
| 0750 | 527 | 432 | 391 | 340 | 192 | 194 | 122 | 198 | 50 |
| 0760 | 638 | 538 | 477 | 419 | 264 | 237 | 157 | 190 | 56 |
| 0770 | 638 | 538 | 477 | 419 | 264 | 237 | 157 | 190 | 56 |
| 0780 | 554 | 449 | 399 | 350 | 194 | 188 | 121 | 176 | 47 |

| PRCO | RK11 | RK12 | RK13 | RK14 | RK15 | RK16 | RK17 | RK18 | RK19 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 395 | 301 | 270 | 289 | 103 | 112 | 141 | 129 | 257 |
| 0200 | 445 | 340 | 295 | 278 | 114 | 114 | 91 | 115 | 58 |
| 0300 | 482 | 399 | 372 | 357 | 188 | 204 | 176 | 239 | 154 |
| 0400 | 463 | 375 | 340 | 343 | 160 | 165 | 170 | 176 | 190 |
| 0500 | 383 | 310 | 287 | 257 | 137 | 144 | 101 | 160 | 55 |
| 0600 | 289 | 232 | 214 | 219 | 95 | 108 | 114 | 137 | 164 |
| 0700 | 379 | 298 | 281 | 247 | 119 | 139 | 91 | 194 | 52 |
| 0800 | 221 | 186 | 176 | 194 | 93 | 103 | 142 | 127 | 340 |
| 0900 | 395 | 379 | 340 | 353 | 320 | 235 | 270 | 127 | 188 |
| 1000 | 395 | 368 | 330 | 336 | 275 | 212 | 228 | 127 | 156 |
| 1100 | 407 | 395 | 368 | 320 | 350 | 292 | 181 | 200 | 48 |
| 9000 | 395 | 375 | 336 | 336 | 301 | 230 | 232 | 133 | 138 |
| 0610 | 310 | 244 | 225 | 230 | 95 | 108 | 114 | 137 | 164 |
| 0620 | 249 | 219 | 202 | 208 | 130 | 122 | 139 | 110 | 159 |
| 0630 | 375 | 295 | 264 | 278 | 113 | 115 | 135 | 121 | 196 |
| 0631 | 336 | 259 | 289 | 295 | 93 | 101 | 111 | 121 | 159 |
| 0632 | 472 | 399 | 350 | 368 | 204 | 170 | 204 | 121 | 204 |
| 0710 | 387 | 333 | 310 | 273 | 179 | 183 | 119 | 194 | 52 |
| 0720 | 190 | 177 | 179 | 157 | 138 | 154 | 100 | 194 | 52 |
| 0730 | 387 | 326 | 304 | 267 | 164 | 174 | 112 | 194 | 52 |
| 0740 | 497 | 415 | 375 | 330 | 200 | 198 | 127 | 194 | 52 |
| 0750 | 522 | 423 | 379 | 333 | 183 | 179 | 116 | 176 | 47 |
| 0760 | 407 | 336 | 313 | 275 | 157 | 169 | 110 | 194 | 52 |
| 0770 | 340 | 301 | 284 | 249 | 181 | 185 | 120 | 194 | 52 |
| 0780 | 482 | 379 | 343 | 301 | 147 | 154 | 101 | 167 | 48 |

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Table A.5.1-2. Team Rank: Values of the Measures for
25 Systems (2 of 2)

| PRCO | RK21 | RK22 | RK23 | RK24 | RK25 | RK26 | RK27 | RK28 | RK29 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 289 | 214 | 198 | 206 | 65 | 80 | 94 | 124 | 200 |
| 0200 | 387 | 304 | 278 | 252 | 116 | 129 | 91 | 159 | 56 |
| 0300 | 458 | 375 | 343 | 333 | 172 | 174 | 159 | 176 | 134 |
| 0400 | 379 | 310 | 284 | 289 | 138 | 142 | 153 | 153 | 185 |
| 0500 | 364 | 292 | 273 | 242 | 121 | 137 | 93 | 174 | 56 |
| 0600 | 330 | 254 | 232 | 237 | 91 | 104 | 110 | 135 | 159 |
| 0700 | 375 | 289 | 267 | 235 | 102 | 122 | 79 | 176 | 47 |
| 0800 | 217 | 186 | 181 | 192 | 101 | 118 | 147 | 159 | 313 |
| 0900 | 449 | 343 | 304 | 307 | 113 | 121 | 127 | 139 | 162 |
| 1000 | 391 | 310 | 281 | 281 | 124 | 129 | 129 | 141 | 138 |
| 1100 | 449 | 379 | 346 | 304 | 200 | 190 | 124 | 176 | 47 |
| 9000 | 403 | 320 | 289 | 284 | 127 | 133 | 125 | 144 | 120 |
| 0610 | 304 | 239 | 221 | 223 | 91 | 103 | 110 | 135 | 159 |
| 0620 | 307 | 264 | 244 | 249 | 147 | 142 | 150 | 135 | 159 |
| 0630 | 391 | 310 | 278 | 289 | 120 | 124 | 142 | 133 | 202 |
| 0631 | 350 | 273 | 247 | 254 | 99 | 110 | 119 | 133 | 169 |
| 0632 | 487 | 411 | 361 | 379 | 210 | 181 | 210 | 133 | 210 |
| 0710 | 415 | 346 | 320 | 278 | 170 | 172 | 111 | 176 | 47 |
| 0720 | 156 | 147 | 148 | 130 | 118 | 134 | 86 | 176 | 47 |
| 0730 | 399 | 330 | 301 | 264 | 151 | 159 | 103 | 176 | 47 |
| 0740 | 517 | 423 | 379 | 333 | 186 | 183 | 118 | 176 | 47 |
| 0750 | 487 | 399 | 361 | 317 | 179 | 177 | 116 | 174 | 49 |
| 0760 | 156 | 147 | 148 | 130 | 118 | 134 | 86 | 176 | 47 |
| 0770 | 357 | 307 | 287 | 252 | 164 | 167 | 109 | 176 | 47 |
| 0780 | 477 | 379 | 340 | 301 | 148 | 154 | 102 | 167 | 49 |

| PRCO | RK31 | RK32 | RK33 | RK34 | RK35 | RK36 | RK37 | RK38 | RK39 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 368 | 278 | 252 | 267 | 93 | 102 | 127 | 127 | 239 |
| 0200 | 432 | 340 | 301 | 278 | 125 | 129 | 98 | 139 | 62 |
| 0300 | 477 | 399 | 368 | 353 | 188 | 198 | 176 | 221 | 154 |
| 0400 | 440 | 353 | 320 | 326 | 148 | 156 | 162 | 170 | 194 |
| 0500 | 372 | 304 | 281 | 252 | 135 | 145 | 101 | 164 | 56 |
| 0600 | 326 | 259 | 237 | 242 | 101 | 113 | 120 | 141 | 170 |
| 0700 | 427 | 333 | 289 | 254 | 124 | 142 | 93 | 186 | 52 |
| 0800 | 206 | 177 | 172 | 186 | 99 | 114 | 148 | 154 | 333 |
| 0900 | 423 | 364 | 326 | 333 | 194 | 176 | 190 | 147 | 183 |
| 1000 | 383 | 323 | 295 | 295 | 162 | 157 | 159 | 147 | 151 |
| 1100 | 440 | 391 | 357 | 313 | 242 | 223 | 142 | 188 | 49 |
| 9000 | 395 | 340 | 307 | 304 | 185 | 172 | 167 | 151 | 137 |
| 0610 | 330 | 262 | 239 | 244 | 101 | 113 | 120 | 141 | 170 |
| 0620 | 295 | 254 | 237 | 244 | 150 | 141 | 156 | 126 | 167 |
| 0630 | 364 | 289 | 257 | 273 | 114 | 112 | 137 | 108 | 198 |
| 0631 | 320 | 249 | 239 | 249 | 93 | 98 | 113 | 108 | 162 |
| 0632 | 497 | 415 | 357 | 379 | 206 | 165 | 206 | 108 | 206 |
| 0710 | 454 | 383 | 350 | 307 | 196 | 192 | 126 | 186 | 52 |
| 0720 | 204 | 190 | 188 | 167 | 147 | 159 | 103 | 186 | 52 |
| 0730 | 458 | 383 | 350 | 307 | 185 | 185 | 121 | 186 | 52 |
| 0740 | 527 | 440 | 395 | 346 | 210 | 202 | 131 | 186 | 52 |
| 0750 | 512 | 419 | 375 | 330 | 185 | 185 | 119 | 183 | 49 |
| 0760 | 343 | 298 | 281 | 247 | 170 | 176 | 114 | 186 | 52 |
| 0770 | 427 | 368 | 336 | 298 | 200 | 194 | 127 | 186 | 52 |
| 0780 | 502 | 403 | 361 | 317 | 162 | 165 | 109 | 170 | 48 |

Table A.5.1-3. Team Rank: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| RK01 | DPROG | 50 | 970 | 183 | 368 | 432 | 477 | 543 | 419.3 | 96.7 | 322.6 | 516.0 |
| RK02 | DTS PROJ | 46 | 844 | 162 | 295 | 368 | 399 | 427 | 341.7 | 75.7 | 266.1 | 417.4 |
| RK03 | DTSANALY | 43 | 787 | 162 | 275 | 323 | 343 | 391 | 306.6 | 60.9 | 245.7 | 367.6 |
| RK04 | DTSDEVEL | 43 | 787 | 174 | 273 | 310 | 340 | 375 | 297.6 | 54.3 | 243.3 | 352.0 |
| RK05 | DDM PROJ | 31 | 477 | 103 | 120 | 148 | 198 | 206 | 152.2 | 36.5 | 115.7 | 188.7 |
| RK06 | DDMANALY | 31 | 477 | 121 | 130 | 156 | 192 | 221 | 159.6 | 32.6 | 127.1 | 192.2 |
| RK07 | DDMDEVEL | 31 | 477 | 109 | 116 | 139 | 165 | 200 | 146.3 | 31.2 | 115.1 | 177.5 |
| RK08 | DIMANALY | 31 | 477 | 130 | 150 | 179 | 188 | 254 | 176.3 | 32.2 | 144.0 | 208.5 |
| RK09 | DIMDEVEL | 31 | 477 | 53 | 56 | 176 | 210 | 346 | 162.3 | 95.8 | 66.4 | 258.1 |
| RK11 | I PROG | 50 | 970 | 221 | 379 | 395 | 445 | 482 | 386.7 | 74.8 | 311.9 | 461.6 |
| RK12 | ITSPROJ | 46 | 844 | 186 | 298 | 340 | 379 | 399 | 325.7 | 68.8 | 256.9 | 394.5 |
| RK13 | ITSANALY | 43 | 787 | 176 | 270 | 295 | 340 | 372 | 297.5 | 61.7 | 235.8 | 359.2 |
| RK14 | ITSDEVEL | 43 | 787 | 194 | 247 | 289 | 343 | 357 | 290.3 | 56.2 | 234.0 | 346.5 |
| RK15 | IDM PROJ | 31 | 477 | 93 | 103 | 137 | 275 | 350 | 177.6 | 94.1 | 83.5 | 271.8 |
| RK16 | IDMANALY | 31 | 477 | 103 | 112 | 144 | 212 | 292 | 166.2 | 61.9 | 104.2 | 228.1 |
| RK17 | IDMDEVEL | 31 | 477 | 91 | 101 | 142 | 181 | 270 | 155.0 | 57.5 | 97.5 | 212.5 |
| RK18 | IIMANALY | 31 | 477 | 115 | 127 | 137 | 194 | 239 | 157.4 | 39.9 | 117.4 | 197.3 |
| RK19 | IIMDEVEL | 31 | 477 | 48 | 55 | 156 | 190 | 340 | 151.1 | 94.0 | 57.1 | 245.1 |
| RK21 | TPOG | 50 | 970 | 217 | 330 | 379 | 449 | 458 | 371.6 | 72.6 | 299.1 | 444.2 |
| RK22 | TTS PROJ | 46 | 844 | 186 | 254 | 304 | 343 | 379 | 296.0 | 60.4 | 235.6 | 356.4 |
| RK23 | TTSANALY | 43 | 787 | 181 | 232 | 278 | 304 | 346 | 271.5 | 52.1 | 219.4 | 323.7 |
| RK24 | TTSDEVEL | 43 | 787 | 192 | 235 | 252 | 304 | 333 | 261.6 | 44.5 | 217.1 | 306.1 |
| RK25 | TDM PROJ | 31 | 477 | 65 | 101 | 116 | 138 | 200 | 122.1 | 37.4 | 84.7 | 159.5 |
| RK26 | TDMANALY | 31 | 477 | 80 | 118 | 129 | 142 | 190 | 131.5 | 30.3 | 101.2 | 161.7 |
| RK27 | TDMDEVEL | 31 | 477 | 79 | 93 | 124 | 147 | 159 | 118.7 | 27.4 | 91.4 | 146.1 |
| RK28 | TIMANALY | 31 | 477 | 124 | 139 | 159 | 176 | 176 | 155.6 | 18.8 | 136.9 | 174.4 |
| RK29 | TIMDEVEL | 31 | 477 | 47 | 56 | 138 | 185 | 313 | 136.1 | 82.3 | 53.8 | 218.4 |
| RK31 | O PROG | 50 | 970 | 206 | 368 | 423 | 440 | 477 | 390.4 | 74.6 | 315.8 | 464.9 |
| RK32 | OTSPROJ | 46 | 844 | 177 | 278 | 333 | 364 | 399 | 320.1 | 64.1 | 256.0 | 384.2 |
| RK33 | OTSANALY | 43 | 787 | 172 | 252 | 295 | 326 | 368 | 290.7 | 55.8 | 234.9 | 346.6 |
| RK34 | OTSDEVEL | 43 | 787 | 186 | 252 | 278 | 326 | 353 | 281.7 | 48.4 | 233.3 | 330.2 |
| RK35 | ODM PROJ | 31 | 477 | 93 | 101 | 135 | 188 | 242 | 146.5 | 46.5 | 99.9 | 193.0 |
| RK36 | ODMANALY | 31 | 477 | 102 | 114 | 145 | 176 | 223 | 150.5 | 37.3 | 113.2 | 187.7 |
| RK37 | ODMDEVEL | 31 | 477 | 93 | 101 | 142 | 162 | 190 | 137.8 | 32.7 | 105.1 | 170.6 |
| RK38 | OIMANALY | 31 | 477 | 127 | 141 | 154 | 186 | 221 | 162.2 | 27.4 | 134.8 | 189.6 |
| RK39 | OIMDEVEL | 31 | 477 | 49 | 56 | 154 | 194 | 333 | 149.4 | 90.1 | 59.2 | 239.5 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| | 1 | 6 | 2 | 7 | 5 | 3 | 4 | 9 | 0 | 1 | 8 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | ***** | * | * | * | * | * | * | * | * |
| 9 | * | * | ***** | * | * | * | * | ***** | * | * | * |
| 8 | * | * | ***** | ***** | * | * | * | ***** | * | * | * |
| 7 | * | * | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * |
| 6 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * |
| 5 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 4 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |

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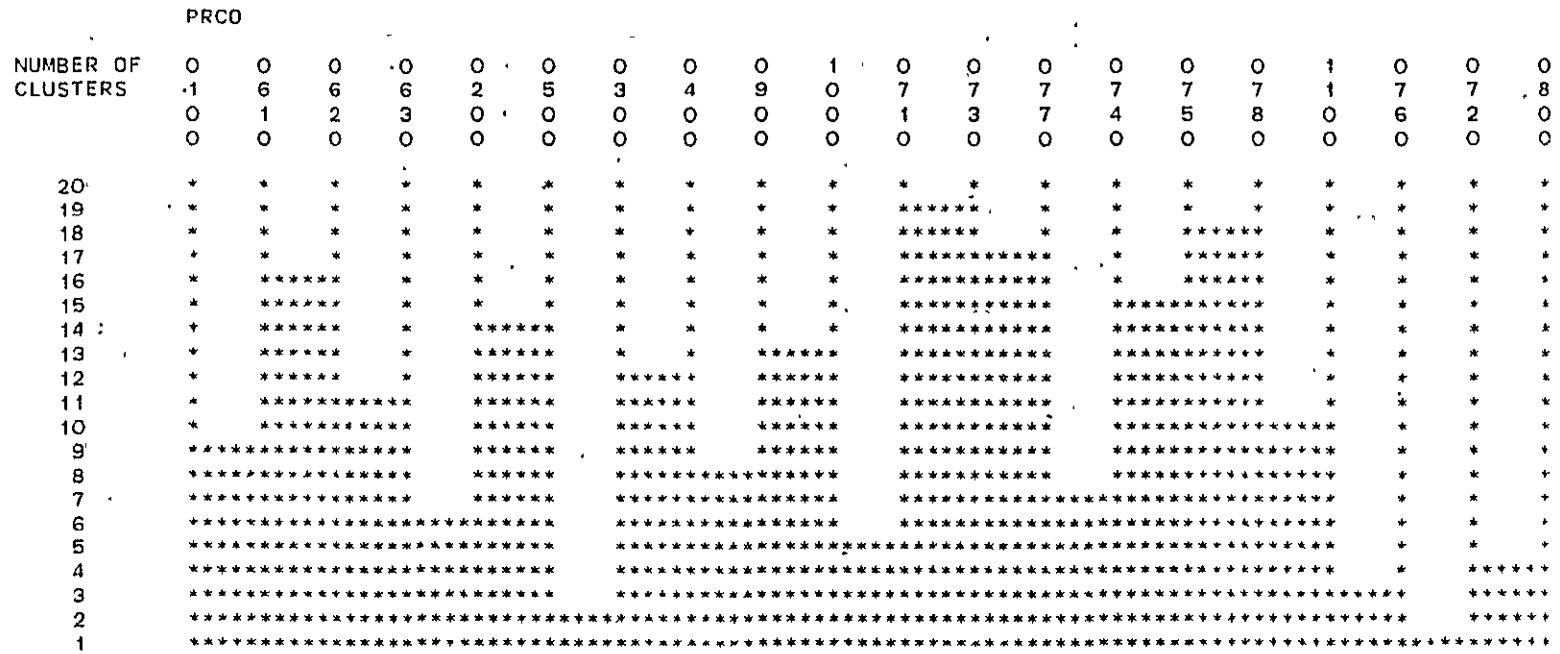
Figure A.5.1-1. Team Rank: Cluster Map for 11 Projects

Table A.5.1-4. Team Rank: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| RK01 | DPORG | 50 | 970 | 183 | 368 | 470 | 567 | 638 | 458.0 | 124.9 | 333.1 | 582.9 |
| RK02 | DTSPROJ | 46 | 844 | 162 | 297 | 376 | 474 | 538 | 379.9 | 104.1 | 275.8 | 484.0 |
| RK03 | OTSANALY | 43 | 787 | 162 | 276 | 340 | 424 | 477 | 344.3 | 88.5 | 255.7 | 432.8 |
| RK04 | OTSDEVEL | 43 | 787 | 174 | 274 | 330 | 381 | 419 | 323.0 | 67.4 | 255.6 | 390.4 |
| RK05 | DDMPROJ | 31 | 477 | 103 | 129 | 192 | 238 | 264 | 183.1 | 54.1 | 129.0 | 237.2 |
| RK06 | DDMANALY | 31 | 477 | 97 | 141 | 190 | 226 | 237 | 179.0 | 43.7 | 135.3 | 222.7 |
| RK07 | DDMDEVEL | 31 | 477 | 109 | 128 | 153 | 157 | 200 | 147.7 | 25.0 | 122.7 | 172.7 |
| RK08 | DIMANALY | 31 | 477 | 77 | 153 | 181 | 190 | 254 | 173.7 | 35.0 | 138.7 | 208.7 |
| RK09 | DIMDEVEL | 31 | 477 | 47 | 56 | 65 | 192 | 346 | 127.1 | 89.2 | 37.9 | 216.3 |
| RK11 | IPROG | 50 | 970 | 190 | 349 | 395 | 459 | 522 | 386.6 | 89.5 | 297.1 | 476.1 |
| RK12 | ITSPROJ | 46 | 844 | 177 | 297 | 335 | 379 | 423 | 325.0 | 72.5 | 252.5 | 397.6 |
| RK13 | ITSANALY | 43 | 787 | 176 | 266 | 307 | 342 | 379 | 297.8 | 63.1 | 234.7 | 360.9 |
| RK14 | ITSDEVEL | 43 | 787 | 157 | 251 | 278 | 332 | 357 | 281.4 | 55.1 | 226.3 | 336.5 |
| RK15 | IDMPROJ | 31 | 477 | 93 | 118 | 159 | 187 | 350 | 171.3 | 70.5 | 100.8 | 241.9 |
| RK16 | IDMANALY | 31 | 477 | 103 | 117 | 167 | 195 | 292 | 166.1 | 48.3 | 117.8 | 214.4 |
| RK17 | IDMDEVEL | 31 | 477 | 91 | 111 | 124 | 163 | 270 | 139.6 | 45.6 | 94.0 | 185.3 |
| RK18 | IIMANALY | 31 | 477 | 110 | 127 | 172 | 194 | 239 | 163.8 | 36.9 | 126.9 | 200.6 |
| RK19 | IIMDEVEL | 31 | 477 | 47 | 52 | 57 | 182 | 340 | 118.6 | 85.8 | 32.8 | 204.4 |
| RK21 | TPOG | 50 | 970 | 156 | 305 | 389 | 449 | 517 | 367.4 | 102.9 | 264.6 | 470.3 |
| RK22 | TTSPROJ | 46 | 844 | 147 | 245 | 310 | 368 | 423 | 300.2 | 79.7 | 220.5 | 379.9 |
| RK23 | TTSANALY | 43 | 787 | 148 | 227 | 283 | 335 | 379 | 275.8 | 67.6 | 208.2 | 343.3 |
| RK24 | TTSDEVEL | 43 | 787 | 130 | 228 | 271 | 303 | 333 | 258.6 | 58.7 | 199.9 | 317.3 |
| RK25 | TDMPROJ | 31 | 477 | 65 | 117 | 131 | 169 | 200 | 137.1 | 34.5 | 102.6 | 171.6 |
| RK26 | TDMANALY | 31 | 477 | 80 | 125 | 140 | 171 | 190 | 143.4 | 28.4 | 115.0 | 171.9 |
| RK27 | TDMDEVEL | 31 | 477 | 86 | 96 | 114 | 139 | 159 | 117.5 | 23.2 | 94.3 | 140.7 |
| RK28 | TIMANALY | 31 | 477 | 124 | 140 | 171 | 176 | 176 | 160.0 | 18.7 | 141.4 | 178.7 |
| RK29 | TIMDEVEL | 31 | 477 | 47 | 47 | 56 | 161 | 313 | 109.5 | 77.2 | 32.3 | 186.8 |
| RK31 | OPROG | 50 | 970 | 204 | 348 | 425 | 457 | 527 | 397.8 | 90.4 | 307.4 | 488.3 |
| RK32 | OTSPROJ | 46 | 844 | 177 | 281 | 347 | 389 | 440 | 330.9 | 73.3 | 257.6 | 404.2 |
| RK33 | OTSANALY | 43 | 787 | 172 | 253 | 311 | 355 | 395 | 302.0 | 62.8 | 239.2 | 364.9 |
| RK34 | OTSDEVEL | 43 | 787 | 167 | 248 | 297 | 324 | 353 | 284.1 | 50.0 | 234.1 | 334.2 |
| RK35 | ODMPROJ | 31 | 477 | 93 | 128 | 162 | 193 | 242 | 160.3 | 40.7 | 119.6 | 201.0 |
| RK36 | ODMANALY | 31 | 477 | 102 | 132 | 162 | 190 | 223 | 161.2 | 34.6 | 126.6 | 195.8 |
| RK37 | ODMDEVEL | 31 | 477 | 98 | 115 | 127 | 154 | 190 | 133.3 | 25.3 | 108.0 | 158.6 |
| RK38 | OIMANALY | 31 | 477 | 108 | 143 | 170 | 186 | 221 | 165.0 | 28.0 | 137.0 | 193.1 |
| RK39 | OIMDEVEL | 31 | 477 | 48 | 52 | 59 | 180 | 333 | 118.3 | 83.4 | 34.8 | 201.7 |

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Figure A.5.1-2. Team Rank: Cluster Map for 20 Independent Systems

Table A.5.1-5. Team Rank: Summary Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| RK01 | DPROG | 50 | 970 | 368 | 378 | 432 | 487 | 625 | 450.9 | 80.7 | 370.2 | 531.6 |
| RK02 | DTS PROJ | 46 | 844 | 295 | 307 | 368 | 399 | 522 | 366.9 | 71.1 | 295.8 | 438.0 |
| RK03 | DTSANALY | 43 | 787 | 275 | 281 | 333 | 367 | 463 | 333.1 | 61.9 | 271.3 | 395.0 |
| RK04 | DTSDEVEL | 43 | 787 | 257 | 279 | 320 | 361 | 411 | 324.0 | 49.8 | 274.2 | 373.8 |
| RK05 | DDM PROJ | 31 | 477 | 116 | 122 | 148 | 202 | 254 | 162.7 | 46.9 | 115.8 | 209.5 |
| RK06 | DDMANALY | 31 | 477 | 121 | 135 | 156 | 207 | 230 | 166.1 | 39.3 | 126.8 | 205.4 |
| RK07 | DDMDEVEL | 31 | 477 | 109 | 126 | 153 | 181 | 200 | 151.8 | 31.6 | 120.1 | 183.4 |
| RK08 | DIMANALY | 31 | 477 | 130 | 149 | 179 | 187 | 254 | 174.7 | 35.7 | 138.9 | 210.4 |
| RK09 | DIMDEVEL | 31 | 477 | 55 | 65 | 176 | 206 | 267 | 154.0 | 75.5 | 78.5 | 229.5 |
| RK11 | I PROG | 50 | 970 | 310 | 385 | 395 | 454 | 482 | 406.1 | 51.3 | 354.9 | 457.4 |
| RK12 | ITSPROJ | 46 | 844 | 244 | 306 | 340 | 377 | 399 | 338.0 | 48.5 | 289.5 | 386.5 |
| RK13 | ITSANALY | 43 | 787 | 225 | 279 | 304 | 340 | 372 | 307.0 | 44.1 | 262.9 | 351.1 |
| RK14 | ITSDEVEL | 43 | 787 | 230 | 262 | 289 | 318 | 357 | 301.1 | 47.0 | 254.2 | 348.1 |
| RK15 | IDM PROJ | 31 | 477 | 95 | 109 | 160 | 232 | 320 | 172.9 | 77.7 | 95.2 | 250.5 |
| RK16 | IDMANALY | 31 | 477 | 108 | 113 | 165 | 208 | 235 | 163.1 | 47.1 | 116.0 | 210.3 |
| RK17 | IDMDEVEL | 31 | 477 | 91 | 107 | 141 | 202 | 270 | 155.9 | 61.2 | 94.7 | 217.1 |
| RK18 | IIMANALY | 31 | 477 | 115 | 127 | 137 | 185 | 239 | 156.0 | 40.6 | 115.4 | 196.6 |
| RK19 | IIMDEVEL | 31 | 477 | 52 | 57 | 156 | 189 | 257 | 141.6 | 71.8 | 69.8 | 213.3 |
| RK21 | TPOG | 50 | 970 | 289 | 334 | 387 | 424 | 458 | 380.0 | 56.7 | 323.3 | 436.7 |
| RK22 | TTS PROJ | 46 | 844 | 214 | 266 | 310 | 337 | 375 | 301.9 | 49.7 | 252.2 | 351.6 |
| RK23 | TTSANALY | 43 | 787 | 198 | 247 | 281 | 303 | 343 | 275.9 | 43.5 | 232.4 | 319.3 |
| RK24 | TTSDEVEL | 43 | 787 | 206 | 233 | 264 | 298 | 333 | 266.3 | 40.5 | 225.8 | 306.9 |
| RK25 | TDM PROJ | 31 | 477 | 65 | 102 | 121 | 145 | 172 | 121.2 | 31.5 | 89.8 | 152.7 |
| RK26 | TDMANALY | 31 | 477 | 80 | 112 | 129 | 151 | 174 | 130.4 | 28.0 | 102.4 | 158.5 |
| RK27 | TDMDEVEL | 31 | 477 | 91 | 94 | 110 | 141 | 159 | 117.7 | 25.8 | 91.9 | 143.5 |
| RK28 | TIMANALY | 31 | 477 | 124 | 137 | 153 | 175 | 176 | 153.0 | 19.5 | 133.5 | 172.5 |
| RK29 | TIMDEVEL | 31 | 477 | 47 | 56 | 138 | 174 | 200 | 126.3 | 58.7 | 67.6 | 185.1 |
| RK31 | OPROG | 50 | 970 | 330 | 370 | 423 | 449 | 477 | 409.2 | 48.3 | 360.9 | 457.5 |
| RK32 | OTSPROJ | 46 | 844 | 262 | 291 | 340 | 374 | 399 | 334.0 | 46.5 | 287.5 | 380.5 |
| RK33 | OTSANALY | 43 | 787 | 239 | 267 | 301 | 338 | 368 | 303.6 | 42.6 | 261.0 | 346.1 |
| RK34 | OTSDEVEL | 43 | 787 | 244 | 260 | 295 | 330 | 353 | 295.0 | 37.8 | 257.2 | 332.8 |
| RK35 | ODM PROJ | 31 | 477 | 93 | 113 | 148 | 187 | 194 | 147.9 | 37.4 | 110.5 | 185.3 |
| RK36 | ODMANALY | 31 | 477 | 102 | 121 | 156 | 181 | 198 | 151.2 | 32.4 | 118.8 | 183.7 |
| RK37 | ODMDEVEL | 31 | 477 | 98 | 111 | 127 | 169 | 190 | 139.3 | 33.3 | 106.1 | 172.6 |
| RK38 | OIMANALY | 31 | 477 | 127 | 140 | 147 | 178 | 221 | 160.2 | 29.0 | 131.2 | 189.3 |
| RK39 | OIMDEVEL | 31 | 477 | 52 | 59 | 154 | 189 | 239 | 140.1 | 67.7 | 72.4 | 207.8 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1 | 6 | 2 | 5 | 3 | 4 | 9 | 0 | 7 |
| | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | * | * | * | * | * | * | * | * | * |
| 8 | * | * | ***** | * | * | * | * | * | * |
| 7 | ***** | ***** | ***** | * | * | * | * | * | * |
| 6 | ***** | ***** | ***** | * | * | ***** | ***** | * | * |
| 5 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 4 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |

Figure A.5.1-3. Team Rank: Cluster Map for 9 Large Systems

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Table A.5.1-6. Team Rank: Summary Statistics for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| RK01 | DPRDG | 50 | 970 | 183 | 326 | 527 | 577 | 638 | 463.8 | 156.0 | 307.8 | 619.8 |
| RK02 | DTSPROJ | 46 | 844 | 162 | 264 | 432 | 487 | 538 | 390.5 | 127.5 | 263.0 | 518.1 |
| RK03 | DTSANALY | 43 | 787 | 162 | 254 | 391 | 436 | 477 | 353.4 | 107.8 | 245.5 | 461.2 |
| RK04 | DTSDEVEL | 43 | 787 | 174 | 249 | 340 | 387 | 419 | 322.2 | 81.5 | 240.7 | 403.7 |
| RK05 | DDMPROJ | 31 | 477 | 103 | 177 | 194 | 249 | 264 | 199.8 | 55.9 | 144.0 | 255.7 |
| RK06 | DDMANALY | 31 | 477 | 97 | 162 | 194 | 228 | 237 | 189.5 | 46.0 | 143.5 | 235.6 |
| RK07 | DDMDEVEL | 31 | 477 | 121 | 127 | 153 | 157 | 181 | 144.4 | 18.9 | 125.4 | 163.3 |
| RK08 | DIMANALY | 31 | 477 | 77 | 176 | 190 | 190 | 198 | 172.9 | 36.2 | 136.7 | 209.1 |
| RK09 | DIMDEVEL | 31 | 477 | 47 | 53 | 56 | 186 | 346 | 105.1 | 96.8 | 8.3 | 201.9 |
| RK11 | IPROG | 50 | 970 | 190 | 249 | 387 | 482 | 522 | 370.6 | 111.8 | 258.8 | 482.4 |
| RK12 | ITSPROJ | 46 | 844 | 177 | 219 | 333 | 395 | 423 | 314.5 | 88.6 | 225.9 | 403.0 |
| RK13 | ITSANALY | 43 | 787 | 176 | 202 | 310 | 368 | 379 | 290.3 | 76.6 | 213.6 | 366.9 |
| RK14 | ITSDEVEL | 43 | 787 | 157 | 208 | 275 | 320 | 333 | 265.3 | 58.1 | 207.2 | 323.3 |
| RK15 | IDMPROJ | 31 | 477 | 93 | 130 | 157 | 183 | 350 | 170.1 | 67.9 | 102.1 | 238.0 |
| RK16 | IDMANALY | 31 | 477 | 103 | 122 | 169 | 185 | 292 | 168.5 | 51.4 | 117.1 | 220.0 |
| RK17 | IDMDEVEL | 31 | 477 | 100 | 110 | 120 | 139 | 181 | 126.4 | 23.0 | 103.4 | 149.3 |
| RK18 | IIMANALY | 31 | 477 | 110 | 127 | 194 | 194 | 200 | 170.1 | 34.2 | 135.9 | 204.3 |
| RK19 | IIMDEVEL | 31 | 477 | 47 | 48 | 52 | 159 | 340 | 99.8 | 94.9 | 4.9 | 194.7 |
| RK21 | TPOG | 50 | 970 | 156 | 217 | 391 | 477 | 517 | 357.2 | 131.4 | 225.7 | 488.6 |
| RK22 | TTSPROJ | 46 | 844 | 147 | 186 | 310 | 379 | 423 | 298.8 | 100.4 | 198.4 | 399.2 |
| RK23 | TTSANALY | 43 | 787 | 148 | 181 | 287 | 346 | 379 | 275.6 | 84.7 | 191.0 | 360.3 |
| RK24 | TTSDEVEL | 43 | 787 | 130 | 192 | 278 | 304 | 333 | 252.3 | 71.6 | 180.6 | 323.9 |
| RK25 | TDMPROJ | 31 | 477 | 101 | 118 | 148 | 179 | 200 | 150.1 | 32.5 | 117.5 | 182.6 |
| RK26 | TDMANALY | 31 | 477 | 118 | 134 | 154 | 177 | 190 | 154.1 | 25.1 | 129.0 | 179.2 |
| RK27 | TDMDEVEL | 31 | 477 | 86 | 102 | 116 | 142 | 150 | 117.4 | 22.2 | 95.2 | 139.5 |
| RK28 | TIMANALY | 31 | 477 | 133 | 159 | 176 | 176 | 176 | 165.8 | 16.6 | 149.2 | 182.4 |
| RK29 | TIMDEVEL | 31 | 477 | 47 | 47 | 47 | 159 | 313 | 95.8 | 90.1 | 5.8 | 185.9 |
| RK31 | OPROG | 50 | 970 | 204 | 295 | 427 | 502 | 527 | 388.5 | 116.0 | 272.6 | 504.5 |
| RK32 | OTSPROJ | 46 | 844 | 177 | 254 | 368 | 403 | 440 | 328.4 | 92.1 | 236.3 | 420.4 |
| RK33 | OTSANALY | 43 | 787 | 172 | 237 | 336 | 361 | 395 | 300.8 | 77.8 | 223.0 | 378.6 |
| RK34 | OTSDEVEL | 43 | 787 | 167 | 244 | 298 | 317 | 346 | 275.3 | 58.4 | 216.8 | 333.7 |
| RK35 | ODMPROJ | 31 | 477 | 99 | 147 | 170 | 200 | 242 | 170.5 | 42.1 | 128.3 | 212.6 |
| RK36 | ODMANALY | 31 | 477 | 112 | 141 | 176 | 194 | 223 | 169.4 | 35.5 | 133.8 | 204.9 |
| RK37 | ODMDEVEL | 31 | 477 | 103 | 114 | 127 | 142 | 156 | 128.4 | 16.5 | 111.8 | 144.9 |
| RK38 | OIMANALY | 31 | 477 | 108 | 154 | 186 | 186 | 188 | 169.0 | 27.9 | 141.1 | 196.9 |
| RK39 | DIMDEVEL | 31 | 477 | 48 | 49 | 52 | 167 | 333 | 100.4 | 93.7 | 6.7 | 194.1 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|-------|---|---|-------|-------|-------|-------|-------|-------|-------|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 6 | 6 | 8 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 1 | 7 |
| 2 | 3 | 0 | 2 | 1 | 7 | 4 | 5 | 8 | 0 | 0 | 6 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | * |
| 9 | * | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * | * |
| 7 | ***** | * | * | ***** | ***** | ***** | ***** | * | * | * | * |
| 6 | ***** | * | * | ***** | ***** | ***** | ***** | ***** | * | * | * |
| 5 | ***** | * | * | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 4 | ***** | * | * | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |
| 3 | ***** | * | * | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |
| 2 | ***** | * | * | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |
| 1 | ***** | * | * | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |

Figure A.5.1-4. Team Rank: Cluster Map for 11 Small Systems

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A.5.2 YEARS OF PROFESSIONAL EXPERIENCE

| | | | |
|-----------|------------|-----------|-------------|
| <u>X</u> | Objective | <u> </u> | Subjective |
| <u> </u> | Absolute | <u>X</u> | Relative |
| <u> </u> | Explicit | <u>X</u> | Derived |
| <u>X</u> | Static | <u> </u> | Dynamic |
| <u>X</u> | Predictive | <u> </u> | Explanatory |

This category measures professional experience of the development team, who are a part of the development environment. These measures are derived from explicit objective data by combining the experience of each team member is combined to form a team value. They are static and predictive since they are computed from data available before the design, implementation, and testing phases. They are dynamic and explanatory in the sense that the values for each phase can be updated to be more accurate as each phase is completed, since the composition of the development team may have changed during a phase. Codes ending in 1, 5, 8, and 9 are unique; the others are derived. The overall measures are derived from the phase measures.

The remainder of this subsection contains tables and figures that describe the Years of Professional Experience measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.5.2-1)
- Values of the measures for 25 systems (Table A.5.2-2), where large values indicate more experience
- Summary statistics for 11 projects (Table A.5.2-3)
- Cluster map for 11 projects (Figure A.5.2-1)

- Summary statistics for 20 independent systems (Table A.5.2-4)
- Cluster map for 20 independent systems (Figure A.5.2-2)
- Summary statistics for 9 large systems (Table A.5.2-5)
- Cluster map for 9 large systems (Figure A.5.2-3)
- Summary statistics for 11 small systems (Table A.5.2-6)
- Cluster map for 11 small systems (Figure A.5.2-4)

Table A.5.2-1. Years of Professional Experience:
Description of Measures (1 of 3)

| Code | Measure | Range | | Description |
|---------------------------|----------|-------|------|---|
| | | Low | High | |
| Design | | | | |
| YP01 | DPROG | 020 | 200 | Programmers Technical Staff |
| YP02 | DTSPROJ | 023 | 210 | Programmers and Project Managers |
| YP03 | DTSANALY | 025 | 215 | Programmers, Project Mana- gers, and Analysis Managers |
| YP04 | DTSDEVEL | 025 | 215 | Programmers and Development Managers |
| Development Management | | | | |
| YP05 | DDMPROJ | 035 | 250 | Project |
| YP06 | DDMANALY | 035 | 250 | Project and Analysis |
| YP07 | DDMDEVEL | 035 | 250 | Development |
| Implementation Management | | | | |
| YP08 | DIMANALY | 035 | 250 | Analysis |
| YP09 | DIMDEVEL | 035 | 250 | Development |
| YP10 | D - - | 000 | 000 | Not Defined |
| Implementation | | | | |
| YP11 | I PROG | 020 | 200 | Programmers Technical Staff |
| YP12 | ITS PROJ | 023 | 210 | Programmers and Project Managers |
| YP13 | ITSANALY | 025 | 215 | Programmers, Project Mana- gers, and Analysis Managers |
| YP14 | ITSDEVEL | 025 | 215 | Programmers and Development Managers |
| Development Management | | | | |
| YP15 | IDM PROJ | 035 | 250 | Project |
| YP16 | IDMANALY | 035 | 250 | Project and Analysis |
| YP17 | IDMDEVEL | 035 | 250 | Development |

Table A.5.2-1. Years of Professional Experience:
Description of Measures (2 of 3)

| Code | Measure | Range | | Description |
|------|----------|-------|------|--|
| | | Low | High | |
| | | | | Implementation (Continued) |
| | | | | Interface Management |
| YP18 | IIMANALY | 035 | 250 | Analysis |
| YP19 | IIMDEVEL | 035 | 250 | Development |
| YP20 | I | 000 | 000 | Not Defined |
| | | | | Test |
| YP21 | TPROG | 020 | 200 | Programmers |
| | | | | Technical Staff |
| YP22 | TTSPROJ | 023 | 210 | Programmers and Project Managers |
| YP23 | TTSANALY | 025 | 215 | Programmers, Project Managers, and Analysis Managers |
| YP24 | TTSDEVEL | 025 | 215 | Programmers and Development Managers |
| | | | | Development Management |
| YP25 | TDMPROJ | 035 | 250 | Project |
| YP26 | TDMANALY | 035 | 250 | Project and Analysis |
| YP27 | TDMDEVEL | 035 | 250 | Development |
| | | | | Interface Management |
| YP28 | TIMANALY | 035 | 250 | Analysis |
| YP29 | TIMDEVEL | 035 | 250 | Development |
| YP30 | T | 000 | 000 | Not Defined |
| | | | | Overall |
| YP31 | OPROG | 020 | 200 | Programmers |
| | | | | Technical Staff |
| YP32 | OTSPROJ | 023 | 210 | Programmers and Project Managers |
| YP33 | OTSANALY | 025 | 215 | Programmers, Project Managers, and Analysis Managers |

Table A.5.2-1. Years of Professional Experience:
 Description of Measures (3 of 3)

| <u>Code</u> | <u>Measure</u> | <u>Range</u> | | <u>Description</u> |
|-------------|----------------|--------------|-------------|---|
| | | <u>Low</u> | <u>High</u> | |
| | | | | Overall (Continued) |
| | | | | Technical Staff (Continued) |
| YP34 | OTSDEVEL | 025 | 215 | Programmers and Development Managers |
| | | | | Development Management |
| YP35 | ODMPROJ | 035 | 250 | Project |
| YP36 | ODMANALY | 035 | 250 | Project and Analysis |
| YP37 | ODMDEVEL | 035 | 250 | Development |
| | | | | Interface Management |
| YP38 | OIMANALY | 035 | 250 | Analysis |
| YP39 | OIMDEVEL | 035 | 250 | Development |
| YP40 | O | 000 | 000 | Not Defined |

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Table A.5.2-2. Years of Professional Experience: Values of the Measures for 25 Systems (1 of 2)

| PRCO | YPO1 | YPO2 | YPO3 | YPO4 | YPO5 | YPO6 | YPO7 | YPO8 | YPO9 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 44 | 55 | 64 | 58 | 102 | 113 | 91 | 136 | 70 |
| 0200 | 76 | 88 | 93 | 93 | 134 | 132 | 134 | 129 | 133 |
| 0300 | 58 | 71 | 75 | 78 | 120 | 114 | 125 | 102 | 136 |
| 0400 | 60 | 68 | 74 | 70 | 96 | 107 | 90 | 128 | 78 |
| 0500 | 51 | 54 | 63 | 63 | 66 | 91 | 91 | 142 | 142 |
| 0600 | 66 | 68 | 81 | 70 | 73 | 116 | 78 | 201 | 89 |
| 0700 | 89 | 97 | 101 | 103 | 128 | 127 | 135 | 126 | 150 |
| 0800 | 150 | 148 | 149 | 136 | 141 | 146 | 105 | 157 | 33 |
| 0900 | 75 | 76 | 84 | 78 | 81 | 106 | 84 | 157 | 91 |
| 1000 | 102 | 106 | 111 | 106 | 118 | 131 | 113 | 157 | 103 |
| 1100 | 31 | 38 | 51 | 52 | 65 | 96 | 98 | 159 | 165 |
| 9000 | 85 | 87 | 94 | 90 | 96 | 116 | 100 | 157 | 108 |
| 0610 | 62 | 64 | 78 | 67 | 73 | 116 | 78 | 201 | 89 |
| 0620 | 114 | 110 | 118 | 107 | 92 | 128 | 91 | 201 | 89 |
| 0630 | 46 | 53 | 69 | 57 | 81 | 124 | 83 | 209 | 86 |
| 0631 | 49 | 55 | 71 | 60 | 80 | 123 | 85 | 209 | 96 |
| 0632 | 53 | 59 | 75 | 62 | 84 | 126 | 84 | 209 | 84 |
| 0710 | 34 | 46 | 55 | 57 | 92 | 103 | 111 | 126 | 150 |
| 0720 | 140 | 138 | 137 | 139 | 132 | 130 | 138 | 126 | 150 |
| 0730 | 101 | 106 | 109 | 111 | 129 | 128 | 136 | 126 | 150 |
| 0740 | 105 | 108 | 110 | 112 | 119 | 121 | 129 | 126 | 150 |
| 0750 | 73 | 81 | 87 | 89 | 111 | 118 | 126 | 132 | 156 |
| 0760 | 57 | 65 | 72 | 75 | 99 | 108 | 116 | 126 | 150 |
| 0770 | 57 | 65 | 72 | 75 | 99 | 108 | 116 | 126 | 150 |
| 0780 | 32 | 44 | 54 | 57 | 93 | 107 | 115 | 134 | 158 |

| PRCO | YP11 | YP12 | YP13 | YP14 | YP15 | YP16 | YP17 | YP18 | YP19 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 46 | 58 | 67 | 61 | 105 | 116 | 94 | 139 | 73 |
| 0200 | 70 | 84 | 90 | 90 | 138 | 136 | 138 | 133 | 137 |
| 0300 | 56 | 66 | 71 | 74 | 106 | 106 | 117 | 106 | 140 |
| 0400 | 67 | 72 | 78 | 73 | 91 | 104 | 88 | 131 | 81 |
| 0500 | 55 | 58 | 66 | 67 | 69 | 92 | 94 | 137 | 145 |
| 0600 | 69 | 71 | 85 | 73 | 78 | 120 | 83 | 207 | 94 |
| 0700 | 88 | 96 | 101 | 103 | 132 | 131 | 139 | 130 | 154 |
| 0800 | 132 | 134 | 136 | 125 | 146 | 145 | 100 | 142 | 38 |
| 0900 | 83 | 85 | 91 | 86 | 92 | 109 | 94 | 144 | 98 |
| 1000 | 98 | 107 | 112 | 108 | 146 | 145 | 134 | 144 | 110 |
| 1100 | 43 | 49 | 60 | 62 | 74 | 99 | 106 | 150 | 170 |
| 9000 | 85 | 91 | 97 | 94 | 114 | 124 | 114 | 144 | 115 |
| 0610 | 66 | 68 | 82 | 71 | 78 | 120 | 83 | 207 | 94 |
| 0620 | 116 | 113 | 122 | 111 | 99 | 135 | 98 | 209 | 96 |
| 0630 | 76 | 78 | 92 | 79 | 85 | 128 | 86 | 214 | 90 |
| 0631 | 51 | 57 | 73 | 62 | 82 | 126 | 88 | 212 | 98 |
| 0632 | 125 | 117 | 126 | 114 | 88 | 130 | 88 | 214 | 88 |
| 0710 | 43 | 54 | 62 | 65 | 98 | 109 | 117 | 129 | 153 |
| 0720 | 144 | 142 | 140 | 143 | 136 | 134 | 142 | 130 | 154 |
| 0730 | 101 | 107 | 110 | 113 | 132 | 131 | 139 | 130 | 154 |
| 0740 | 101 | 105 | 108 | 110 | 122 | 124 | 132 | 129 | 153 |
| 0750 | 74 | 82 | 88 | 90 | 112 | 120 | 127 | 134 | 157 |
| 0760 | 78 | 87 | 92 | 95 | 124 | 126 | 134 | 130 | 154 |
| 0770 | 60 | 69 | 76 | 78 | 102 | 111 | 119 | 130 | 154 |
| 0780 | 28 | 43 | 54 | 57 | 105 | 116 | 124 | 136 | 160 |

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Table A.5.2-2. Years of Professional Experience: Values of the Measures for 25 Systems (2 of 2)

| PRCD | YP21 | YP22 | YP23 | YP24 | YP25 | YP26 | YP27 | YP28 | YP29 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 52 | 62 | 72 | 65 | 100 | 118 | 93 | 154 | 80 |
| 0200 | 77 | 88 | 93 | 94 | 130 | 130 | 134 | 129 | 141 |
| 0300 | 56 | 67 | 79 | 76 | 111 | 133 | 122 | 177 | 145 |
| 0400 | 77 | 81 | 87 | 82 | 96 | 110 | 93 | 136 | 86 |
| 0500 | 58 | 60 | 69 | 70 | 72 | 94 | 97 | 140 | 148 |
| 0600 | 72 | 74 | 88 | 77 | 82 | 125 | 87 | 212 | 98 |
| 0700 | 93 | 101 | 105 | 108 | 136 | 135 | 143 | 134 | 158 |
| 0800 | 130 | 134 | 136 | 125 | 150 | 149 | 114 | 146 | 42 |
| 0900 | 91 | 101 | 106 | 102 | 139 | 141 | 128 | 145 | 105 |
| 1000 | 101 | 110 | 102 | 112 | 147 | 146 | 136 | 143 | 115 |
| 1100 | 45 | 51 | 62 | 64 | 76 | 103 | 109 | 156 | 176 |
| 9000 | 92 | 101 | 106 | 104 | 136 | 139 | 131 | 145 | 121 |
| 0610 | 69 | 72 | 86 | 75 | 82 | 125 | 87 | 212 | 98 |
| 0620 | 124 | 120 | 129 | 118 | 102 | 139 | 101 | 214 | 100 |
| 0630 | 78 | 80 | 94 | 81 | 87 | 130 | 88 | 216 | 92 |
| 0631 | 53 | 60 | 76 | 64 | 85 | 128 | 90 | 215 | 101 |
| 0632 | 127 | 119 | 128 | 116 | 90 | 132 | 90 | 216 | 90 |
| 0710 | 51 | 61 | 70 | 72 | 103 | 114 | 122 | 134 | 158 |
| 0720 | 148 | 146 | 145 | 147 | 140 | 138 | 146 | 134 | 158 |
| 0730 | 106 | 112 | 115 | 117 | 137 | 136 | 144 | 134 | 158 |
| 0740 | 113 | 116 | 118 | 120 | 127 | 129 | 137 | 134 | 158 |
| 0750 | 77 | 85 | 91 | 93 | 115 | 123 | 130 | 137 | 160 |
| 0760 | 151 | 149 | 148 | 150 | 143 | 141 | 149 | 137 | 161 |
| 0770 | 67 | 75 | 82 | 85 | 109 | 118 | 126 | 136 | 160 |
| 0780 | 29 | 44 | 55 | 58 | 106 | 117 | 125 | 137 | 161 |

| PRCD | YP31 | YP32 | YP33 | YP34 | YP35 | YP36 | YP37 | YP38 | YP39 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 48 | 58 | 68 | 61 | 102 | 116 | 93 | 143 | 74 |
| 0200 | 74 | 86 | 92 | 93 | 134 | 133 | 135 | 130 | 137 |
| 0300 | 57 | 68 | 75 | 76 | 112 | 118 | 122 | 128 | 140 |
| 0400 | 68 | 73 | 80 | 75 | 95 | 107 | 90 | 132 | 82 |
| 0500 | 55 | 58 | 66 | 66 | 69 | 92 | 94 | 140 | 145 |
| 0600 | 69 | 71 | 85 | 73 | 78 | 120 | 83 | 206 | 94 |
| 0700 | 90 | 98 | 102 | 105 | 132 | 131 | 139 | 130 | 154 |
| 0800 | 137 | 139 | 139 | 129 | 146 | 147 | 106 | 148 | 38 |
| 0900 | 83 | 87 | 94 | 89 | 104 | 119 | 102 | 148 | 98 |
| 1000 | 100 | 108 | 108 | 109 | 137 | 141 | 128 | 148 | 109 |
| 1100 | 40 | 46 | 58 | 59 | 72 | 99 | 104 | 155 | 170 |
| 9000 | 88 | 93 | 99 | 96 | 115 | 126 | 115 | 149 | 115 |
| 0610 | 65 | 68 | 82 | 71 | 78 | 120 | 83 | 206 | 94 |
| 0620 | 118 | 114 | 123 | 112 | 98 | 134 | 97 | 208 | 95 |
| 0630 | 67 | 70 | 85 | 72 | 84 | 127 | 86 | 213 | 89 |
| 0631 | 51 | 57 | 74 | 62 | 82 | 126 | 88 | 212 | 98 |
| 0632 | 101 | 98 | 110 | 97 | 87 | 129 | 87 | 213 | 87 |
| 0710 | 43 | 54 | 62 | 65 | 98 | 108 | 116 | 130 | 154 |
| 0720 | 144 | 142 | 141 | 143 | 136 | 134 | 142 | 130 | 154 |
| 0730 | 102 | 108 | 111 | 114 | 132 | 132 | 140 | 130 | 154 |
| 0740 | 106 | 110 | 112 | 114 | 122 | 125 | 133 | 130 | 154 |
| 0750 | 75 | 82 | 88 | 91 | 113 | 120 | 128 | 134 | 158 |
| 0760 | 95 | 101 | 104 | 106 | 122 | 125 | 133 | 131 | 155 |
| 0770 | 62 | 70 | 77 | 79 | 103 | 112 | 120 | 130 | 154 |
| 0780 | 29 | 44 | 54 | 57 | 102 | 113 | 121 | 136 | 160 |

Table A.5.2-3. Years of Professional Experience: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|-----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| YPO1 | DPROG | 20 | 200 | 31 | 51 | 66 | 89 | 150 | 72.9 | 32.5 | 40.4 | 105.4 |
| YPO2 | DTSPROJ | 23 | 210 | 38 | 55 | 71 | 97 | 148 | 79.0 | 30.2 | 48.8 | 109.2 |
| YPO3 | DTSANALY | 25 | 215 | 51 | 64 | 81 | 101 | 149 | 86.0 | 27.2 | 58.8 | 113.2 |
| YPO4 | DTSDEVEL | 25 | 215 | 52 | 63 | 78 | 103 | 136 | 82.5 | 24.9 | 57.5 | 107.4 |
| YPO5 | DDMPROJ | 35 | 250 | 65 | 73 | 102 | 128 | 141 | 102.2 | 27.9 | 74.3 | 130.1 |
| YPO6 | DDMANALY | 35 | 250 | 91 | 106 | 114 | 131 | 146 | 116.3 | 16.5 | 99.8 | 132.8 |
| YPO7 | DDMDEVEL | 35 | 250 | 78 | 90 | 98 | 125 | 135 | 104.0 | 20.1 | 83.9 | 124.1 |
| YPO8 | DIMANALY | 35 | 250 | 102 | 128 | 142 | 157 | 201 | 144.9 | 25.7 | 119.2 | 170.6 |
| YPO9 | DIMDEVEL | 35 | 250 | 33 | 78 | 103 | 142 | 165 | 108.2 | 40.3 | 67.9 | 148.5 |
| YP11 | IIPROG | 20 | 200 | 43 | 55 | 69 | 88 | 132 | 73.4 | 25.9 | 47.4 | 99.3 |
| YP12 | ITSPROJ | 23 | 210 | 49 | 58 | 72 | 96 | 134 | 80.0 | 24.9 | 55.1 | 104.9 |
| YP13 | ITSANALY | 25 | 215 | 60 | 67 | 85 | 101 | 136 | 87.0 | 22.7 | 64.3 | 109.7 |
| YP14 | ITSDEVEL | 25 | 215 | 61 | 67 | 74 | 103 | 125 | 83.8 | 20.7 | 63.1 | 104.6 |
| YP15 | IDMPROJ | 35 | 250 | 69 | 78 | 105 | 138 | 146 | 107.0 | 29.1 | 77.9 | 136.1 |
| YP16 | IDMANALY | 35 | 250 | 92 | 104 | 116 | 136 | 145 | 118.5 | 18.5 | 100.0 | 136.9 |
| YP17 | IDMDEVEL | 35 | 250 | 83 | 94 | 100 | 134 | 139 | 107.9 | 20.7 | 87.2 | 128.6 |
| YP18 | IIMANALY | 35 | 250 | 106 | 131 | 139 | 144 | 207 | 142.1 | 24.4 | 117.7 | 166.5 |
| YP19 | IIMDEVEL | 35 | 250 | 38 | 81 | 110 | 145 | 170 | 112.7 | 40.1 | 72.6 | 152.9 |
| YP21 | TIPROG | 20 | 200 | 45 | 56 | 77 | 93 | 130 | 77.5 | 25.1 | 52.3 | 102.6 |
| YP22 | TISPROJ | 23 | 210 | 51 | 62 | 81 | 101 | 134 | 84.5 | 25.1 | 59.3 | 109.6 |
| YP23 | TISANALY | 25 | 215 | 62 | 72 | 88 | 105 | 136 | 90.8 | 21.0 | 69.8 | 111.9 |
| YP24 | TISDEVEL | 25 | 215 | 64 | 70 | 82 | 108 | 125 | 88.6 | 20.7 | 67.9 | 109.4 |
| YP25 | TIDMPROJ | 35 | 250 | 72 | 82 | 111 | 139 | 150 | 112.6 | 29.1 | 83.5 | 141.8 |
| YP26 | TIDMANALY | 35 | 250 | 94 | 110 | 130 | 141 | 149 | 125.8 | 17.8 | 108.0 | 143.6 |
| YP27 | TIDMDEVEL | 35 | 250 | 87 | 93 | 114 | 134 | 143 | 114.2 | 19.8 | 94.4 | 134.0 |
| YP28 | TIMANALY | 35 | 250 | 129 | 136 | 145 | 156 | 212 | 152.0 | 23.8 | 128.2 | 175.8 |
| YP29 | TIMDEVEL | 35 | 250 | 42 | 86 | 115 | 148 | 176 | 117.6 | 39.9 | 77.7 | 157.6 |
| YP31 | OIPROG | 20 | 200 | 40 | 55 | 69 | 90 | 137 | 74.6 | 27.4 | 47.2 | 102.1 |
| YP32 | OISPROJ | 23 | 210 | 46 | 58 | 73 | 98 | 139 | 81.1 | 26.6 | 54.5 | 107.7 |
| YP33 | OISANALY | 25 | 215 | 58 | 68 | 85 | 102 | 139 | 87.9 | 23.0 | 64.9 | 110.9 |
| YP34 | OISDEVEL | 25 | 215 | 59 | 66 | 76 | 105 | 129 | 85.0 | 22.2 | 62.8 | 107.2 |
| YP35 | ODMPROJ | 35 | 250 | 69 | 78 | 104 | 134 | 146 | 107.4 | 27.4 | 80.0 | 134.7 |
| YP36 | ODMANALY | 35 | 250 | 92 | 107 | 119 | 133 | 147 | 120.3 | 17.0 | 103.3 | 137.2 |
| YP37 | ODMDEVEL | 35 | 250 | 83 | 93 | 104 | 128 | 139 | 108.7 | 19.3 | 89.5 | 128.0 |
| YP38 | OIMANALY | 35 | 250 | 128 | 130 | 143 | 148 | 206 | 146.2 | 21.8 | 124.3 | 168.0 |
| YP39 | OIMDEVEL | 35 | 250 | 38 | 82 | 109 | 145 | 170 | 112.8 | 40.0 | 72.9 | 152.8 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|-------|---|---|---|-------|-------|-------|-------|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| | 1 | 4 | 9 | 6 | 3 | 5 | 1 | 2 | 7 | 0 | 8 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | * |
| 9 | ***** | * | * | * | * | * | * | ***** | * | * | * |
| 8 | ***** | * | * | * | * | ***** | ***** | ***** | * | * | * |
| 7 | ***** | * | * | * | ***** | ***** | ***** | ***** | * | * | * |
| 6 | ***** | * | * | * | ***** | ***** | ***** | ***** | * | * | * |
| 5 | ***** | * | * | * | ***** | ***** | ***** | ***** | * | * | * |
| 4 | ***** | * | * | * | ***** | ***** | ***** | ***** | * | * | * |
| 3 | ***** | * | * | * | ***** | ***** | ***** | ***** | * | * | * |
| 2 | ***** | * | * | * | ***** | ***** | ***** | ***** | * | * | * |
| 1 | ***** | * | * | * | ***** | ***** | ***** | ***** | * | * | * |

Figure A.5.2-1. Years of Professional Experience: Cluster Map for 11 Projects

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Table A.5.2-4. Years of Professional Experience: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| YPO1 | DPROG | 20 | 200 | 31 | 47 | 61 | 102 | 150 | 73.4 | 34.6 | 38.8 | 108.0 |
| YPO2 | DTSPROJ | 23 | 210 | 38 | 54 | 70 | 106 | 148 | 79.2 | 31.0 | 48.2 | 110.2 |
| YPO3 | DTSANALY | 25 | 215 | 51 | 65 | 77 | 110 | 149 | 86.3 | 27.7 | 58.5 | 114.0 |
| YPO4 | DTSDEVEL | 25 | 215 | 52 | 59 | 77 | 107 | 139 | 84.0 | 26.6 | 57.4 | 110.6 |
| YPO5 | DDMPROJ | 35 | 250 | 65 | 84 | 99 | 120 | 141 | 102.1 | 22.8 | 79.4 | 124.9 |
| YPO6 | DDMANALY | 35 | 250 | 91 | 107 | 115 | 128 | 146 | 116.3 | 13.7 | 102.7 | 130.0 |
| YPO7 | DDMDEVEL | 35 | 250 | 78 | 91 | 112 | 126 | 138 | 108.5 | 19.2 | 89.3 | 127.7 |
| YPO8 | DIMANALY | 35 | 250 | 102 | 126 | 133 | 157 | 209 | 145.0 | 29.0 | 116.0 | 174.0 |
| YPO9 | DIMDEVEL | 35 | 250 | 33 | 89 | 139 | 150 | 165 | 121.4 | 37.7 | 83.7 | 159.2 |
| YP11 | IPROG | 20 | 200 | 28 | 55 | 72 | 100 | 144 | 76.8 | 30.6 | 46.2 | 107.5 |
| YP12 | ITSPROJ | 23 | 210 | 43 | 60 | 80 | 107 | 142 | 83.0 | 27.5 | 55.6 | 110.5 |
| YP13 | ITSANALY | 25 | 215 | 54 | 68 | 89 | 110 | 140 | 89.8 | 24.8 | 65.0 | 114.7 |
| YP14 | ITSDEVEL | 25 | 215 | 57 | 68 | 83 | 110 | 143 | 87.9 | 23.8 | 64.1 | 111.7 |
| YP15 | IDMPROJ | 35 | 250 | 69 | 91 | 105 | 130 | 146 | 108.0 | 23.5 | 84.5 | 131.5 |
| YP16 | IDMANALY | 35 | 250 | 92 | 109 | 120 | 133 | 145 | 120.3 | 14.9 | 105.4 | 135.2 |
| YP17 | IDMDEVEL | 35 | 250 | 83 | 94 | 117 | 134 | 142 | 113.3 | 19.9 | 93.4 | 133.2 |
| YP18 | IIMANALY | 35 | 250 | 106 | 130 | 135 | 144 | 214 | 145.2 | 29.3 | 115.9 | 174.5 |
| YP19 | IIMDEVEL | 35 | 250 | 38 | 95 | 143 | 154 | 170 | 125.5 | 37.1 | 88.4 | 162.7 |
| YP21 | TPROG | 20 | 200 | 29 | 57 | 77 | 111 | 151 | 85.0 | 34.6 | 50.4 | 119.6 |
| YP22 | TSPROJ | 23 | 210 | 44 | 63 | 83 | 115 | 149 | 90.7 | 31.3 | 59.4 | 122.0 |
| YP23 | TTSANALY | 25 | 215 | 55 | 74 | 92 | 117 | 148 | 96.9 | 27.4 | 69.5 | 124.4 |
| YP24 | TTSDEVEL | 25 | 215 | 58 | 73 | 89 | 118 | 150 | 95.3 | 27.4 | 67.9 | 122.7 |
| YP25 | TDMPROJ | 35 | 250 | 72 | 97 | 110 | 139 | 150 | 113.6 | 24.4 | 89.2 | 138.0 |
| YP26 | TDMANALY | 35 | 250 | 94 | 117 | 130 | 139 | 149 | 126.7 | 14.6 | 112.1 | 141.3 |
| YP27 | TDMDEVEL | 35 | 250 | 87 | 98 | 124 | 136 | 149 | 119.0 | 20.1 | 99.0 | 139.1 |
| YP28 | TIMANALY | 35 | 250 | 129 | 135 | 139 | 156 | 216 | 152.5 | 28.6 | 124.0 | 181.1 |
| YP29 | TIMDEVEL | 35 | 250 | 42 | 99 | 147 | 160 | 176 | 130.1 | 37.0 | 93.1 | 167.1 |
| YP31 | OPROG | 20 | 200 | 29 | 56 | 71 | 102 | 144 | 78.4 | 31.8 | 46.6 | 110.2 |
| YP32 | OTSPROJ | 23 | 210 | 44 | 61 | 78 | 108 | 142 | 84.3 | 28.8 | 55.5 | 113.1 |
| YP33 | OTSANALY | 25 | 215 | 54 | 70 | 87 | 110 | 141 | 90.9 | 25.4 | 65.5 | 116.4 |
| YP34 | OTSDEVEL | 25 | 215 | 57 | 67 | 84 | 111 | 143 | 89.0 | 25.0 | 64.0 | 114.1 |
| YP35 | ODMPROJ | 35 | 250 | 69 | 96 | 104 | 130 | 146 | 107.9 | 22.4 | 85.6 | 130.3 |
| YP36 | ODMANALY | 35 | 250 | 92 | 112 | 120 | 133 | 147 | 121.1 | 13.8 | 107.3 | 134.9 |
| YP37 | ODMDEVEL | 35 | 250 | 83 | 95 | 118 | 132 | 142 | 113.6 | 19.1 | 94.6 | 132.7 |
| YP38 | OIMANALY | 35 | 250 | 128 | 130 | 135 | 148 | 213 | 147.5 | 27.7 | 119.8 | 175.2 |
| YP39 | OIMDEVEL | 35 | 250 | 38 | 94 | 143 | 154 | 170 | 125.7 | 37.3 | 88.4 | 163.0 |

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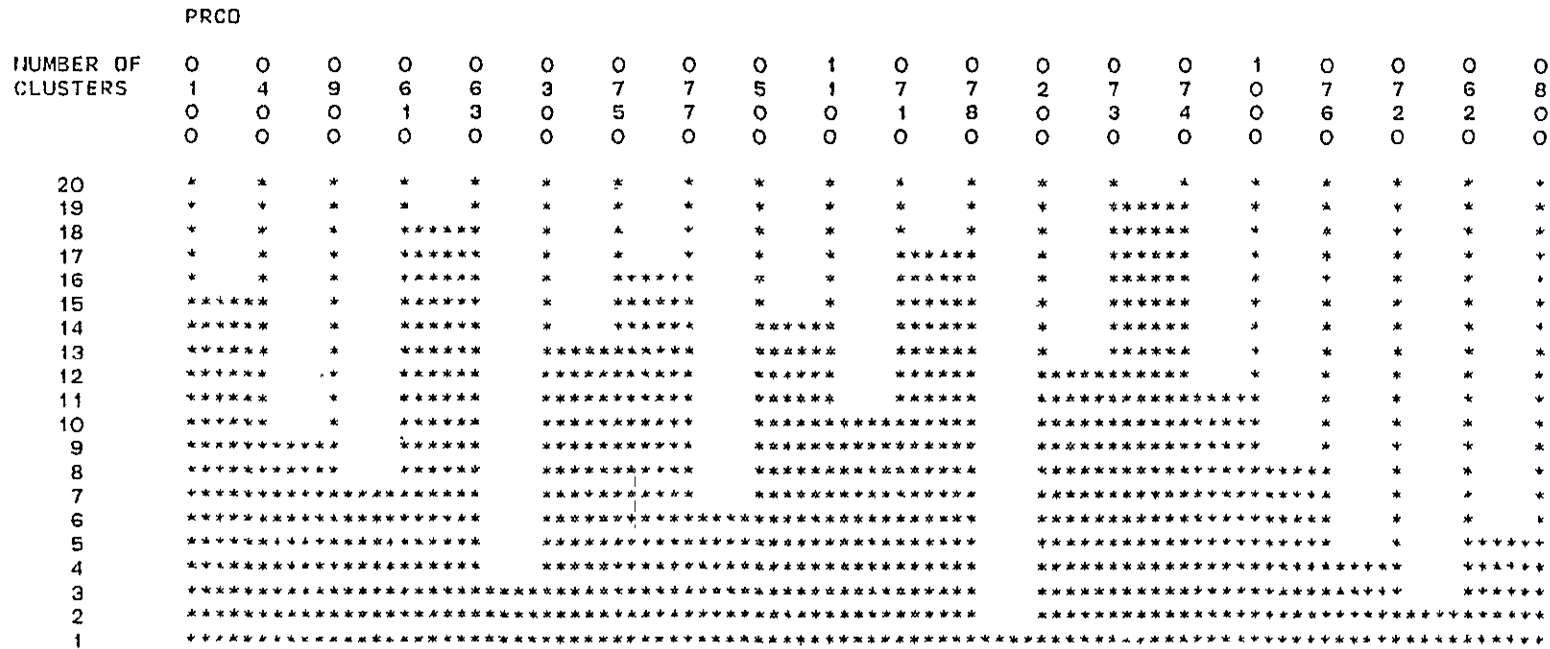


Figure A.5.2-2. Years of Professional Experience: Cluster Map for 20 Independent Systems

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Table A.5.2-5. Years of Professional Experience: Summary Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE- | | -ACTUAL-RANGE- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|-----------------|------|----------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| YPO1 | DPROG | 20 | 200 | 44 | 55 | 62 | 89 | 102 | 69.9 | 20.6 | 49.3 | 90.5 |
| YPO2 | DTSPROJ | 23 | 210 | 54 | 60 | 71 | 97 | 106 | 76.4 | 19.7 | 56.8 | 96.1 |
| YPO3 | DTSANALY | 25 | 215 | 63 | 69 | 78 | 101 | 111 | 83.4 | 17.6 | 65.8 | 101.1 |
| YPO4 | DTSDEVEL | 25 | 215 | 58 | 65 | 78 | 100 | 111 | 80.4 | 18.9 | 61.6 | 99.3 |
| YPO5 | DDMPROJ | 35 | 250 | 66 | 77 | 102 | 125 | 134 | 102.1 | 24.9 | 77.2 | 127.0 |
| YPO6 | DDMANALY | 35 | 250 | 91 | 107 | 114 | 130 | 132 | 115.3 | 13.4 | 101.9 | 128.7 |
| YPO7 | DDMDEVEL | 35 | 250 | 78 | 87 | 91 | 130 | 136 | 104.7 | 22.5 | 82.2 | 127.2 |
| YPO8 | DIMANALY | 35 | 250 | 102 | 127 | 136 | 157 | 201 | 142.0 | 27.8 | 114.2 | 169.8 |
| YPO9 | DIMDEVEL | 35 | 250 | 70 | 84 | 103 | 139 | 150 | 110.2 | 30.2 | 80.0 | 140.4 |
| YP11 | IPROG | 20 | 200 | 46 | 56 | 67 | 91 | 101 | 71.3 | 19.1 | 52.2 | 90.4 |
| YP12 | ITSPROJ | 23 | 210 | 58 | 62 | 72 | 96 | 107 | 78.3 | 18.9 | 59.5 | 97.2 |
| YP13 | ITSANALY | 25 | 215 | 66 | 69 | 82 | 101 | 112 | 85.2 | 17.2 | 68.1 | 102.4 |
| YP14 | ITSDEVEL | 25 | 215 | 61 | 69 | 74 | 99 | 113 | 82.6 | 18.2 | 64.4 | 100.7 |
| YP15 | IDMPROJ | 35 | 250 | 69 | 85 | 105 | 135 | 146 | 106.3 | 27.1 | 79.2 | 133.4 |
| YP16 | IDMANALY | 35 | 250 | 92 | 105 | 116 | 134 | 145 | 117.7 | 17.1 | 100.6 | 134.7 |
| YP17 | IDMDEVEL | 35 | 250 | 83 | 91 | 94 | 136 | 139 | 109.0 | 23.0 | 86.0 | 132.0 |
| YP18 | IIMANALY | 35 | 250 | 106 | 131 | 137 | 144 | 207 | 141.2 | 27.2 | 114.1 | 168.4 |
| YP19 | IIMDEVEL | 35 | 250 | 73 | 88 | 110 | 143 | 154 | 114.7 | 30.0 | 84.7 | 144.7 |
| YP21 | TPROG | 20 | 200 | 52 | 57 | 77 | 96 | 106 | 76.3 | 19.7 | 56.6 | 96.0 |
| YP22 | TTSPROJ | 23 | 210 | 60 | 65 | 81 | 106 | 112 | 83.7 | 20.2 | 63.5 | 103.9 |
| YP23 | TTSANALY | 25 | 215 | 69 | 76 | 87 | 104 | 115 | 89.9 | 15.6 | 74.3 | 105.5 |
| YP24 | TTSDEVEL | 25 | 215 | 65 | 73 | 82 | 107 | 117 | 88.1 | 18.9 | 69.2 | 107.0 |
| YP25 | TDMPROJ | 35 | 250 | 72 | 89 | 111 | 138 | 147 | 112.7 | 26.9 | 85.7 | 139.6 |
| YP26 | TDMANALY | 35 | 250 | 94 | 114 | 130 | 139 | 146 | 125.9 | 16.3 | 109.6 | 142.2 |
| YP27 | TDMDEVEL | 35 | 250 | 87 | 93 | 122 | 135 | 144 | 114.9 | 22.2 | 92.7 | 137.1 |
| YP28 | TIMANALY | 35 | 250 | 129 | 135 | 143 | 166 | 212 | 152.2 | 26.5 | 125.7 | 178.7 |
| YP29 | TIMDEVEL | 35 | 250 | 80 | 92 | 115 | 147 | 158 | 119.6 | 29.1 | 90.4 | 148.7 |
| YP31 | OPROG | 20 | 200 | 48 | 56 | 68 | 92 | 102 | 72.4 | 19.2 | 53.2 | 91.7 |
| YP32 | OTSPROJ | 23 | 210 | 58 | 63 | 73 | 98 | 108 | 79.3 | 19.2 | 60.1 | 98.5 |
| YP33 | OTSANALY | 25 | 215 | 66 | 72 | 82 | 101 | 111 | 86.2 | 16.2 | 70.0 | 102.4 |
| YP34 | OTSDEVEL | 25 | 215 | 61 | 69 | 76 | 101 | 114 | 83.8 | 18.7 | 65.1 | 102.5 |
| YP35 | ODMPROJ | 35 | 250 | 69 | 87 | 104 | 133 | 137 | 107.0 | 24.3 | 82.7 | 131.3 |
| YP36 | ODMANALY | 35 | 250 | 92 | 112 | 119 | 133 | 141 | 119.8 | 14.7 | 105.1 | 134.5 |
| YP37 | ODMDEVEL | 35 | 250 | 83 | 92 | 102 | 132 | 140 | 109.7 | 21.6 | 88.1 | 131.3 |
| YP38 | OIMANALY | 35 | 250 | 128 | 130 | 140 | 148 | 206 | 145.0 | 24.2 | 120.8 | 169.2 |
| YP39 | OIMDEVEL | 35 | 250 | 74 | 88 | 109 | 143 | 154 | 114.8 | 29.7 | 85.1 | 144.5 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | |
|--------------------|-------|---|-------|-------|-------|-------|-------|-------|-------|
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 1 | 4 | 9 | 6 | 3 | 5 | 2 | 7 | 0 |
| | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 3 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | * | * | * | * | * | * | * | * | * |
| 8 | ***** | * | * | * | * | * | * | * | * |
| 7 | ***** | * | * | * | * | * | ***** | * | * |
| 6 | ***** | * | * | * | * | * | ***** | ***** | ***** |
| 5 | ***** | * | * | * | ***** | * | ***** | ***** | ***** |
| 4 | ***** | * | * | ***** | * | ***** | ***** | ***** | ***** |
| 3 | ***** | * | ***** | * | ***** | * | ***** | ***** | ***** |
| 2 | ***** | * | ***** | * | ***** | * | ***** | ***** | ***** |
| 1 | ***** | * | ***** | * | ***** | * | ***** | ***** | ***** |

Figure A.5.2-3. Years of Professional Experience: Cluster Map for 9 Large Systems

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Table A.5.2-6. Years of Professional Experience: Summary Statistics for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| YPO1 | DPROG | 20 | 200 | 31 | 34 | 57 | 114 | 150 | 76.3 | 43.8 | 32.4 | 120.1 |
| YPO2 | DTS PROJ | 23 | 210 | 38 | 46 | 65 | 110 | 148 | 81.5 | 38.8 | 42.7 | 120.2 |
| YPO3 | DTSANALY | 25 | 215 | 51 | 55 | 72 | 118 | 149 | 88.5 | 34.6 | 53.9 | 123.2 |
| YPO4 | DTSDEVEL | 25 | 215 | 52 | 57 | 75 | 112 | 139 | 86.9 | 32.2 | 54.7 | 119.1 |
| YPO5 | DDM PROJ | 35 | 250 | 65 | 92 | 99 | 119 | 141 | 102.2 | 22.1 | 80.0 | 124.3 |
| YPO6 | DDMANALY | 35 | 250 | 96 | 107 | 118 | 128 | 146 | 117.2 | 14.5 | 102.7 | 131.7 |
| YPO7 | DDMDEVEL | 35 | 250 | 83 | 98 | 115 | 126 | 138 | 111.6 | 16.5 | 95.1 | 128.2 |
| YPO8 | DIMANALY | 35 | 250 | 126 | 126 | 132 | 159 | 209 | 147.5 | 31.0 | 116.5 | 178.4 |
| YPO9 | DIMDEVEL | 35 | 250 | 33 | 89 | 150 | 156 | 165 | 130.6 | 42.1 | 88.6 | 172.7 |
| YP11 | I PROG | 20 | 200 | 28 | 43 | 76 | 116 | 144 | 81.4 | 38.0 | 43.4 | 119.3 |
| YP12 | ITS PROJ | 23 | 210 | 43 | 54 | 82 | 113 | 142 | 86.9 | 33.4 | 53.5 | 120.3 |
| YP13 | ITSANALY | 25 | 215 | 54 | 62 | 92 | 122 | 140 | 93.6 | 30.0 | 63.6 | 123.6 |
| YP14 | ITSDEVEL | 25 | 215 | 57 | 65 | 90 | 111 | 143 | 92.3 | 27.6 | 64.7 | 119.9 |
| YP15 | IDM PROJ | 35 | 250 | 74 | 98 | 105 | 124 | 146 | 109.4 | 21.4 | 87.9 | 130.8 |
| YP16 | IDMANALY | 35 | 250 | 99 | 111 | 124 | 134 | 145 | 122.5 | 13.2 | 109.2 | 135.7 |
| YP17 | IDMDEVEL | 35 | 250 | 86 | 100 | 119 | 132 | 142 | 116.8 | 17.4 | 99.4 | 134.2 |
| YP18 | IIMANALY | 35 | 250 | 129 | 130 | 134 | 150 | 214 | 148.5 | 31.9 | 116.6 | 180.3 |
| YP19 | IIMDEVEL | 35 | 250 | 38 | 96 | 154 | 157 | 170 | 134.5 | 41.3 | 93.2 | 175.7 |
| YP21 | T PROG | 20 | 200 | 29 | 51 | 78 | 130 | 151 | 92.1 | 42.9 | 49.2 | 135.0 |
| YP22 | TTS PROJ | 23 | 210 | 44 | 61 | 85 | 134 | 149 | 96.5 | 38.1 | 58.4 | 134.5 |
| YP23 | TTSANALY | 25 | 215 | 55 | 70 | 94 | 136 | 148 | 102.7 | 33.9 | 68.8 | 136.7 |
| YP24 | TTSDEVEL | 25 | 215 | 58 | 72 | 93 | 125 | 150 | 101.2 | 32.4 | 68.7 | 133.6 |
| YP25 | TDM PROJ | 35 | 250 | 76 | 102 | 109 | 140 | 150 | 114.4 | 23.5 | 90.9 | 137.8 |
| YP26 | TDMANALY | 35 | 250 | 103 | 117 | 129 | 139 | 149 | 127.4 | 13.8 | 113.6 | 141.1 |
| YP27 | TDMDEVEL | 35 | 250 | 88 | 109 | 125 | 137 | 149 | 122.5 | 18.6 | 103.9 | 141.0 |
| YP28 | TIMANALY | 35 | 250 | 134 | 134 | 137 | 156 | 216 | 152.8 | 31.4 | 121.4 | 184.3 |
| YP29 | TIMDEVEL | 35 | 250 | 42 | 100 | 158 | 161 | 176 | 138.7 | 41.8 | 97.0 | 180.5 |
| YP31 | O PROG | 20 | 200 | 29 | 43 | 75 | 118 | 144 | 83.3 | 39.6 | 43.7 | 122.8 |
| YP32 | OTS PROJ | 23 | 210 | 44 | 54 | 82 | 114 | 142 | 88.4 | 35.2 | 53.2 | 123.6 |
| YP33 | OTSANALY | 25 | 215 | 54 | 62 | 88 | 123 | 141 | 94.8 | 31.3 | 63.5 | 126.2 |
| YP34 | OTSDEVEL | 25 | 215 | 57 | 65 | 91 | 114 | 143 | 93.4 | 29.4 | 64.0 | 122.8 |
| YP35 | ODM PROJ | 35 | 250 | 72 | 98 | 103 | 122 | 146 | 108.7 | 21.8 | 86.9 | 130.6 |
| YP36 | ODMANALY | 35 | 250 | 99 | 112 | 125 | 134 | 147 | 122.2 | 13.7 | 108.5 | 135.8 |
| YP37 | ODMDEVEL | 35 | 250 | 86 | 104 | 120 | 133 | 142 | 116.9 | 17.1 | 99.8 | 134.0 |
| YP38 | OIMANALY | 35 | 250 | 130 | 130 | 134 | 155 | 213 | 149.5 | 31.3 | 118.3 | 180.8 |
| YP39 | OIMDEVEL | 35 | 250 | 38 | 95 | 154 | 158 | 170 | 134.6 | 41.6 | 93.0 | 176.3 |

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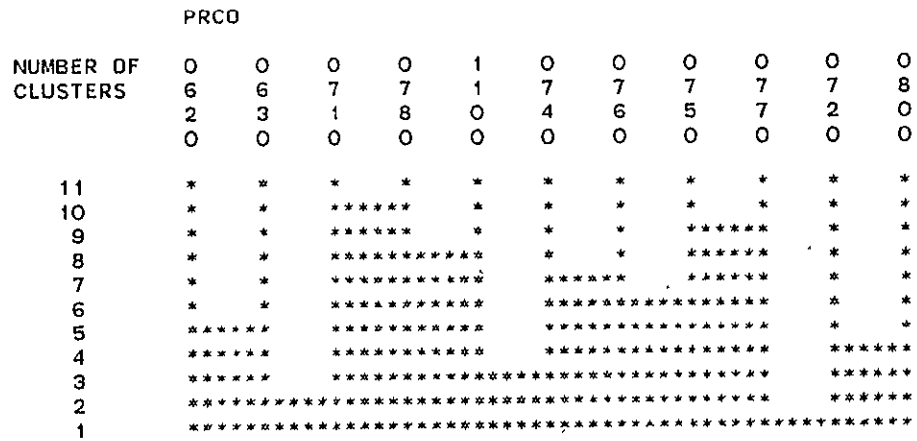


Figure A.5.2-4. Years of Professional Experience: Cluster Map for 11 Small Systems

A.5.3 YEARS OF APPLICABLE EXPERIENCE

| | | | |
|---------------|------------|---------------|-------------|
| - <u>X</u> - | Objective | - <u> </u> - | Subjective |
| - <u> </u> - | Absolute | - <u>X</u> - | Relative |
| - <u> </u> - | Explicit | - <u>X</u> - | Derived |
| - <u>X</u> - | Static | - <u> </u> - | Dynamic |
| - <u>X</u> - | Predictive | - <u> </u> - | Explanatory |

This category measures the development team's experience that is applicable to the application. The development team is a part of the development environment. These measures are derived from explicit objective data by combining the experience of each team member to form a team value. However, the determination of applicable experience is a subjective judgment. These measures are static and predictive since they are computed from data available before the design, implementation, and testing phases. They are dynamic and explanatory in the sense that the values for each phase can be updated to be more accurate as each phase is completed since the composition of the development team may have changed during a phase. Codes ending in 1, 5, 8, and 9 are unique; the others are derived. The overall measures are derived from the phase measures.

The remainder of this subsection contains tables and figures that describe the Years of Applicable Experience measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.5.3-1)
- Values of the measures for 25 systems (Table A.5.3-2), where large values indicate more experience
- Summary statistics for 11 projects (Table A.5.3-3)
- Cluster map for 11 projects (Figure A.5.3-1)

- Summary statistics for 20 independent systems (Table A.5.3-4)
- Cluster map for 20 independent systems (Figure A.5.3-2)
- Summary statistics for 9 large systems (Table A.5.3-5)
- Cluster map for 9 large systems (Figure A.5.3-3)
- Summary statistics for 11 small systems (Table A.5.3-6)
- Cluster map for 11 small systems (Figure A.5.3-4)

Table A.5.3-1. Years of Applicable Experience: Description of Measures (1 of 3)

| Code | Measure | Range | | Description |
|------|----------|-------|------|--|
| | | Low | High | |
| | | | | Design |
| YA01 | DPROG | 010 | 175 | Programmers Technical Staff |
| YA02 | DTSPROJ | 014 | 185 | Programmers and Project Managers |
| YA03 | DTSANALY | 016 | 190 | Programmers, Project Managers, and Analysis Managers |
| YA04 | DTSDEVEL | 016 | 190 | Programmers and Development Managers |
| | | | | Development Management |
| YA05 | DDMPROJ | 030 | 225 | Project |
| YA06 | DDMANALY | 030 | 225 | Project and Analysis |
| YA07 | DDMDEVEL | 030 | 225 | Development |
| | | | | Interface Management |
| YA08 | DIMANALY | 030 | 225 | Analysis |
| YA09 | DIMDEVEL | 030 | 225 | Development |
| YA10 | D | 000 | 000 | Not Defined |
| | | | | Implementation |
| YA11 | IPROG | 010 | 175 | Programmers Technical Staff |
| YA12 | ITSPROJ | 014 | 185 | Programmers and Project Managers |
| YA13 | ITSANALY | 016 | 190 | Programmers, Project Managers, and Analysis Managers |
| YA14 | ITSDEVEL | 016 | 190 | Programmers and Development Managers |
| | | | | Development Management |
| YA15 | IDMPROJ | 030 | 225 | Project |
| YA16 | IDMANALY | 030 | 225 | Project and Analysis |
| YA17 | IDMDEVEL | 030 | 225 | Development |

Table A.5.3-1. Years of Applicable Experience: Description of Measures (2 of 3)

| Code | Measure | Range | | Description |
|----------------------------|----------|-------|------|--|
| | | Low | High | |
| Implementation (Continued) | | | | |
| Interface Management | | | | |
| YA18 | IIMANALY | 030 | 225 | Analysis |
| YA19 | IIMDEVEL | 030 | 225 | Development |
| YA20 | I | 000 | 000 | Not Defined |
| Test | | | | |
| YA21 | TPROG | 010 | 175 | Programmers Technical Staff |
| YA22 | TTSPROJ | 014 | 185 | Programmers and Project Managers |
| YA23 | TTSANALY | 016 | 190 | Programmers, Project Managers, and Analysis Managers |
| YA24 | TTSDEVEL | 016 | 190 | Programmers and Development Managers |
| Development Management | | | | |
| YA25 | TDMPROJ | 030 | 225 | Project |
| YA26 | TDMANALY | 030 | 225 | Project and Analysis |
| YA27 | TDMDEVEL | 030 | 225 | Development |
| Interface Management | | | | |
| YA28 | TIMANALY | 030 | 225 | Analysis |
| YA29 | TIMDEVEL | 030 | 225 | Development |
| YA30 | T | 000 | 000 | Not Defined |
| Overall | | | | |
| YA31 | OPROG | 010 | 175 | Programmers Technical Staff |
| YA32 | OTSPROJ | 014 | 185 | Programmers and Project Managers |
| YA33 | OTSANALY | 016 | 190 | Programmers, Project Managers, and Analysis Managers |

Table A.5.3-1. Years of Applicable Experience: Description of Measures (3 of 3)

| <u>Code</u> | <u>Measure</u> | <u>Range</u> | | <u>Description</u> |
|-------------|----------------|--------------|-------------|--------------------------------------|
| | | <u>Low</u> | <u>High</u> | |
| | | | | Overall (Continued) |
| | | | | Technical Staff (Continued) |
| YA34 | OTSDEVEL | 016 | 190 | Programmers and Development Managers |
| | | | | Development Management |
| YA35 | ODMPROJ | 030 | 225 | Project |
| YA36 | ODMANALY | 030 | 225 | Project and Analysis |
| YA37 | ODMDEVEL | 030 | 225 | Development |
| | | | | Interface Management |
| YA38 | OIMANALY | 030 | 225 | Analysis |
| YA39 | OIMDEVEL | 030 | 225 | Development |
| YA40 | O | 000 | 000 | Not Defined |

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Table A.5.3-2. Years of Applicable Experience: Values of the Measures for 25 Systems (1 of 2)

| PRCD | YA01 | YA02 | YA03 | YA04 | YA05 | YA06 | YA07 | YA08 | YA09 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 40 | 52 | 59 | 55 | 100 | 102 | 89 | 106 | 66 |
| 0200 | 53 | 63 | 69 | 70 | 102 | 105 | 109 | 111 | 123 |
| 0300 | 43 | 54 | 58 | 59 | 100 | 95 | 97 | 83 | 90 |
| 0400 | 46 | 54 | 60 | 57 | 86 | 91 | 82 | 100 | 71 |
| 0500 | 44 | 48 | 58 | 58 | 68 | 90 | 89 | 135 | 132 |
| 0600 | 49 | 54 | 61 | 58 | 74 | 90 | 78 | 120 | 85 |
| 0700 | 33 | 46 | 52 | 57 | 100 | 97 | 113 | 91 | 110 |
| 0800 | 100 | 102 | 103 | 95 | 113 | 110 | 85 | 105 | 28 |
| 0900 | 43 | 48 | 54 | 52 | 71 | 82 | 74 | 105 | 81 |
| 1000 | 61 | 67 | 72 | 71 | 92 | 96 | 94 | 105 | 99 |
| 1100 | 29 | 36 | 43 | 48 | 63 | 78 | 94 | 107 | 155 |
| 9000 | 51 | 57 | 62 | 62 | 79 | 88 | 86 | 105 | 101 |
| 0610 | 45 | 51 | 59 | 55 | 75 | 90 | 78 | 120 | 85 |
| 0620 | 78 | 78 | 82 | 79 | 78 | 91 | 80 | 118 | 85 |
| 0630 | 43 | 52 | 59 | 55 | 86 | 97 | 83 | 120 | 77 |
| 0631 | 49 | 55 | 62 | 60 | 82 | 94 | 85 | 120 | 92 |
| 0632 | 44 | 50 | 58 | 53 | 74 | 89 | 74 | 120 | 74 |
| 0710 | 24 | 34 | 40 | 45 | 72 | 78 | 94 | 91 | 140 |
| 0720 | 95 | 96 | 95 | 100 | 98 | 96 | 112 | 91 | 140 |
| 0730 | 62 | 69 | 72 | 77 | 95 | 94 | 110 | 91 | 140 |
| 0740 | 33 | 42 | 47 | 52 | 75 | 80 | 96 | 91 | 110 |
| 0750 | 47 | 55 | 58 | 65 | 85 | 84 | 105 | 84 | 146 |
| 0760 | 29 | 37 | 43 | 48 | 72 | 78 | 94 | 91 | 140 |
| 0770 | 29 | 37 | 43 | 48 | 72 | 78 | 94 | 91 | 140 |
| 0780 | 36 | 45 | 50 | 56 | 80 | 83 | 102 | 89 | 148 |

| PRCD | YA11 | YA12 | YA13 | YA14 | YA15 | YA16 | YA17 | YA18 | YA19 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 43 | 55 | 62 | 58 | 103 | 105 | 92 | 110 | 69 |
| 0200 | 52 | 62 | 69 | 70 | 106 | 109 | 113 | 115 | 127 |
| 0300 | 43 | 50 | 55 | 55 | 79 | 82 | 84 | 87 | 94 |
| 0400 | 50 | 58 | 63 | 61 | 88 | 93 | 84 | 103 | 77 |
| 0500 | 45 | 50 | 56 | 59 | 71 | 82 | 92 | 104 | 135 |
| 0600 | 53 | 58 | 65 | 62 | 79 | 92 | 83 | 118 | 90 |
| 0700 | 55 | 64 | 67 | 73 | 103 | 96 | 117 | 82 | 144 |
| 0800 | 87 | 93 | 95 | 88 | 118 | 112 | 90 | 100 | 33 |
| 0900 | 55 | 56 | 61 | 59 | 59 | 73 | 68 | 102 | 88 |
| 1000 | 61 | 68 | 72 | 72 | 95 | 97 | 98 | 102 | 106 |
| 1100 | 37 | 40 | 46 | 52 | 49 | 67 | 86 | 103 | 160 |
| 9000 | 56 | 60 | 64 | 65 | 74 | 84 | 85 | 102 | 107 |
| 0610 | 49 | 55 | 62 | 59 | 79 | 92 | 83 | 118 | 90 |
| 0620 | 81 | 82 | 86 | 83 | 85 | 97 | 87 | 120 | 92 |
| 0630 | 72 | 75 | 80 | 76 | 89 | 99 | 86 | 118 | 81 |
| 0631 | 46 | 54 | 61 | 59 | 84 | 95 | 88 | 118 | 94 |
| 0632 | 120 | 111 | 111 | 107 | 78 | 91 | 78 | 118 | 78 |
| 0710 | 33 | 42 | 47 | 53 | 78 | 79 | 100 | 81 | 143 |
| 0720 | 98 | 99 | 98 | 104 | 102 | 95 | 116 | 82 | 144 |
| 0730 | 66 | 73 | 74 | 80 | 98 | 93 | 113 | 82 | 144 |
| 0740 | 38 | 46 | 50 | 57 | 78 | 79 | 99 | 81 | 143 |
| 0750 | 48 | 56 | 60 | 66 | 86 | 86 | 106 | 88 | 147 |
| 0760 | 46 | 55 | 59 | 65 | 93 | 89 | 110 | 82 | 144 |
| 0770 | 48 | 54 | 58 | 64 | 80 | 81 | 101 | 84 | 144 |
| 0780 | 34 | 45 | 50 | 56 | 86 | 88 | 108 | 91 | 150 |

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Table A.5.3-2. Years of Applicable Experience: Values of the Measure for 25 Systems (2 of 2)

| PRCD | YA21 | YA22 | YA23 | YA24 | YA25 | YA26 | YA27 | YA28 | YA29 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 49 | 58 | 64 | 61 | 97 | 100 | 90 | 107 | 76 |
| 0200 | 57 | 66 | 70 | 73 | 100 | 100 | 110 | 100 | 131 |
| 0300 | 43 | 51 | 56 | 57 | 84 | 87 | 89 | 92 | 99 |
| 0400 | 58 | 65 | 70 | 67 | 94 | 99 | 90 | 109 | 82 |
| 0500 | 47 | 52 | 57 | 62 | 73 | 79 | 95 | 91 | 138 |
| 0600 | 58 | 63 | 69 | 67 | 84 | 95 | 87 | 117 | 94 |
| 0700 | 61 | 70 | 73 | 79 | 108 | 102 | 121 | 89 | 148 |
| 0800 | 92 | 98 | 99 | 92 | 122 | 116 | 94 | 104 | 37 |
| 0900 | 64 | 72 | 76 | 75 | 104 | 104 | 101 | 104 | 95 |
| 1000 | 56 | 69 | 73 | 74 | 119 | 113 | 116 | 102 | 111 |
| 1100 | 40 | 47 | 54 | 59 | 74 | 86 | 105 | 110 | 166 |
| 9000 | 63 | 72 | 76 | 77 | 108 | 106 | 110 | 104 | 114 |
| 0610 | 53 | 59 | 66 | 63 | 84 | 95 | 87 | 117 | 94 |
| 0620 | 89 | 89 | 92 | 89 | 88 | 98 | 91 | 118 | 96 |
| 0630 | 74 | 77 | 82 | 78 | 91 | 101 | 88 | 120 | 83 |
| 0631 | 49 | 57 | 64 | 62 | 87 | 98 | 90 | 120 | 97 |
| 0632 | 122 | 113 | 113 | 109 | 80 | 93 | 80 | 120 | 80 |
| 0710 | 41 | 50 | 54 | 60 | 83 | 85 | 105 | 89 | 148 |
| 0720 | 103 | 104 | 102 | 108 | 106 | 101 | 120 | 89 | 148 |
| 0730 | 71 | 77 | 79 | 85 | 103 | 98 | 118 | 89 | 148 |
| 0740 | 41 | 50 | 54 | 60 | 83 | 85 | 104 | 89 | 148 |
| 0750 | 51 | 59 | 63 | 68 | 88 | 90 | 109 | 92 | 150 |
| 0760 | 106 | 107 | 105 | 111 | 109 | 104 | 123 | 92 | 151 |
| 0770 | 57 | 63 | 67 | 72 | 89 | 90 | 109 | 91 | 150 |
| 0780 | 35 | 46 | 52 | 57 | 88 | 89 | 109 | 92 | 151 |

| PRCD | YA31 | YA32 | YA33 | YA34 | YA35 | YA36 | YA37 | YA38 | YA39 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 44 | 55 | 62 | 58 | 100 | 103 | 90 | 108 | 70 |
| 0200 | 54 | 64 | 69 | 71 | 103 | 105 | 111 | 109 | 127 |
| 0300 | 43 | 52 | 56 | 57 | 88 | 88 | 90 | 88 | 94 |
| 0400 | 51 | 59 | 64 | 62 | 89 | 94 | 86 | 104 | 78 |
| 0500 | 45 | 50 | 57 | 60 | 71 | 84 | 92 | 110 | 135 |
| 0600 | 53 | 58 | 65 | 62 | 79 | 92 | 83 | 118 | 90 |
| 0700 | 50 | 60 | 64 | 70 | 104 | 98 | 117 | 87 | 144 |
| 0800 | 93 | 98 | 99 | 92 | 118 | 113 | 90 | 103 | 33 |
| 0900 | 54 | 59 | 64 | 62 | 78 | 86 | 81 | 104 | 88 |
| 1000 | 60 | 68 | 72 | 72 | 102 | 102 | 103 | 103 | 105 |
| 1100 | 35 | 41 | 48 | 53 | 62 | 77 | 95 | 106 | 160 |
| 9000 | 57 | 63 | 68 | 68 | 87 | 92 | 94 | 104 | 107 |
| 0610 | 49 | 55 | 62 | 59 | 79 | 92 | 83 | 118 | 90 |
| 0620 | 83 | 83 | 87 | 84 | 84 | 95 | 86 | 119 | 91 |
| 0630 | 63 | 68 | 74 | 70 | 89 | 99 | 86 | 120 | 80 |
| 0631 | 48 | 55 | 62 | 60 | 84 | 96 | 88 | 119 | 94 |
| 0632 | 95 | 92 | 94 | 90 | 77 | 91 | 77 | 120 | 77 |
| 0710 | 33 | 42 | 47 | 53 | 78 | 81 | 100 | 87 | 144 |
| 0720 | 99 | 99 | 98 | 104 | 102 | 97 | 116 | 87 | 144 |
| 0730 | 66 | 73 | 75 | 81 | 99 | 95 | 114 | 87 | 144 |
| 0740 | 38 | 46 | 51 | 56 | 78 | 81 | 100 | 87 | 144 |
| 0750 | 49 | 56 | 60 | 66 | 86 | 87 | 107 | 88 | 148 |
| 0760 | 60 | 66 | 69 | 75 | 91 | 90 | 109 | 88 | 145 |
| 0770 | 44 | 52 | 56 | 62 | 80 | 83 | 102 | 89 | 145 |
| 0780 | 35 | 45 | 51 | 57 | 85 | 87 | 106 | 91 | 150 |

Table A.5.3-3. Years of Applicable Experience: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE- | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|-----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| YAO1 | DPROG | 10 | 175 | 29 | 40 | 44 | 53 | 100 | 49.2 | 19.0 | 30.2 | 68.2 |
| YAO2 | DTSPROJ | 14 | 185 | 36 | 48 | 54 | 63 | 102 | 56.7 | 17.1 | 39.6 | 73.9 |
| YAO3 | DTSANALY | 16 | 190 | 43 | 54 | 59 | 69 | 103 | 62.6 | 15.5 | 47.2 | 78.1 |
| YAO4 | DTSEVEL | 16 | 190 | 48 | 55 | 58 | 70 | 95 | 61.8 | 12.9 | 48.9 | 74.7 |
| YAO5 | DDMPROJ | 30 | 225 | 63 | 71 | 92 | 100 | 113 | 88.1 | 16.7 | 71.4 | 104.8 |
| YAO6 | DDMANALY | 30 | 225 | 78 | 90 | 95 | 102 | 110 | 94.2 | 9.5 | 84.7 | 103.6 |
| YAO7 | DDMDEVEL | 30 | 225 | 74 | 82 | 89 | 97 | 113 | 91.3 | 12.0 | 79.3 | 103.3 |
| YAO8 | DIMANALY | 30 | 225 | 83 | 100 | 105 | 111 | 135 | 106.2 | 13.6 | 92.6 | 119.8 |
| YAO9 | DIMDEVEL | 30 | 225 | 28 | 74 | 90 | 132 | 155 | 97.5 | 37.2 | 60.4 | 134.7 |
| YA11 | IPRDG | 10 | 175 | 37 | 43 | 52 | 55 | 87 | 52.8 | 13.3 | 39.6 | 66.1 |
| YA12 | ITSPROJ | 14 | 185 | 40 | 50 | 58 | 64 | 93 | 59.5 | 13.5 | 46.0 | 72.9 |
| YA13 | ITSANALY | 16 | 190 | 46 | 56 | 63 | 69 | 95 | 64.6 | 12.4 | 52.2 | 77.0 |
| YA14 | ITSDEVEL | 16 | 190 | 52 | 58 | 61 | 72 | 88 | 64.5 | 10.4 | 54.1 | 74.8 |
| YA15 | IDMPROJ | 30 | 225 | 49 | 71 | 88 | 103 | 118 | 86.4 | 21.2 | 65.1 | 107.6 |
| YA16 | IDMANALY | 30 | 225 | 67 | 82 | 93 | 105 | 112 | 91.6 | 14.4 | 77.2 | 106.1 |
| YA17 | IDMDEVEL | 30 | 225 | 68 | 84 | 90 | 98 | 117 | 91.5 | 13.9 | 77.7 | 105.4 |
| YA18 | IIMANALY | 30 | 225 | 82 | 100 | 103 | 110 | 118 | 102.4 | 10.6 | 91.8 | 113.0 |
| YA19 | IIMDEVEL | 30 | 225 | 33 | 77 | 94 | 135 | 160 | 102.1 | 37.1 | 65.0 | 139.2 |
| YA21 | TPROG | 10 | 175 | 40 | 47 | 57 | 61 | 92 | 56.8 | 13.9 | 42.9 | 70.8 |
| YA22 | TTSPROJ | 14 | 185 | 47 | 52 | 65 | 70 | 98 | 64.6 | 13.9 | 50.8 | 78.5 |
| YA23 | TTSANALY | 16 | 190 | 54 | 57 | 70 | 73 | 99 | 69.2 | 12.4 | 56.7 | 81.6 |
| YA24 | TTSDEVEL | 16 | 190 | 57 | 61 | 67 | 75 | 92 | 69.6 | 10.3 | 59.3 | 80.0 |
| YA25 | TDMPROJ | 30 | 225 | 73 | 84 | 97 | 108 | 122 | 96.3 | 16.5 | 79.7 | 112.8 |
| YA26 | TDMANALY | 30 | 225 | 79 | 87 | 100 | 104 | 116 | 98.3 | 11.2 | 87.1 | 109.4 |
| YA27 | TDMDEVEL | 30 | 225 | 87 | 90 | 95 | 110 | 121 | 99.8 | 11.7 | 88.1 | 111.5 |
| YA28 | TIMANALY | 30 | 225 | 89 | 92 | 104 | 109 | 117 | 102.3 | 8.7 | 93.5 | 111.0 |
| YA29 | TIMDEVEL | 30 | 225 | 37 | 82 | 99 | 138 | 166 | 107.0 | 36.8 | 70.2 | 143.8 |
| YA31 | OPROG | 10 | 175 | 35 | 44 | 51 | 54 | 93 | 52.9 | 14.9 | 38.0 | 67.9 |
| YA32 | OTSPROJ | 14 | 185 | 41 | 52 | 59 | 64 | 98 | 60.4 | 14.4 | 45.9 | 74.8 |
| YA33 | OTSANALY | 16 | 190 | 48 | 57 | 64 | 69 | 99 | 65.5 | 12.9 | 52.6 | 78.4 |
| YA34 | OTSDEVEL | 16 | 190 | 53 | 58 | 62 | 71 | 92 | 65.4 | 10.7 | 54.7 | 76.1 |
| YA35 | ODMPROJ | 30 | 225 | 62 | 78 | 89 | 103 | 118 | 90.4 | 16.8 | 73.6 | 107.1 |
| YA36 | ODMANALY | 30 | 225 | 77 | 86 | 94 | 103 | 113 | 94.7 | 10.6 | 84.1 | 105.4 |
| YA37 | ODMDEVEL | 30 | 225 | 81 | 86 | 90 | 103 | 117 | 94.4 | 11.4 | 82.9 | 105.8 |
| YA38 | OIMANALY | 30 | 225 | 87 | 103 | 104 | 109 | 118 | 103.6 | 9.1 | 94.6 | 112.7 |
| YA39 | OIMDEVEL | 30 | 225 | 33 | 78 | 94 | 135 | 160 | 102.2 | 36.9 | 65.3 | 139.1 |

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| NUMBER OF CLUSTERS | PRCD | | | | | | | | | | |
|--------------------|-------|---|---|-------|---|-------|---|---|-------|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| | 1 | 4 | 3 | 6 | 9 | 2 | 0 | 7 | 5 | 1 | 8 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | ***** | | * | * | * | * | * | * | * | * | * |
| 9 | ***** | | * | ***** | | * | * | * | * | * | * |
| 8 | ***** | * | | ***** | | ***** | * | * | * | * | * |
| 7 | ***** | | | ***** | | ***** | * | * | * | * | * |
| 6 | ***** | | | ***** | | ***** | * | | ***** | * | * |
| 5 | ***** | | | ***** | | ***** | * | | ***** | * | * |
| 4 | ***** | | | ***** | | ***** | * | | ***** | * | * |
| 3 | ***** | | | ***** | | ***** | * | | ***** | * | * |
| 2 | ***** | | | ***** | | ***** | * | | ***** | * | * |
| 1 | ***** | | | ***** | | ***** | * | | ***** | * | * |

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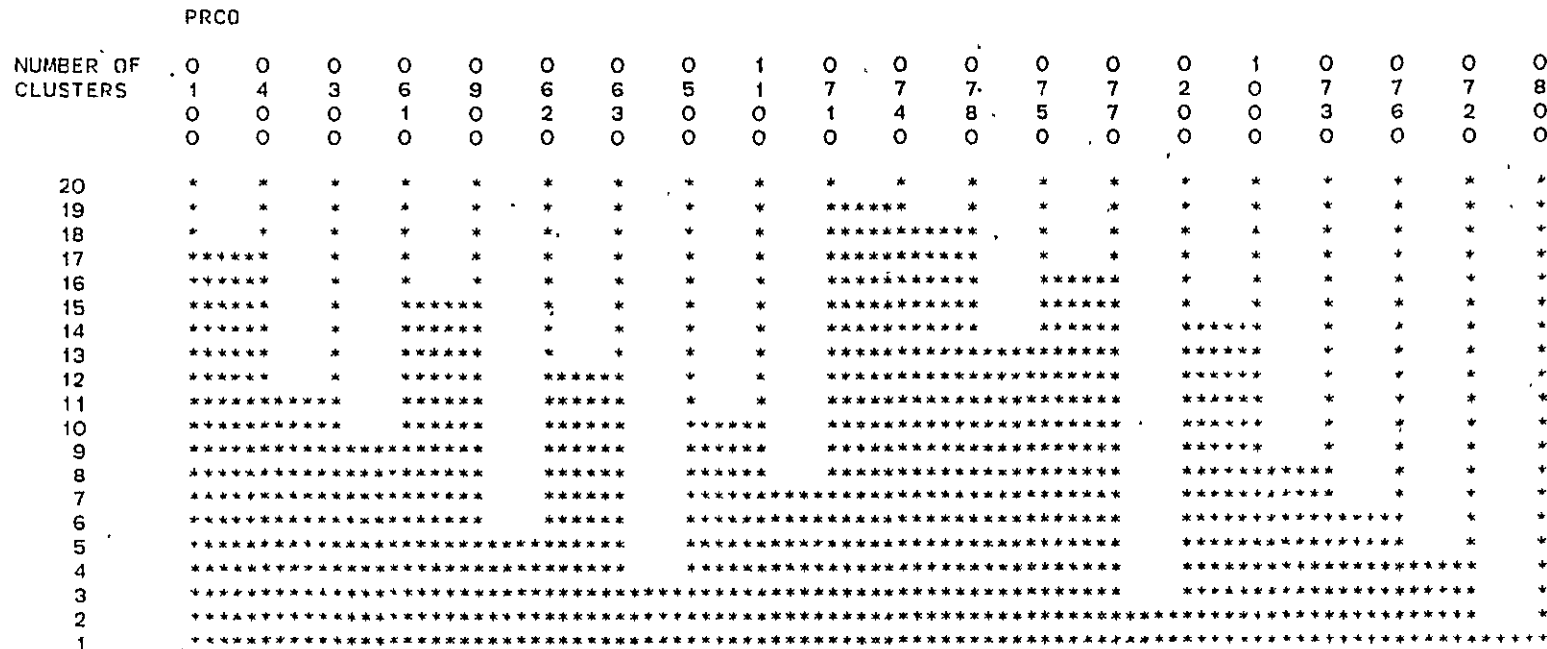
Figure A.5.3-1. Years of Applicable Experience: Cluster Map for 11 Projects

Table A.5.3-4. Years of Applicable Experience: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| YAO1 | DPROG | 10 | 175 | 24 | 34 | 44 | 59 | 100 | 49.0 | 21.0 | 28.0 | 70.0 |
| YAO2 | DTSPROJ | 14 | 185 | 34 | 43 | 52 | 66 | 102 | 56.0 | 18.7 | 37.3 | 74.7 |
| YAO3 | DTSANALY | 16 | 190 | 40 | 48 | 59 | 71 | 103 | 61.2 | 17.0 | 44.2 | 78.2 |
| YAO4 | DTSDEVEL | 16 | 190 | 45 | 52 | 57 | 71 | 100 | 62.3 | 15.4 | 46.8 | 77.7 |
| YAO5 | DDMPROJ | 30 | 225 | 63 | 72 | 83 | 97 | 113 | 84.1 | 13.7 | 70.4 | 97.9 |
| YAO6 | DDMANALY | 30 | 225 | 78 | 81 | 91 | 96 | 110 | 89.9 | 9.6 | 80.3 | 99.5 |
| YAO7 | DDMDEVEL | 30 | 225 | 74 | 84 | 94 | 101 | 112 | 93.0 | 10.8 | 82.2 | 103.9 |
| YAO8 | DIMANALY | 30 | 225 | 83 | 91 | 103 | 110 | 135 | 101.7 | 14.0 | 87.7 | 115.7 |
| YAO9 | DIMDEVEL | 30 | 225 | 28 | 82 | 128 | 140 | 155 | 111.4 | 35.9 | 75.6 | 147.3 |
| YA11 | IPROG | 10 | 175 | 33 | 43 | 49 | 65 | 98 | 54.3 | 18.0 | 36.3 | 72.3 |
| YA12 | ITSPROJ | 14 | 185 | 40 | 50 | 56 | 72 | 99 | 60.7 | 16.3 | 44.4 | 77.0 |
| YA13 | ITSANALY | 16 | 190 | 46 | 55 | 62 | 74 | 98 | 65.1 | 15.0 | 50.2 | 80.1 |
| YA14 | ITSDEVEL | 16 | 190 | 52 | 57 | 63 | 75 | 104 | 66.8 | 13.5 | 53.4 | 80.3 |
| YA15 | IDMPROJ | 30 | 225 | 49 | 78 | 86 | 97 | 118 | 86.1 | 16.0 | 70.1 | 102.1 |
| YA16 | IDMANALY | 30 | 225 | 67 | 81 | 91 | 97 | 112 | 89.9 | 11.7 | 78.2 | 101.6 |
| YA17 | IDMDEVEL | 30 | 225 | 68 | 86 | 95 | 108 | 116 | 95.8 | 12.7 | 83.1 | 108.5 |
| YA18 | IIMANALY | 30 | 225 | 81 | 83 | 101 | 109 | 120 | 97.6 | 13.9 | 83.8 | 111.5 |
| YA19 | IIMDEVEL | 30 | 225 | 33 | 89 | 131 | 144 | 160 | 115.5 | 35.2 | 80.3 | 150.8 |
| YA21 | TPROG | 10 | 175 | 35 | 44 | 57 | 73 | 106 | 61.3 | 21.3 | 40.0 | 82.7 |
| YA22 | TTSPROJ | 14 | 185 | 46 | 51 | 64 | 77 | 107 | 67.9 | 18.9 | 49.1 | 86.8 |
| YA23 | TTSANALY | 16 | 190 | 52 | 56 | 69 | 81 | 105 | 71.8 | 16.8 | 55.0 | 88.5 |
| YA24 | TTSDEVEL | 16 | 190 | 57 | 60 | 70 | 83 | 111 | 73.5 | 16.1 | 57.4 | 89.7 |
| YA25 | TDMPROJ | 30 | 225 | 73 | 84 | 90 | 104 | 122 | 93.9 | 13.4 | 80.5 | 107.4 |
| YA26 | TDMANALY | 30 | 225 | 79 | 88 | 98 | 101 | 116 | 96.0 | 9.6 | 86.4 | 105.6 |
| YA27 | TDMDEVEL | 30 | 225 | 87 | 90 | 105 | 110 | 123 | 102.6 | 11.6 | 91.1 | 114.2 |
| YA28 | TIMANALY | 30 | 225 | 89 | 91 | 96 | 109 | 120 | 99.8 | 10.7 | 89.1 | 110.6 |
| YA29 | TIMDEVEL | 30 | 225 | 37 | 94 | 135 | 150 | 166 | 120.1 | 35.1 | 85.0 | 155.2 |
| YA31 | OPROG | 10 | 175 | 33 | 43 | 50 | 62 | 99 | 54.9 | 18.6 | 36.3 | 73.5 |
| YA32 | OTSPROJ | 14 | 185 | 41 | 51 | 58 | 68 | 99 | 61.5 | 16.5 | 45.0 | 78.1 |
| YA33 | OTSANALY | 16 | 190 | 47 | 56 | 63 | 74 | 99 | 66.0 | 14.9 | 51.1 | 81.0 |
| YA34 | OTSDEVEL | 16 | 190 | 53 | 57 | 62 | 74 | 104 | 67.7 | 13.7 | 54.0 | 81.4 |
| YA35 | ODMPROJ | 30 | 225 | 62 | 78 | 87 | 100 | 118 | 88.1 | 13.0 | 75.1 | 101.1 |
| YA36 | ODMANALY | 30 | 225 | 77 | 85 | 91 | 99 | 113 | 91.9 | 9.3 | 82.6 | 101.3 |
| YA37 | ODMDEVEL | 30 | 225 | 81 | 87 | 98 | 107 | 116 | 97.3 | 10.9 | 86.5 | 108.2 |
| YA38 | OIMANALY | 30 | 225 | 87 | 88 | 103 | 109 | 120 | 99.8 | 12.0 | 87.8 | 111.8 |
| YA39 | OIMDEVEL | 30 | 225 | 33 | 89 | 131 | 145 | 160 | 115.8 | 35.4 | 80.3 | 151.2 |

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Figure A.5.3-2. Years of Applicable Experience: Cluster Map for 20 Independent Systems

Table A.5.3-5. Years of Applicable Experience: Summary
 Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| YA01 | DPROG | 10 | 175 | 40 | 43 | 45 | 57 | 62 | 48.6 | 8.1 | 40.4 | 56.7 |
| YA02 | DTSPROJ | 14 | 185 | 48 | 50 | 54 | 65 | 69 | 56.2 | 8.0 | 48.2 | 64.2 |
| YA03 | DTSANALY | 16 | 190 | 54 | 58 | 59 | 71 | 72 | 62.3 | 6.8 | 55.6 | 69.1 |
| YA04 | DTSEVEL | 16 | 190 | 52 | 55 | 58 | 71 | 77 | 61.6 | 8.8 | 52.8 | 70.3 |
| YA05 | DDMPROJ | 30 | 225 | 68 | 73 | 92 | 100 | 102 | 87.7 | 13.3 | 74.4 | 100.9 |
| YA06 | DDMANALY | 30 | 225 | 82 | 90 | 94 | 99 | 105 | 93.9 | 6.8 | 87.0 | 100.7 |
| YA07 | DDMDEVEL | 30 | 225 | 74 | 80 | 89 | 103 | 110 | 91.3 | 12.6 | 78.7 | 104.0 |
| YA08 | DIMANALY | 30 | 225 | 83 | 96 | 105 | 116 | 135 | 106.2 | 15.2 | 91.0 | 121.4 |
| YA09 | DIMDEVEL | 30 | 225 | 66 | 78 | 90 | 128 | 140 | 98.9 | 26.6 | 72.3 | 125.5 |
| YA11 | IPROG | 10 | 175 | 43 | 44 | 50 | 58 | 66 | 51.6 | 8.0 | 43.6 | 59.5 |
| YA12 | ITSPROJ | 14 | 185 | 50 | 53 | 56 | 65 | 73 | 58.6 | 7.8 | 50.7 | 66.4 |
| YA13 | ITSANALY | 16 | 190 | 55 | 59 | 62 | 71 | 74 | 63.8 | 6.6 | 57.1 | 70.4 |
| YA14 | ITSDEVEL | 16 | 190 | 55 | 59 | 59 | 71 | 80 | 63.7 | 8.3 | 55.3 | 72.0 |
| YA15 | IDMPROJ | 30 | 225 | 59 | 75 | 88 | 101 | 106 | 86.4 | 15.7 | 70.8 | 102.1 |
| YA16 | IDMANALY | 30 | 225 | 73 | 82 | 93 | 101 | 109 | 91.8 | 11.4 | 80.3 | 103.2 |
| YA17 | IDMDEVEL | 30 | 225 | 68 | 84 | 92 | 106 | 113 | 91.9 | 14.6 | 77.3 | 106.5 |
| YA18 | IIMANALY | 30 | 225 | 82 | 95 | 103 | 113 | 118 | 102.6 | 11.8 | 90.7 | 114.4 |
| YA19 | IIMDEVEL | 30 | 225 | 69 | 83 | 94 | 131 | 144 | 103.3 | 26.4 | 76.9 | 129.8 |
| YA21 | TPROG | 10 | 175 | 43 | 48 | 56 | 61 | 71 | 55.3 | 8.6 | 46.7 | 64.0 |
| YA22 | TTSPROJ | 14 | 185 | 51 | 55 | 65 | 71 | 77 | 63.2 | 8.9 | 54.3 | 72.1 |
| YA23 | TTSANALY | 16 | 190 | 56 | 61 | 70 | 75 | 79 | 67.9 | 7.9 | 60.0 | 75.8 |
| YA24 | TTSDEVEL | 16 | 190 | 57 | 62 | 67 | 75 | 85 | 68.6 | 8.9 | 59.7 | 77.4 |
| YA25 | TDMPROJ | 30 | 225 | 73 | 84 | 97 | 104 | 119 | 95.3 | 13.6 | 81.8 | 108.9 |
| YA26 | TDMANALY | 30 | 225 | 79 | 91 | 99 | 102 | 113 | 97.2 | 9.7 | 87.5 | 106.9 |
| YA27 | TDMDEVEL | 30 | 225 | 87 | 90 | 95 | 113 | 118 | 99.6 | 12.2 | 87.3 | 111.8 |
| YA28 | TIMANALY | 30 | 225 | 89 | 92 | 102 | 108 | 117 | 101.2 | 9.3 | 91.9 | 110.5 |
| YA29 | TIMDEVEL | 30 | 225 | 76 | 88 | 99 | 135 | 148 | 108.2 | 25.5 | 82.8 | 133.7 |
| YA31 | OPROG | 10 | 175 | 43 | 45 | 51 | 57 | 66 | 51.8 | 7.7 | 44.1 | 59.5 |
| YA32 | OTSPROJ | 14 | 185 | 50 | 54 | 59 | 66 | 73 | 59.4 | 7.6 | 51.8 | 67.0 |
| YA33 | OTSANALY | 16 | 190 | 56 | 60 | 64 | 71 | 75 | 64.6 | 6.4 | 58.2 | 71.0 |
| YA34 | OTSDEVEL | 16 | 190 | 57 | 59 | 62 | 72 | 81 | 64.7 | 8.2 | 56.5 | 72.8 |
| YA35 | ODMPROJ | 30 | 225 | 71 | 79 | 89 | 101 | 103 | 89.9 | 11.9 | 78.0 | 101.7 |
| YA36 | ODMANALY | 30 | 225 | 84 | 87 | 94 | 103 | 105 | 94.3 | 7.7 | 86.7 | 102.0 |
| YA37 | ODMDEVEL | 30 | 225 | 81 | 85 | 90 | 107 | 114 | 94.4 | 12.0 | 82.4 | 106.5 |
| YA38 | OIMANALY | 30 | 225 | 87 | 96 | 104 | 110 | 118 | 103.4 | 10.1 | 93.3 | 113.5 |
| YA39 | OIMDEVEL | 30 | 225 | 70 | 83 | 94 | 131 | 144 | 103.4 | 26.2 | 77.3 | 129.6 |

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| | PRCO | | | | | | | | | |
|--------------------|-------|---|---|-------|---|-------|---|---|---|---|
| NUMBER OF CLUSTERS | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 9 | * | * | * | * | * | * | * | * | * | * |
| 8 | ***** | | * | * | * | * | * | * | * | * |
| 7 | ***** | | * | ***** | | * | * | * | * | * |
| 6 | ***** | | * | ***** | | ***** | | * | * | * |
| 5 | ***** | | * | ***** | | ***** | | * | * | * |
| 4 | ***** | | * | ***** | | ***** | | * | * | * |
| 3 | ***** | | * | ***** | | ***** | | * | * | * |
| 2 | ***** | | * | ***** | | ***** | | * | * | * |
| 1 | ***** | | * | ***** | | ***** | | * | * | * |

Figure A.5.3-3. Years of Applicable Experience: Cluster Map for 9 Large Systems

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Table A.5.3-6. Years of Applicable Experience: Summary Statistics for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| YAO1 | DPROG | 10 | 175 | 24 | 29 | 36 | 78 | 100 | 49.4 | 28.0 | 21.4 | 77.4 |
| YAO2 | DTSPROJ | 14 | 185 | 34 | 37 | 45 | 78 | 102 | 55.8 | 24.8 | 31.0 | 80.6 |
| YAO3 | DTSANALY | 16 | 190 | 40 | 43 | 50 | 82 | 103 | 60.3 | 22.6 | 37.7 | 82.9 |
| YAO4 | DTSDEVEL | 16 | 190 | 45 | 48 | 55 | 79 | 100 | 62.8 | 19.7 | 43.1 | 82.5 |
| YAO5 | DDMPROJ | 30 | 225 | 63 | 72 | 78 | 86 | 113 | 81.3 | 14.0 | 67.3 | 95.3 |
| YAO6 | DDMANALY | 30 | 225 | 78 | 78 | 83 | 96 | 110 | 86.6 | 10.6 | 76.0 | 97.2 |
| YAO7 | DDMDEVEL | 30 | 225 | 80 | 85 | 94 | 102 | 112 | 94.5 | 9.5 | 84.9 | 104.0 |
| YAO8 | DIMANALY | 30 | 225 | 84 | 91 | 91 | 107 | 120 | 98.0 | 12.4 | 85.6 | 110.4 |
| YAO9 | DIMDEVEL | 30 | 225 | 28 | 85 | 140 | 146 | 155 | 121.7 | 40.2 | 81.5 | 162.0 |
| YA11 | IPROG | 10 | 175 | 33 | 37 | 48 | 81 | 98 | 56.5 | 23.5 | 33.0 | 80.1 |
| YA12 | ITSPROJ | 14 | 185 | 40 | 45 | 55 | 82 | 99 | 62.5 | 21.2 | 41.3 | 83.6 |
| YA13 | ITSANALY | 16 | 190 | 46 | 50 | 59 | 86 | 98 | 66.3 | 19.7 | 46.6 | 86.0 |
| YA14 | ITSDEVEL | 16 | 190 | 52 | 56 | 65 | 83 | 104 | 69.5 | 16.5 | 52.9 | 86.0 |
| YA15 | IDMPROJ | 30 | 225 | 49 | 78 | 86 | 93 | 118 | 85.8 | 16.9 | 68.9 | 102.8 |
| YA16 | IDMANALY | 30 | 225 | 67 | 79 | 88 | 97 | 112 | 88.4 | 12.2 | 76.2 | 100.5 |
| YA17 | IDMDEVEL | 30 | 225 | 86 | 87 | 100 | 108 | 116 | 99.0 | 10.5 | 88.5 | 109.5 |
| YA18 | IIMANALY | 30 | 225 | 81 | 82 | 88 | 103 | 120 | 93.6 | 14.6 | 79.0 | 108.3 |
| YA19 | IIMDEVEL | 30 | 225 | 33 | 92 | 144 | 147 | 160 | 125.5 | 39.4 | 86.1 | 165.0 |
| YA21 | TPROG | 10 | 175 | 35 | 41 | 57 | 92 | 106 | 66.3 | 27.3 | 39.0 | 93.5 |
| YA22 | TTSPROJ | 14 | 185 | 46 | 50 | 63 | 98 | 107 | 71.8 | 24.0 | 47.8 | 95.8 |
| YA23 | TTSANALY | 16 | 190 | 52 | 54 | 67 | 99 | 105 | 74.9 | 21.5 | 53.5 | 96.4 |
| YA24 | TTSDEVEL | 16 | 190 | 57 | 60 | 72 | 92 | 111 | 77.6 | 19.7 | 57.9 | 97.4 |
| YA25 | TDMPROJ | 30 | 225 | 74 | 83 | 88 | 106 | 122 | 92.8 | 13.9 | 79.0 | 106.7 |
| YA26 | TDMANALY | 30 | 225 | 85 | 86 | 90 | 101 | 116 | 95.0 | 9.8 | 85.2 | 104.8 |
| YA27 | TDMDEVEL | 30 | 225 | 88 | 94 | 105 | 109 | 123 | 105.2 | 11.0 | 94.2 | 116.2 |
| YA28 | TIMANALY | 30 | 225 | 89 | 89 | 92 | 110 | 120 | 98.7 | 12.1 | 86.7 | 110.8 |
| YA29 | TIMDEVEL | 30 | 225 | 37 | 96 | 148 | 151 | 166 | 129.8 | 40.0 | 89.9 | 169.8 |
| YA31 | OPROG | 10 | 175 | 33 | 35 | 49 | 83 | 99 | 57.5 | 24.3 | 33.1 | 81.8 |
| YA32 | OTSPROJ | 14 | 185 | 41 | 45 | 56 | 83 | 99 | 63.3 | 21.6 | 41.7 | 84.9 |
| YA33 | OTSANALY | 16 | 190 | 47 | 51 | 60 | 87 | 99 | 67.3 | 19.7 | 47.6 | 87.0 |
| YA34 | OTSDEVEL | 16 | 190 | 53 | 56 | 66 | 84 | 104 | 70.2 | 17.0 | 53.2 | 87.2 |
| YA35 | ODMPROJ | 30 | 225 | 62 | 78 | 85 | 91 | 118 | 86.6 | 14.3 | 72.3 | 101.0 |
| YA36 | ODMANALY | 30 | 225 | 77 | 81 | 87 | 97 | 113 | 90.0 | 10.4 | 79.6 | 100.4 |
| YA37 | ODMDEVEL | 30 | 225 | 86 | 90 | 100 | 107 | 116 | 99.7 | 9.7 | 90.0 | 109.4 |
| YA38 | OIMANALY | 30 | 225 | 87 | 87 | 89 | 106 | 120 | 96.8 | 13.0 | 83.8 | 109.8 |
| YA39 | OIMDEVEL | 30 | 225 | 33 | 91 | 144 | 148 | 160 | 125.8 | 39.9 | 85.9 | 165.7 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|-------|---|---|---|-------|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | 6 | 6 | 8 | 7 | 7 | 7 | 7 | 7 | 7 | 1 | 7 |
| | 2 | 3 | 0 | 2 | 1 | 4 | 8 | 5 | 7 | 0 | 6 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | ***** | * | * | * | * | * | * |
| 9 | * | * | * | * | ***** | * | * | * | * | * | * |
| 8 | * | * | * | * | ***** | * | * | * | * | * | * |
| 7 | * | * | * | * | ***** | * | * | * | * | * | * |
| 6 | ***** | * | * | * | ***** | * | * | * | * | * | * |
| 5 | ***** | * | * | * | ***** | * | * | * | * | * | * |
| 4 | ***** | * | * | * | ***** | * | * | * | * | * | * |
| 3 | ***** | * | * | * | ***** | * | * | * | * | * | * |
| 2 | ***** | * | * | * | ***** | * | * | * | * | * | * |
| 1 | ***** | * | * | * | ***** | * | * | * | * | * | * |

Figure A.5.3-4. Years of Applicable Experience: Cluster Map for 11 Small Systems

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A.5.4 YEARS OF ENVIRONMENT EXPERIENCE

| | |
|---------------------------|---------------------------|
| -- <u>X</u> -- Objective | -- <u>X</u> -- Subjective |
| -- -- Absolute | -- <u>X</u> -- Relative |
| -- -- Explicit | -- <u>X</u> -- Derived |
| -- <u>X</u> -- Static | -- -- Dynamic |
| -- <u>X</u> -- Predictive | -- -- Explanatory |

This category measures the development team's experience in the development environment of the application. These measures are derived from explicit objective data by combining the experience of each team member to form a team value. They are static and predictive because they are computed from data available before the design, implementation, and testing phases. They are dynamic and explanatory in the sense that the values for each phase can be updated to be more accurate as each phase is completed, since the composition of the development team may have changed during a phase. Codes ending in 1, 5, 8, and 9 are unique; the others are derived. The overall measures are derived from the phase measures.

The remainder of this subsection contains tables and figures that describe the Years of Environment Experience measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.5.4-1)
- Values of the measures for 25 systems (Table A.5.4-2), where large values indicate more experience
- Summary statistics for 11 projects (Table A.5.4-3)
- Cluster map for 11 projects (Figure A.5.4-1)
- Summary statistics for 20 independent systems (Table A.5.4-4)

- Cluster map for 20 independent systems (Figure A.5.4-2)
- Summary statistics for 9 large systems (Table A.5.4-5)
- Cluster map for 9 large systems (Figure A.5.4-3)
- Summary statistics for 11 small systems (Table A.5.4-6)
- Cluster map for 11 small systems (Figure A.5.4-4)

Table A.5.4-1. Years of Environment Experience: Description of Measures (1 of 3)

| Code | Measure | Range | | Description |
|------------------------|----------|-------|------|--|
| | | Low | High | |
| Design | | | | |
| YE01 | DPROG | 000 | 150 | Programmers Technical Staff |
| YE02 | DTSPROJ | 005 | 160 | Programmers and Project Managers |
| YE03 | DTSANALY | 008 | 165 | Programmers, Project Managers, and Analysis Managers |
| YE04 | DTSDEVEL | 008 | 165 | Programmers and Development Managers |
| Development Management | | | | |
| YE05 | DDMPROJ | 025 | 200 | Project |
| YE06 | DDMANALY | 025 | 200 | Project and Analysis |
| YE07 | DDMDEVEL | 025 | 200 | Development |
| Interface Management | | | | |
| YE08 | DIMANALY | 025 | 200 | Analysis |
| YE09 | DIMDEVEL | 025 | 200 | Development |
| YE10 | D | 000 | 000 | Not Defined |
| Implementation | | | | |
| YE11 | IPROG | 000 | 150 | Programmers Technical Staff |
| YE12 | ITSPROJ | 005 | 160 | Programmers and Project Managers |
| YE13 | ITSANALY | 008 | 165 | Programmers, Project Managers, and Analysis Managers |
| YE14 | ITSDEVEL | 025 | 200 | Programmers and Development Managers |
| Development Management | | | | |
| YE15 | IDMPROJ | 025 | 200 | Project |
| YE16 | IDMANALY | 025 | 200 | Project and Analysis |
| YE17 | IDMDEVEL | 025 | 200 | Development |

Table A.5.4-1. Years of Applicable Experience: Description of Measures (2 of 3)

| Code | Measure | Range | | Description |
|----------------------------|----------|-------|------|--|
| | | Low | High | |
| Implementation (Continued) | | | | |
| Interface Management | | | | |
| YE18 | IIMANALY | 025 | 200 | Analysis |
| YE19 | IIMDEVEL | 025 | 200 | Development |
| YE20 | I | 000 | 000 | Not Defined |
| Test | | | | |
| YE21 | TPROG | 000 | 150 | Programmers Technical Staff |
| YE22 | TTSPROJ | 005 | 160 | Programmers and Project Managers |
| YE23 | TTSANALY | 008 | 165 | Programmers, Project Managers, and Analysis Managers |
| YE24 | TTSDEVEL | 008 | 165 | Programmers and Development Managers |
| Development Management | | | | |
| YE25 | TDMPROJ | 025 | 200 | Project |
| YE26 | TDMANALY | 025 | 200 | Project and Analysis |
| YE27 | TDMDEVEL | 025 | 200 | Development |
| Interface Management | | | | |
| YE28 | TIMANALY | 025 | 200 | Analysis |
| YE29 | TIMDEVEL | 025 | 200 | Development |
| YE30 | T | 000 | 000 | Not Defined |
| Overall | | | | |
| YE31 | OPROG | 000 | 150 | Programmers Technical Staff |
| YE32 | OTSPROJ | 005 | 160 | Programmers and Project Managers |
| YE33 | OTSANALY | 008 | 165 | Programmers, Project Managers, and Analysis Managers |

Table A.5.4-1. Years of Applicable Experience: Description of Measures (3 of 3)

| Code | Measure | Range | | Description |
|-----------------------------|----------|-------|------|--------------------------------------|
| | | Low | High | |
| Overall (Continued) | | | | |
| Technical Staff (Continued) | | | | |
| YE34 | OTSDEVEL | 008 | 165 | Programmers and Development Managers |
| Development Management | | | | |
| YE35 | ODMPROJ | 025 | 200 | Project |
| YE36 | ODMANALY | 025 | 200 | Project and Analysis |
| YE37 | ODMDEVEL | 025 | 200 | Development |
| Interface Management | | | | |
| YE38 | OIMANALY | 025 | 200 | Analysis |
| YE39 | OIMDEVEL | 025 | 200 | Development |
| YE40 | O | 000 | 000 | Not Defined |

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Table A.5.4-2. Years of Environment Experience: Values of the Measures for 25 Systems (1 of 2)

| PRCO | YE01 | YE02 | YE03 | YE04 | YE05 | YE06 | YE07 | YE08 | YE09 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 24 | 28 | 30 | 31 | 41 | 42 | 47 | 44 | 59 |
| 0200 | 26 | 32 | 35 | 40 | 59 | 57 | 75 | 52 | 106 |
| 0300 | 24 | 28 | 30 | 34 | 47 | 43 | 59 | 36 | 83 |
| 0400 | 23 | 28 | 29 | 32 | 49 | 45 | 55 | 36 | 67 |
| 0500 | 30 | 32 | 37 | 41 | 41 | 51 | 65 | 71 | 115 |
| 0600 | 27 | 31 | 33 | 36 | 48 | 45 | 58 | 41 | 78 |
| 0700 | 19 | 24 | 25 | 35 | 47 | 40 | 72 | 25 | 123 |
| 0800 | 44 | 47 | 47 | 44 | 60 | 53 | 42 | 41 | 18 |
| 0900 | 30 | 33 | 34 | 30 | 44 | 43 | 53 | 41 | 70 |
| 1000 | 28 | 31 | 32 | 38 | 45 | 44 | 61 | 41 | 92 |
| 1100 | 22 | 25 | 27 | 36 | 37 | 39 | 71 | 43 | 138 |
| 9000 | 27 | 31 | 32 | 37 | 44 | 43 | 59 | 41 | 90 |
| 0610 | 27 | 31 | 32 | 36 | 48 | 45 | 58 | 41 | 78 |
| 0620 | 16 | 20 | 21 | 26 | 35 | 33 | 49 | 29 | 78 |
| 0630 | 37 | 41 | 41 | 44 | 57 | 50 | 60 | 36 | 67 |
| 0631 | 44 | 46 | 43 | 48 | 55 | 49 | 65 | 36 | 85 |
| 0632 | 38 | 43 | 43 | 45 | 63 | 54 | 63 | 36 | 63 |
| 0710 | 15 | 19 | 20 | 30 | 35 | 32 | 64 | 25 | 123 |
| 0720 | 46 | 46 | 44 | 54 | 46 | 40 | 72 | 25 | 123 |
| 0730 | 19 | 23 | 24 | 34 | 38 | 34 | 66 | 25 | 123 |
| 0740 | 6 | 11 | 16 | 26 | 31 | 29 | 62 | 25 | 123 |
| 0750 | 6 | 12 | 13 | 24 | 36 | 30 | 67 | 17 | 129 |
| 0760 | 18 | 21 | 22 | 32 | 35 | 32 | 64 | 25 | 123 |
| 0770 | 18 | 21 | 22 | 32 | 35 | 32 | 64 | 25 | 123 |
| 0780 | 12 | 17 | 19 | 29 | 38 | 38 | 69 | 38 | 131 |

| PRCO | YE11 | YE12 | YE13 | YE14 | YE15 | YE16 | YE17 | YE18 | YE19 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 27 | 30 | 32 | 34 | 44 | 45 | 50 | 47 | 62 |
| 0200 | 28 | 35 | 38 | 43 | 63 | 61 | 79 | 56 | 110 |
| 0300 | 26 | 28 | 29 | 34 | 36 | 38 | 53 | 40 | 87 |
| 0400 | 24 | 30 | 31 | 34 | 54 | 49 | 60 | 39 | 70 |
| 0500 | 31 | 34 | 36 | 42 | 44 | 46 | 68 | 51 | 118 |
| 0600 | 32 | 36 | 36 | 41 | 52 | 46 | 62 | 34 | 83 |
| 0700 | 22 | 27 | 27 | 38 | 50 | 38 | 76 | 15 | 126 |
| 0800 | 42 | 46 | 46 | 44 | 65 | 56 | 51 | 39 | 23 |
| 0900 | 35 | 35 | 36 | 40 | 36 | 38 | 50 | 40 | 76 |
| 1000 | 30 | 31 | 32 | 38 | 36 | 38 | 57 | 40 | 99 |
| 1100 | 27 | 27 | 28 | 39 | 27 | 30 | 66 | 34 | 142 |
| 9000 | 32 | 33 | 34 | 40 | 36 | 37 | 56 | 40 | 99 |
| 0610 | 31 | 35 | 36 | 40 | 52 | 46 | 62 | 34 | 83 |
| 0620 | 24 | 27 | 28 | 33 | 42 | 40 | 56 | 36 | 85 |
| 0630 | 67 | 66 | 62 | 66 | 60 | 50 | 64 | 28 | 70 |
| 0631 | 41 | 44 | 43 | 49 | 57 | 47 | 67 | 28 | 88 |
| 0632 | 116 | 106 | 97 | 101 | 66 | 54 | 66 | 28 | 66 |
| 0710 | 23 | 27 | 26 | 37 | 41 | 32 | 69 | 14 | 126 |
| 0720 | 50 | 50 | 46 | 57 | 50 | 38 | 76 | 15 | 126 |
| 0730 | 17 | 22 | 22 | 33 | 41 | 33 | 70 | 15 | 126 |
| 0740 | 8 | 13 | 14 | 25 | 34 | 28 | 65 | 14 | 126 |
| 0750 | 6 | 12 | 16 | 25 | 37 | 37 | 68 | 37 | 130 |
| 0760 | 27 | 31 | 30 | 41 | 46 | 36 | 73 | 15 | 126 |
| 0770 | 35 | 37 | 36 | 46 | 43 | 37 | 71 | 24 | 126 |
| 0780 | 19 | 25 | 27 | 36 | 50 | 47 | 78 | 40 | 133 |

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Table A.5.4-2. Years of Environment Experience: Values of the Measures for 25 Systems (2 of 2)

| PRCO | YE21 | YE22 | YE23 | YE24 | YE25 | YE26 | YE27 | YE28 | YE29 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 33 | 34 | 35 | 38 | 38 | 39 | 48 | 40 | 69 |
| 0200 | 32 | 38 | 39 | 46 | 63 | 58 | 80 | 47 | 114 |
| 0300 | 28 | 31 | 33 | 37 | 41 | 43 | 58 | 45 | 92 |
| 0400 | 27 | 33 | 35 | 38 | 60 | 55 | 65 | 44 | 76 |
| 0500 | 34 | 36 | 37 | 45 | 46 | 45 | 71 | 42 | 120 |
| 0600 | 39 | 42 | 41 | 47 | 57 | 47 | 67 | 27 | 87 |
| 0700 | 26 | 32 | 33 | 42 | 55 | 49 | 80 | 38 | 131 |
| 0800 | 54 | 57 | 56 | 54 | 69 | 60 | 55 | 43 | 27 |
| 0900 | 43 | 47 | 47 | 51 | 61 | 56 | 69 | 47 | 84 |
| 1000 | 36 | 40 | 41 | 47 | 56 | 53 | 72 | 45 | 104 |
| 1100 | 32 | 36 | 36 | 47 | 48 | 46 | 82 | 40 | 149 |
| 9000 | 40 | 43 | 44 | 50 | 58 | 54 | 73 | 46 | 103 |
| 0610 | 35 | 40 | 39 | 45 | 57 | 47 | 67 | 27 | 87 |
| 0620 | 27 | 30 | 31 | 37 | 45 | 40 | 59 | 28 | 88 |
| 0630 | 69 | 68 | 64 | 68 | 62 | 52 | 66 | 30 | 72 |
| 0631 | 44 | 47 | 45 | 51 | 60 | 50 | 70 | 30 | 90 |
| 0632 | 118 | 108 | 99 | 103 | 68 | 56 | 68 | 30 | 68 |
| 0710 | 31 | 34 | 35 | 44 | 46 | 43 | 74 | 38 | 131 |
| 0720 | 54 | 54 | 52 | 62 | 55 | 49 | 80 | 38 | 131 |
| 0730 | 22 | 26 | 28 | 38 | 46 | 43 | 74 | 38 | 131 |
| 0740 | 14 | 19 | 22 | 31 | 39 | 39 | 70 | 38 | 131 |
| 0750 | 10 | 16 | 19 | 28 | 40 | 40 | 71 | 40 | 133 |
| 0760 | 57 | 57 | 56 | 65 | 58 | 52 | 83 | 41 | 134 |
| 0770 | 44 | 46 | 46 | 55 | 52 | 48 | 79 | 40 | 133 |
| 0780 | 20 | 26 | 28 | 37 | 51 | 48 | 79 | 41 | 134 |

| PRCO | YE31 | YE32 | YE33 | YE34 | YE35 | YE36 | YE37 | YE38 | YE39 |
|------|------|------|------|------|------|------|------|------|------|
| 0100 | 28 | 31 | 32 | 34 | 41 | 42 | 48 | 43 | 64 |
| 0200 | 28 | 35 | 37 | 43 | 62 | 58 | 78 | 52 | 110 |
| 0300 | 26 | 29 | 30 | 35 | 41 | 41 | 57 | 41 | 88 |
| 0400 | 24 | 30 | 32 | 35 | 54 | 50 | 60 | 40 | 71 |
| 0500 | 32 | 34 | 36 | 43 | 43 | 47 | 68 | 55 | 118 |
| 0600 | 33 | 36 | 37 | 42 | 52 | 46 | 62 | 34 | 83 |
| 0700 | 22 | 28 | 28 | 38 | 51 | 42 | 76 | 26 | 127 |
| 0800 | 46 | 50 | 50 | 48 | 64 | 56 | 49 | 41 | 23 |
| 0900 | 36 | 38 | 39 | 40 | 47 | 46 | 57 | 43 | 77 |
| 1000 | 31 | 34 | 35 | 41 | 46 | 45 | 63 | 42 | 98 |
| 1100 | 27 | 29 | 30 | 41 | 38 | 38 | 73 | 39 | 143 |
| 9000 | 33 | 36 | 36 | 42 | 46 | 44 | 63 | 42 | 97 |
| 0610 | 31 | 35 | 36 | 40 | 52 | 46 | 62 | 34 | 83 |
| 0620 | 22 | 26 | 27 | 32 | 41 | 38 | 55 | 31 | 84 |
| 0630 | 58 | 58 | 56 | 59 | 60 | 50 | 63 | 32 | 70 |
| 0631 | 43 | 46 | 44 | 50 | 57 | 48 | 67 | 31 | 88 |
| 0632 | 91 | 86 | 80 | 83 | 66 | 55 | 66 | 32 | 66 |
| 0710 | 23 | 27 | 27 | 37 | 41 | 36 | 69 | 26 | 127 |
| 0720 | 50 | 50 | 48 | 58 | 50 | 42 | 76 | 26 | 127 |
| 0730 | 20 | 24 | 25 | 35 | 42 | 36 | 70 | 26 | 127 |
| 0740 | 9 | 14 | 17 | 27 | 35 | 32 | 65 | 26 | 127 |
| 0750 | 7 | 13 | 16 | 26 | 37 | 35 | 68 | 32 | 131 |
| 0760 | 34 | 36 | 36 | 46 | 46 | 40 | 74 | 27 | 128 |
| 0770 | 32 | 35 | 34 | 44 | 43 | 39 | 71 | 30 | 128 |
| 0780 | 17 | 23 | 25 | 34 | 46 | 44 | 75 | 40 | 133 |

Table A.5.4-3. Years of Environment Experience: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| YE01 | DPROG | 0 | 150 | 19 | 23 | 26 | 30 | 44 | 27.0 | 6.6 | 20.4 | 33.6 |
| YE02 | DTSPROJ | 5 | 160 | 24 | 28 | 31 | 32 | 47 | 30.8 | 6.1 | 24.7 | 36.9 |
| YE03 | DTSANALY | 8 | 165 | 25 | 29 | 32 | 35 | 47 | 32.6 | 5.9 | 26.7 | 38.6 |
| YE04 | DTSDEVEL | 8 | 165 | 30 | 32 | 36 | 40 | 44 | 36.1 | 4.4 | 31.7 | 40.5 |
| YE05 | DDMPROJ | 25 | 200 | 37 | 41 | 47 | 49 | 60 | 47.1 | 7.1 | 40.0 | 54.2 |
| YE06 | DDMANALY | 25 | 200 | 39 | 42 | 44 | 51 | 57 | 45.6 | 5.6 | 40.0 | 51.3 |
| YE07 | DDMDEVEL | 25 | 200 | 42 | 53 | 59 | 71 | 75 | 59.8 | 10.4 | 49.4 | 70.2 |
| YE08 | DIMANALY | 25 | 200 | 25 | 36 | 41 | 44 | 71 | 42.8 | 11.4 | 31.4 | 54.2 |
| YE09 | DIMDEVEL | 25 | 200 | 18 | 67 | 83 | 115 | 138 | 86.3 | 33.8 | 52.5 | 120.0 |
| YE11 | IPROG | 0 | 150 | 22 | 26 | 28 | 32 | 42 | 29.5 | 5.6 | 23.9 | 35.0 |
| YE12 | ITSPROJ | 5 | 160 | 27 | 28 | 31 | 35 | 46 | 32.6 | 5.5 | 27.1 | 38.2 |
| YE13 | ITSANALY | 8 | 165 | 27 | 29 | 32 | 36 | 46 | 33.7 | 5.5 | 28.3 | 39.2 |
| YE14 | ITSDEVEL | 8 | 165 | 34 | 34 | 39 | 42 | 44 | 38.8 | 3.6 | 35.2 | 42.4 |
| YE15 | IDMPROJ | 25 | 200 | 27 | 36 | 44 | 54 | 65 | 46.1 | 12.0 | 34.1 | 58.1 |
| YE16 | IDMANALY | 25 | 200 | 30 | 38 | 45 | 49 | 61 | 44.1 | 9.0 | 35.1 | 53.1 |
| YE17 | IDMDEVEL | 25 | 200 | 50 | 51 | 60 | 68 | 79 | 61.1 | 10.2 | 50.9 | 71.3 |
| YE18 | IIMANALY | 25 | 200 | 15 | 34 | 40 | 47 | 56 | 39.5 | 10.6 | 28.9 | 50.1 |
| YE19 | IIMDEVEL | 25 | 200 | 23 | 70 | 87 | 118 | 142 | 90.5 | 33.4 | 57.1 | 124.0 |
| YE21 | TPROG | 0 | 150 | 26 | 28 | 33 | 39 | 54 | 34.9 | 8.1 | 26.8 | 43.0 |
| YE22 | TTSPROJ | 5 | 160 | 31 | 33 | 36 | 42 | 57 | 38.7 | 7.7 | 31.0 | 46.4 |
| YE23 | TTSANALY | 8 | 165 | 33 | 35 | 37 | 41 | 56 | 39.4 | 6.9 | 32.5 | 46.3 |
| YE24 | TTSDEVEL | 8 | 165 | 37 | 38 | 46 | 47 | 54 | 44.7 | 5.5 | 39.2 | 50.2 |
| YE25 | TDMPROJ | 25 | 200 | 38 | 46 | 56 | 61 | 69 | 54.0 | 9.6 | 44.4 | 63.6 |
| YE26 | TDMANALY | 25 | 200 | 39 | 45 | 49 | 56 | 60 | 50.1 | 6.7 | 43.3 | 56.8 |
| YE27 | TDMDEVEL | 25 | 200 | 48 | 58 | 69 | 80 | 82 | 67.9 | 10.9 | 57.0 | 78.8 |
| YE28 | TIMANALY | 25 | 200 | 27 | 40 | 43 | 45 | 47 | 41.6 | 5.7 | 36.0 | 47.3 |
| YE29 | TIMDEVEL | 25 | 200 | 27 | 76 | 92 | 120 | 149 | 95.7 | 33.4 | 62.4 | 129.1 |
| YE31 | OPROG | 0 | 150 | 22 | 26 | 28 | 33 | 46 | 30.3 | 6.6 | 23.7 | 36.9 |
| YE32 | OTSPROJ | 5 | 160 | 28 | 29 | 34 | 36 | 50 | 34.0 | 6.2 | 27.8 | 40.2 |
| YE33 | OTSANALY | 8 | 165 | 28 | 30 | 35 | 37 | 50 | 35.1 | 6.1 | 29.0 | 41.1 |
| YE34 | OTSDEVEL | 8 | 165 | 34 | 35 | 41 | 43 | 48 | 40.0 | 4.2 | 35.8 | 44.2 |
| YE35 | ODMPROJ | 25 | 200 | 38 | 41 | 47 | 54 | 64 | 49.0 | 8.5 | 40.5 | 57.5 |
| YE36 | ODMANALY | 25 | 200 | 38 | 42 | 46 | 50 | 58 | 46.5 | 6.2 | 40.3 | 52.6 |
| YE37 | ODMDEVEL | 25 | 200 | 48 | 57 | 62 | 73 | 78 | 62.8 | 10.1 | 52.7 | 72.9 |
| YE38 | OIMANALY | 25 | 200 | 26 | 39 | 41 | 43 | 55 | 41.5 | 7.8 | 33.7 | 49.2 |
| YE39 | OIMDEVEL | 25 | 200 | 23 | 71 | 88 | 118 | 143 | 91.1 | 33.4 | 57.7 | 124.5 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 1 | 4 | 3 | 0 | 6 | 9 | 8 | 2 | 5 | 7 | 1 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | ***** | * | * | * | * | * | * |
| 9 | * | * | ***** | ***** | ***** | * | * | * | * | * | * |
| 8 | ***** | ***** | ***** | ***** | ***** | * | * | * | * | * | * |
| 7 | ***** | ***** | ***** | ***** | ***** | * | * | * | * | * | * |
| 6 | ***** | ***** | ***** | ***** | ***** | * | ***** | * | ***** | * | * |
| 5 | ***** | ***** | ***** | ***** | ***** | * | ***** | * | ***** | ***** | * |
| 4 | ***** | ***** | ***** | ***** | ***** | * | ***** | * | ***** | ***** | * |
| 3 | ***** | ***** | ***** | ***** | ***** | * | ***** | * | ***** | ***** | * |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |

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Figure A.5.4-1. Years of Environment Experience: Cluster Map for 11 Projects

Table A.5.4-4. Years of Environment Experience: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| YE01 | DPROG | 0 | 150 | 6 | 17 | 24 | 30 | 46 | 23.5 | 10.7 | 12.8 | 34.3 |
| YE02 | DTSPROJ | 5 | 160 | 11 | 20 | 28 | 32 | 47 | 27.3 | 9.9 | 17.4 | 37.2 |
| YE03 | DTSANALY | 8 | 165 | 13 | 21 | 30 | 35 | 47 | 28.8 | 9.3 | 19.5 | 38.0 |
| YE04 | DTSDEVEL | 8 | 165 | 24 | 30 | 33 | 40 | 54 | 34.6 | 7.3 | 27.4 | 41.9 |
| YE05 | DDMPROJ | 25 | 200 | 31 | 35 | 41 | 48 | 60 | 42.8 | 8.5 | 34.3 | 51.4 |
| YE06 | DDMANALY | 25 | 200 | 29 | 32 | 41 | 45 | 57 | 40.6 | 8.2 | 32.4 | 48.8 |
| YE07 | DDMDEVEL | 25 | 200 | 42 | 56 | 63 | 67 | 75 | 61.1 | 8.6 | 52.6 | 69.7 |
| YE08 | DIMANALY | 25 | 200 | 17 | 25 | 36 | 41 | 71 | 35.8 | 12.2 | 23.6 | 48.0 |
| YE09 | DIMDEVEL | 25 | 200 | 18 | 72 | 111 | 123 | 138 | 98.4 | 32.0 | 66.5 | 130.4 |
| YE11 | IPROG | 0 | 150 | 6 | 23 | 27 | 34 | 67 | 28.8 | 13.5 | 15.4 | 42.3 |
| YE12 | ITSPROJ | 5 | 160 | 12 | 27 | 31 | 35 | 66 | 32.0 | 12.0 | 20.0 | 44.1 |
| YE13 | ITSANALY | 8 | 165 | 14 | 27 | 32 | 36 | 62 | 32.5 | 10.7 | 21.9 | 43.2 |
| YE14 | ITSDEVEL | 8 | 165 | 25 | 34 | 39 | 43 | 66 | 39.3 | 9.5 | 29.9 | 48.8 |
| YE15 | IDMPROJ | 25 | 200 | 27 | 36 | 44 | 52 | 65 | 45.0 | 10.1 | 35.0 | 55.1 |
| YE16 | IDMANALY | 25 | 200 | 28 | 36 | 38 | 47 | 61 | 41.3 | 8.6 | 32.7 | 49.8 |
| YE17 | IDMDEVEL | 25 | 200 | 50 | 56 | 66 | 71 | 79 | 64.3 | 9.2 | 55.1 | 73.5 |
| YE18 | IIMANALY | 25 | 200 | 14 | 17 | 37 | 40 | 56 | 32.9 | 12.9 | 20.0 | 45.8 |
| YE19 | IIMDEVEL | 25 | 200 | 23 | 78 | 114 | 126 | 142 | 102.2 | 31.3 | 70.9 | 133.5 |
| YE21 | TPROG | 0 | 150 | 10 | 27 | 33 | 44 | 69 | 35.1 | 14.8 | 20.3 | 49.9 |
| YE22 | TTSPROJ | 5 | 160 | 16 | 30 | 36 | 47 | 68 | 38.4 | 13.3 | 25.1 | 51.7 |
| YE23 | TTSANALY | 8 | 165 | 19 | 32 | 37 | 47 | 64 | 38.9 | 11.7 | 27.3 | 50.6 |
| YE24 | TTSDEVEL | 8 | 165 | 28 | 37 | 45 | 53 | 68 | 45.6 | 10.9 | 34.7 | 56.6 |
| YE25 | TDMPROJ | 25 | 200 | 38 | 45 | 52 | 60 | 69 | 51.6 | 9.0 | 42.6 | 60.7 |
| YE26 | TDMANALY | 25 | 200 | 39 | 43 | 48 | 53 | 60 | 47.8 | 6.5 | 41.3 | 54.3 |
| YE27 | TDMDEVEL | 25 | 200 | 48 | 65 | 71 | 79 | 83 | 70.1 | 9.6 | 60.5 | 79.7 |
| YE28 | TIMANALY | 25 | 200 | 27 | 38 | 40 | 44 | 47 | 39.6 | 5.6 | 34.0 | 45.2 |
| YE29 | TIMDEVEL | 25 | 200 | 27 | 85 | 117 | 133 | 149 | 107.0 | 31.3 | 75.7 | 138.3 |
| YE31 | OPROG | 0 | 150 | 7 | 22 | 28 | 34 | 58 | 29.0 | 12.4 | 16.7 | 41.4 |
| YE32 | OTSPROJ | 5 | 160 | 13 | 26 | 33 | 36 | 58 | 32.5 | 11.0 | 21.5 | 43.6 |
| YE33 | OTSANALY | 8 | 165 | 16 | 27 | 33 | 37 | 56 | 33.4 | 10.0 | 23.4 | 43.4 |
| YE34 | OTSDEVEL | 8 | 165 | 26 | 34 | 40 | 44 | 59 | 39.9 | 8.6 | 31.3 | 48.5 |
| YE35 | ODMPROJ | 25 | 200 | 35 | 41 | 45 | 52 | 64 | 46.4 | 8.2 | 38.2 | 54.7 |
| YE36 | ODMANALY | 25 | 200 | 32 | 38 | 42 | 47 | 58 | 43.0 | 6.9 | 36.2 | 49.9 |
| YE37 | ODMDEVEL | 25 | 200 | 48 | 58 | 67 | 73 | 78 | 65.0 | 8.7 | 56.3 | 73.8 |
| YE38 | OIMANALY | 25 | 200 | 26 | 28 | 37 | 42 | 55 | 36.3 | 8.6 | 27.7 | 44.9 |
| YE39 | OIMDEVEL | 25 | 200 | 23 | 79 | 114 | 128 | 143 | 102.8 | 31.5 | 71.4 | 134.3 |

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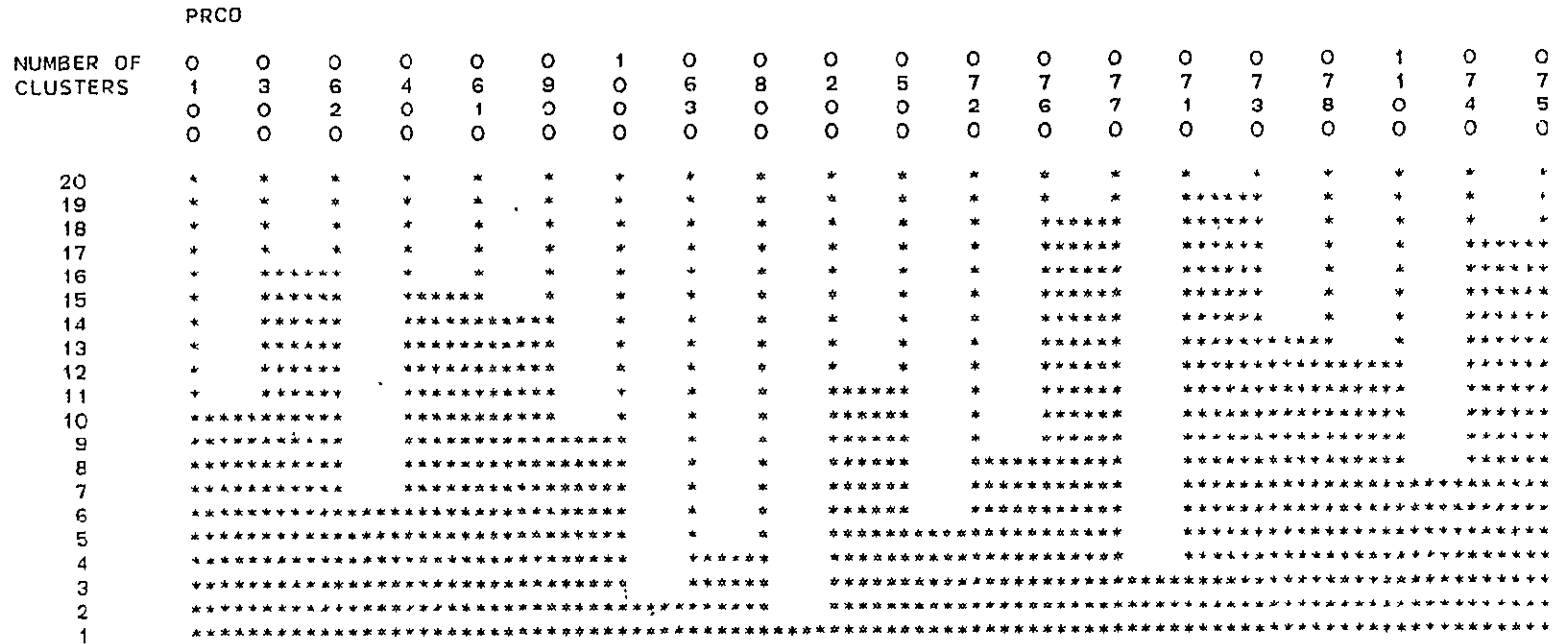


Figure A.5.4-2. Years of Environment Experience: Cluster Map for 20 Independent Systems

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Table A.5.4-5. Years of Environment Experience: Summary Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|-----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| YE01 | DPROG | 0 | 150 | 19 | 24 | 26 | 29 | 30 | 25.7 | 3.6 | 22.1 | 29.2 |
| YE02 | DTSPROJ | 5 | 160 | 23 | 28 | 31 | 32 | 33 | 29.6 | 3.1 | 26.4 | 32.7 |
| YE03 | DTSANALY | 8 | 165 | 24 | 30 | 32 | 35 | 37 | 31.4 | 3.8 | 27.6 | 35.3 |
| YE04 | DTSDEVEL | 8 | 165 | 30 | 32 | 34 | 39 | 41 | 35.1 | 3.9 | 31.2 | 39.0 |
| YE05 | DDMPROJ | 25 | 200 | 38 | 41 | 45 | 49 | 59 | 45.8 | 6.1 | 39.6 | 51.9 |
| YE06 | DDMANALY | 25 | 200 | 34 | 43 | 44 | 48 | 57 | 44.9 | 6.3 | 38.6 | 51.2 |
| YE07 | DDMDEVEL | 25 | 200 | 47 | 54 | 59 | 66 | 75 | 59.9 | 8.2 | 51.7 | 68.1 |
| YE08 | DIMANALY | 25 | 200 | 25 | 36 | 41 | 48 | 71 | 43.0 | 12.7 | 30.3 | 55.7 |
| YE09 | DIMDEVEL | 25 | 200 | 59 | 69 | 83 | 111 | 123 | 88.1 | 22.4 | 65.7 | 110.5 |
| YE11 | IPROG | 0 | 150 | 17 | 25 | 28 | 31 | 35 | 27.7 | 5.1 | 22.5 | 32.8 |
| YE12 | ITSPROJ | 5 | 160 | 22 | 29 | 31 | 35 | 35 | 31.1 | 4.3 | 26.8 | 35.4 |
| YE13 | ITSANALY | 8 | 165 | 22 | 30 | 32 | 36 | 38 | 32.4 | 4.9 | 27.5 | 37.3 |
| YE14 | ITSDEVEL | 8 | 165 | 33 | 34 | 38 | 41 | 43 | 37.6 | 3.9 | 33.7 | 41.4 |
| YE15 | IDMPROJ | 25 | 200 | 36 | 36 | 44 | 53 | 63 | 45.1 | 9.5 | 35.7 | 54.6 |
| YE16 | IDMANALY | 25 | 200 | 33 | 38 | 45 | 48 | 61 | 43.8 | 8.3 | 35.5 | 52.1 |
| YE17 | IDMDEVEL | 25 | 200 | 50 | 52 | 60 | 69 | 79 | 61.0 | 9.9 | 51.1 | 70.9 |
| YE18 | IIMANALY | 25 | 200 | 15 | 37 | 40 | 49 | 56 | 40.2 | 11.7 | 28.6 | 51.9 |
| YE19 | IIMDEVEL | 25 | 200 | 62 | 73 | 87 | 114 | 126 | 92.3 | 22.2 | 70.1 | 114.6 |
| YE21 | TPROG | 0 | 150 | 22 | 28 | 33 | 36 | 43 | 32.2 | 6.0 | 26.2 | 38.3 |
| YE22 | TTSPROJ | 5 | 160 | 26 | 32 | 36 | 40 | 47 | 36.1 | 6.1 | 30.0 | 42.2 |
| YE23 | TTSANALY | 8 | 165 | 28 | 34 | 37 | 40 | 47 | 37.1 | 5.3 | 31.8 | 42.5 |
| YE24 | TTSDEVEL | 8 | 165 | 37 | 38 | 45 | 47 | 51 | 42.8 | 5.1 | 37.7 | 47.9 |
| YE25 | TDMPROJ | 25 | 200 | 38 | 44 | 56 | 61 | 63 | 52.0 | 9.3 | 42.7 | 61.3 |
| YE26 | TDMANALY | 25 | 200 | 39 | 43 | 47 | 56 | 58 | 48.8 | 6.8 | 41.9 | 55.6 |
| YE27 | TDMDEVEL | 25 | 200 | 48 | 62 | 69 | 73 | 80 | 67.1 | 9.4 | 57.7 | 76.5 |
| YE28 | TIMANALY | 25 | 200 | 27 | 39 | 44 | 46 | 47 | 41.7 | 6.3 | 35.4 | 48.0 |
| YE29 | TIMDEVEL | 25 | 200 | 69 | 80 | 92 | 117 | 131 | 97.4 | 21.0 | 76.4 | 118.5 |
| YE31 | OPROG | 0 | 150 | 20 | 25 | 28 | 32 | 36 | 28.4 | 4.7 | 23.7 | 33.2 |
| YE32 | OTSPROJ | 5 | 160 | 24 | 30 | 34 | 35 | 38 | 32.2 | 4.2 | 28.0 | 36.4 |
| YE33 | OTSANALY | 8 | 165 | 25 | 31 | 35 | 37 | 39 | 33.6 | 4.3 | 29.3 | 37.8 |
| YE34 | OTSDLEVEL | 8 | 165 | 34 | 35 | 40 | 42 | 43 | 38.4 | 3.7 | 34.8 | 42.1 |
| YE35 | ODMPROJ | 25 | 200 | 41 | 42 | 46 | 53 | 62 | 47.6 | 7.2 | 40.4 | 54.7 |
| YE36 | ODMANALY | 25 | 200 | 36 | 42 | 46 | 49 | 58 | 45.7 | 6.1 | 39.5 | 51.8 |
| YE37 | ODMDEVEL | 25 | 200 | 48 | 57 | 62 | 69 | 78 | 62.6 | 8.7 | 53.9 | 71.2 |
| YE38 | OIMANALY | 25 | 200 | 26 | 37 | 42 | 48 | 55 | 41.8 | 8.6 | 33.1 | 50.4 |
| YE39 | OIMDEVEL | 25 | 200 | 64 | 74 | 88 | 114 | 127 | 92.9 | 21.8 | 71.1 | 114.7 |

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| NUMBER OF CLUSTERS | PRCD | | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|---|---|
| | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 9 | * | * | * | * | * | * | * | * | * |
| 8 | * | ***** | * | * | * | * | * | * | * |
| 7 | * | ***** | * | ***** | ***** | * | * | * | |
| 6 | * | ***** | ***** | ***** | ***** | ***** | * | * | |
| 5 | * | ***** | ***** | ***** | ***** | ***** | ***** | * | |
| 4 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | |

Figure A.5.4-3. Years of Environment Experience: Cluster Map for 9 Large Systems

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Table A.5.4-6. Years of Environment Experience: Summary Statistics for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| YE01 | DPROG | 0 | 150 | 6 | 12 | 18 | 37 | 46 | 21.8 | 14.2 | 7.6 | 36.0 |
| YE02 | DTS PROJ | 5 | 160 | 11 | 17 | 21 | 41 | 47 | 25.5 | 13.0 | 12.4 | 38.5 |
| YE03 | DTSANALY | 8 | 165 | 13 | 19 | 22 | 41 | 47 | 26.5 | 11.8 | 14.7 | 38.4 |
| YE04 | DTSDEVEL | 8 | 165 | 24 | 26 | 32 | 44 | 54 | 34.3 | 9.4 | 24.9 | 43.7 |
| YE05 | DDM PROJ | 25 | 200 | 31 | 35 | 36 | 46 | 60 | 40.5 | 9.7 | 30.8 | 50.1 |
| YE06 | DDMANALY | 25 | 200 | 29 | 32 | 33 | 40 | 53 | 37.1 | 8.0 | 29.1 | 45.1 |
| YE07 | DDMDEVEL | 25 | 200 | 42 | 60 | 64 | 69 | 72 | 62.2 | 9.2 | 53.0 | 71.3 |
| YE08 | DIMANALY | 25 | 200 | 17 | 25 | 25 | 38 | 43 | 29.9 | 8.3 | 21.6 | 38.2 |
| YE09 | DIMDEVEL | 25 | 200 | 18 | 78 | 123 | 129 | 138 | 106.9 | 37.0 | 69.9 | 143.9 |
| YE11 | IPROG | 0 | 150 | 6 | 19 | 27 | 42 | 67 | 29.8 | 17.9 | 11.9 | 47.8 |
| YE12 | ITSPROJ | 5 | 160 | 12 | 25 | 27 | 46 | 66 | 32.8 | 16.1 | 16.8 | 48.9 |
| YE13 | ITSANALY | 8 | 165 | 14 | 26 | 28 | 46 | 62 | 32.6 | 14.1 | 18.6 | 46.7 |
| YE14 | ITSDEVEL | 8 | 165 | 25 | 33 | 39 | 46 | 66 | 40.8 | 12.4 | 28.4 | 53.2 |
| YE15 | IDM PROJ | 25 | 200 | 27 | 37 | 43 | 50 | 65 | 45.0 | 11.0 | 34.0 | 56.0 |
| YE16 | IDMANALY | 25 | 200 | 28 | 32 | 37 | 47 | 56 | 39.2 | 8.6 | 30.6 | 47.8 |
| YE17 | IDMDEVEL | 25 | 200 | 51 | 64 | 68 | 73 | 78 | 67.0 | 8.1 | 58.9 | 75.1 |
| YE18 | IIMANALY | 25 | 200 | 14 | 15 | 28 | 37 | 40 | 26.9 | 10.9 | 16.1 | 37.8 |
| YE19 | IIMDEVEL | 25 | 200 | 23 | 85 | 126 | 130 | 142 | 110.3 | 36.1 | 74.2 | 146.4 |
| YE21 | T PROJ | 0 | 150 | 10 | 20 | 32 | 54 | 69 | 37.5 | 19.4 | 18.1 | 56.8 |
| YE22 | TTS PROJ | 5 | 160 | 16 | 26 | 36 | 57 | 68 | 40.3 | 17.2 | 23.1 | 57.5 |
| YE23 | TTSANALY | 8 | 165 | 19 | 28 | 36 | 56 | 64 | 40.5 | 15.2 | 25.3 | 55.6 |
| YE24 | TTSDEVEL | 8 | 165 | 28 | 37 | 47 | 62 | 68 | 48.0 | 13.8 | 34.2 | 61.8 |
| YE25 | TDM PROJ | 25 | 200 | 39 | 45 | 51 | 58 | 69 | 51.4 | 9.2 | 42.2 | 60.6 |
| YE26 | TDMANALY | 25 | 200 | 39 | 40 | 48 | 52 | 60 | 47.0 | 6.4 | 40.6 | 53.4 |
| YE27 | TDMDEVEL | 25 | 200 | 55 | 66 | 74 | 80 | 83 | 72.5 | 9.4 | 63.2 | 81.9 |
| YE28 | TIMANALY | 25 | 200 | 28 | 38 | 40 | 41 | 43 | 37.9 | 4.7 | 33.2 | 42.6 |
| YE29 | TIMDEVEL | 25 | 200 | 27 | 88 | 131 | 134 | 149 | 114.8 | 36.9 | 77.9 | 151.7 |
| YE31 | OPROG | 0 | 150 | 7 | 17 | 27 | 46 | 58 | 29.5 | 16.5 | 13.1 | 46.0 |
| YE32 | OTSPROJ | 5 | 160 | 13 | 23 | 29 | 50 | 58 | 32.8 | 14.8 | 18.1 | 47.6 |
| YE33 | OTSANALY | 8 | 165 | 16 | 25 | 30 | 48 | 56 | 33.3 | 13.2 | 20.1 | 46.5 |
| YE34 | OTSDEVEL | 8 | 165 | 26 | 32 | 41 | 48 | 59 | 41.1 | 11.2 | 29.9 | 52.3 |
| YE35 | ODM PROJ | 25 | 200 | 35 | 38 | 43 | 50 | 64 | 45.5 | 9.3 | 36.3 | 54.8 |
| YE36 | ODMANALY | 25 | 200 | 32 | 36 | 39 | 44 | 56 | 40.9 | 6.9 | 34.0 | 47.8 |
| YE37 | ODMDEVEL | 25 | 200 | 49 | 63 | 69 | 74 | 76 | 67.1 | 8.6 | 58.5 | 75.7 |
| YE38 | OIMANALY | 25 | 200 | 26 | 26 | 31 | 39 | 41 | 31.8 | 5.8 | 26.1 | 37.6 |
| YE39 | OIMDEVEL | 25 | 200 | 23 | 84 | 127 | 131 | 143 | 111.0 | 36.6 | 74.4 | 147.6 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 6 | 7 | 7 | 1 | 7 | 7 | 7 | 7 | 7 | 6 | 8 |
| | 2 | 1 | 8 | 0 | 4 | 5 | 2 | 6 | 7 | 3 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | * |
| 9 | * | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * | * |

Figure A.5.4-4. Years of Environment Experience: Cluster Map for 11 Small Systems

A.6 MODELS CLASS OF MEASURES

The Models class measures all four components of software development, i.e., the problem, the environment, the process, and the product. Most of the measures in this class exist in one of the other classes because the models require the measures to be in a form inconvenient for SEL use or scaled differently than the SEL prefers. The measures in this class, some with minor adjustments, comprise the input for the following models:

- IBM's Walston-Felix (WF01 through WF80)
 - Experience (WF01 through WF10)
 - Complexity (WF11 through WF30)
 - Process (WF31 through WF60)
 - Product (WF61 through WF80)
 - Sums (WF81 and WF82)

- RCA's PRICE S3 (PS01 through PS20)
 - Process (PS01 through PS09)
 - Complexity (PS10 through PS13)
 - Product (PS14 through PS17)
 - Other (PS18 through PS20)
 - Sum (PS81)

- TRW's Boehm's COCOMO (CO01 through CO15)
 - Product (CO01 through CO03)
 - Computer (CO04 through CO07)
 - Personnel (CO08 through CO12)
 - Project (CO13 through CO15)

A.6.1 WALSTON-FELIX MODEL

| | | | |
|--------------|------------|--------------|-------------|
| - <u>X</u> - | Objective | - - - | Subjective |
| - <u>X</u> - | Absolute | - - - | Relative |
| - <u>X</u> - | Explicit | - - - | Derived |
| - <u>X</u> - | Static | - - - | Dynamic |
| - - - | Predictive | - <u>X</u> - | Explanatory |

This category measures all four components of software development. The experience (WF01 through WF10) and the complexity (WF11 through WF30) subcategories of measures are subjective in the manner in which they are scaled and the interpretation of the scale values, although objective data are needed to determine values. Both subcategories are predictive: fairly good estimates of the experience measures can be obtained at the beginning of a project, and estimates of the complexity measures improve from the beginning of the project until implementation starts. Both subcategories become static during implementation.

Most of the measures in the process (WF31 through WF60) and the product (WF61 through WF80) subcategories are objective and are computed from explicit and absolute data. Therefore, they are static and explanatory at the end of the project. However, to use the model, estimates (dynamic) of the measures must be made for prediction.

The remainder of this subsection contains tables and figures that describe the Walston-Felix measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.6.1-1)
- Values of the measures for 25 systems (Table A.6.1-2), where for the subjective experience and complexity measures large values indicate more experience and more complexity
- Summary statistics for 11 projects (Table A.6.1-3)
- Cluster map for 11 projects (Figure A.6.1-1)
- Summary statistics for 20 independent systems (Table A.6.1-4)

- Cluster map for 20 independent systems (Figure A.6.1-2)
- Summary statistics for 9 large systems (Table A.6.1-5)
- Cluster map for 9 large systems (Figure A.6.1-3)
- Summary statistics for 11 small systems (Table A.6.1-6)
- Cluster map for 11 small systems (Figure A.6.1-4)

Table A.6.1-1. Walston-Felix: Description of Measures
(1 of 4)

| Code | Measure | Range | | Description |
|------|----------|-------|------|---|
| | | Low | High | |
| WF01 | EAPPLICA | 00 | 50 | Experience With Application |
| WF02 | EREQDEF | 00 | 50 | Participation in Requirements Definition |
| WF03 | EPPDESGN | 00 | 99 | Percentage of Programmers in Design Programmers' |
| WF04 | EPQUALFX | 00 | 60 | Qualifications |
| WF05 | EPMACHIN | 00 | 50 | Familiarity With Machine |
| WF06 | EPLANGE | 00 | 50 | Familiarity With Language |
| WF07 | EPGRAPHX | 00 | 50 | Familiarity With Graphics |
| WF08 | EPAPPLIC | 00 | 50 | Familiarity With Application |
| WF09 | EPTOGETH | 00 | 50 | Degree to Which Personnel Worked Together |
| WF10 | E | 00 | 00 | Not Defined |
| WF11 | CREQDEF | 00 | 50 | Participation in Requirements Definition Customer— |
| WF12 | CINTERFC | 00 | 50 | Interface |
| WF13 | CDCHANGS | 00 | 60 | Originated Design Changes |
| WF14 | CPROCESS | 00 | 50 | Application Processing |
| WF15 | CFLOW | 00 | 50 | Program Flow Communications |
| WF16 | CPROGCOM | 00 | 50 | Interprogram |
| WF17 | CEXTCOM | 00 | 50 | External |
| WF18 | CDBSTRUC | 00 | 50 | Data Base Structure |
| WF19 | CGRAPHX | 00 | 50 | Percentage of Code, Real-Time or Graphics Constraint |
| WF20 | CSTORAGE | 00 | 50 | Storage |
| WF21 | CTIMING | 00 | 50 | Timing |
| WF22 | CIO | 00 | 50 | Input/Output |

Table A.6.1-1. Walston-Felix: Description of Measures
(2 of 4)

| Code | Measure | Range | | Description |
|------|----------|-------|------|---------------------------------|
| | | Low | High | |
| WF23 | CDBITEMS | 00 | 99 | Items in Data Base |
| WF24 | CHW | 00 | 50 | Hardware Under Development |
| WF25 | CCLASIFD | 00 | 50 | Unclassified |
| WF26 | C | 00 | 00 | Not Defined |
| WF27 | C | 00 | 00 | Not Defined |
| WF28 | C | 00 | 00 | Not Defined |
| WF29 | C | 00 | 00 | Not Defined |
| WF30 | C | 00 | 00 | Not Defined |
| | | | | Percentage of |
| WF31 | PDEV95 | 000 | 999 | Development on IBM S/360/95 |
| WF32 | PDEV75 | 000 | 999 | Development on IBM S/360-75 |
| WF33 | PDEVSTL | 000 | 999 | Development at STL |
| WF34 | PPPDESGN | 000 | 999 | Programmers in Design |
| WF35 | PTOGETHR | 000 | 999 | Previous Personnel Interactions |
| WF36 | PECLOSED | 000 | 050 | Environment Closed |
| WF37 | PEOPENWR | 000 | 999 | Environment Open With Respect |
| WF38 | PEOPEN | 000 | 999 | Environment Open |
| WF39 | PERJE | 000 | 999 | Environment RJE |
| WF40 | PETSO | 000 | 999 | Environment TSO |
| WF41 | PCSTRUC | 000 | 999 | Code Structured |
| WF42 | PCREAD | 000 | 999 | Code Read |
| WF43 | PCTOPDWN | 000 | 999 | Code Developed Top-Down |
| WF44 | PCCHIEF | 000 | 999 | Code via Chief Programmer |
| WF45 | PEMANAGE | 000 | 250 | Effort, Management |
| WF46 | PEADMIN | 000 | 100 | Effort, Administration |
| WF47 | PEPROG | 000 | 950 | Effort, Programmers |
| WF48 | PEANALYT | 000 | 950 | Effort, Analysts |

Table A.6.1-1. Walston-Felix: Description of Measures
(3 of 4)

| Code | Measure | Range | | Description |
|------|----------|--------|--------|--|
| | | Low | High | |
| | | | | Percentage of |
| WF49 | PEOPER | 000 | 333 | Effort, Operators |
| WF50 | PEOTHERS | 000 | 250 | Effort, Others |
| | | | | Total |
| WF51 | PTOTALHR | 00000 | 96000 | Staff-Months |
| WF52 | PCOSTPHR | 00000 | 99999 | Cost in Programmer Units |
| WF53 | P | 000 | 000 | Not Defined |
| WF54 | PPSCHACC | 450 | 999 | Percentage of Schedule To Complete Acceptance Testing (Actual Workweeks) |
| WF55 | PTWEEKS | 016 | 104 | Total Weeks To Complete Project (Workweeks) |
| WF56 | P | 000 | 000 | Not Defined |
| WF57 | P | 000 | 000 | Not Defined |
| WF58 | P | 000 | 000 | Not Defined |
| WF59 | P | 000 | 000 | Not Defined |
| WF60 | P | 000 | 000 | Not Defined |
| | | | | Percentage of |
| WF61 | DCNONMTH | 000 | 999 | Code, Nonmathematical and I/O Formatting |
| WF62 | DCMATH | 000 | 500 | Code, Mathematical and Computational |
| WF63 | DCIOCNTL | 000 | 250 | Code, CPU and I/O Control |
| WF64 | DCRECOVR | 000 | 100 | Code, Fallback and Recovery |
| WF65 | DCOTHER | 000 | 999 | Code, Other |
| WF66 | DCGRAPHX | 000 | 625 | Code, Real-Time or Graphics |
| | | | | Developed Lines |
| WF67 | DDVLOL | 000000 | 060000 | ALC (assembler) |
| WF68 | DDVMOL | 000000 | 060000 | Macros |

Table A.6.1-1. Walston-Felix: Description of Measures
(4 of 4)

| Code | Measure | Range | | Description |
|------|----------|--------|--------|-----------------------------|
| | | Low | High | |
| | | | | Developed Lines (Continued) |
| WF69 | DDVHOL | 000000 | 240000 | FORTTRAN |
| WF70 | DDVTOT | 000000 | 240000 | Total |
| | | | | Delivered Lines |
| WF71 | DDLLOL | 000000 | 060000 | ALC |
| WF72 | DDLMOl | 000000 | 060000 | Macros |
| WF73 | DDLHOL | 000000 | 240000 | FORTTRAN |
| WF74 | DDLTOT | 000000 | 240000 | Total |
| WF75 | DDBITEMS | 0000 | 2000 | Items in Data Base |
| WF76 | DDOCPAGE | 0000 | 9999 | Pages of Documentation |
| WF77 | D | 0000 | 0000 | Not Defined |
| WF78 | D | 0000 | 0000 | Not Defined |
| WF79 | D | 0000 | 0000 | Not Defined |
| WF80 | D | 0000 | 0000 | Not Defined |
| WF81 | EXPERIEN | 000 | 509 | Sum WF01 Through WF09 |
| WF82 | COMPLEX | 000 | 809 | Sum WF11 Through WF25 |

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Table A.6.1-2. Walston-Felix: Values of the Measures
for 25 Systems (1 of 4)

| PRCO | WFO1 | WFO2 | WFO3 | WFO4 | WFO5 | WFO6 | WFO7 | WFO8 | WFO9 | WF81 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 50 | 50 | 75 | 40 | 30 | 50 | 50 | 30 | 10 | 385 |
| 0200 | 50 | 50 | 70 | 20 | 30 | 50 | 30 | 30 | 10 | 340 |
| 0300 | 50 | 50 | 71 | 40 | 30 | 50 | 50 | 30 | 10 | 381 |
| 0400 | 50 | 50 | 75 | 20 | 30 | 50 | 30 | 30 | 30 | 365 |
| 0500 | 50 | 50 | 99 | 50 | 30 | 50 | 50 | 30 | 30 | 439 |
| 0600 | 50 | 50 | 55 | 40 | 30 | 50 | 50 | 30 | 10 | 365 |
| 0700 | 50 | 50 | 55 | 20 | 30 | 50 | 30 | 30 | 10 | 325 |
| 0800 | 50 | 30 | 33 | 60 | 50 | 50 | 50 | 50 | 10 | 383 |
| 0900 | 50 | 30 | 80 | 10 | 30 | 50 | 30 | 10 | 10 | 300 |
| 1000 | 50 | 30 | 71 | 30 | 30 | 50 | 50 | 30 | 10 | 351 |
| 1100 | 50 | 50 | 99 | 40 | 30 | 50 | 50 | 30 | 10 | 409 |
| 9000 | 50 | 30 | 78 | 20 | 30 | 50 | 40 | 25 | 10 | 333 |
| 0610 | 50 | 50 | 67 | 40 | 30 | 50 | 50 | 30 | 10 | 377 |
| 0620 | 50 | 50 | 95 | 40 | 30 | 50 | 50 | 30 | 10 | 405 |
| 0630 | 50 | 50 | 67 | 40 | 45 | 50 | 50 | 35 | 25 | 412 |
| 0631 | 50 | 50 | 50 | 40 | 50 | 50 | 50 | 50 | 30 | 420 |
| 0632 | 50 | 50 | 99 | 20 | 30 | 50 | 40 | 10 | 10 | 359 |
| 0710 | 50 | 50 | 50 | 40 | 30 | 50 | 50 | 30 | 10 | 360 |
| 0720 | 50 | 50 | 99 | 60 | 50 | 50 | 50 | 50 | 10 | 469 |
| 0730 | 50 | 50 | 50 | 40 | 50 | 50 | 50 | 50 | 10 | 400 |
| 0740 | 50 | 50 | 75 | 10 | 10 | 30 | 30 | 10 | 10 | 275 |
| 0750 | 50 | 50 | 50 | 20 | 30 | 50 | 10 | 10 | 10 | 280 |
| 0760 | 50 | 50 | 99 | 50 | 30 | 50 | 50 | 30 | 10 | 419 |
| 0770 | 50 | 50 | 50 | 40 | 50 | 50 | 50 | 50 | 10 | 400 |
| 0780 | 50 | 50 | 50 | 20 | 30 | 50 | 10 | 20 | 10 | 290 |

| PRCO | WF11 | WF12 | WF13 | WF14 | WF15 | WF16 | WF17 | WF18 | WF19 | WF20 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 10 | 40 | 20 | 30 | 30 | 30 | 30 | 30 | 20 | 50 |
| 0200 | 10 | 40 | 20 | 30 | 30 | 30 | 30 | 30 | 20 | 50 |
| 0300 | 10 | 30 | 20 | 30 | 30 | 30 | 30 | 50 | 30 | 50 |
| 0400 | 10 | 30 | 40 | 50 | 50 | 50 | 30 | 50 | 10 | 50 |
| 0500 | 10 | 30 | 40 | 30 | 30 | 30 | 30 | 30 | 20 | 50 |
| 0600 | 10 | 50 | 60 | 50 | 50 | 50 | 30 | 50 | 40 | 50 |
| 0700 | 10 | 30 | 40 | 50 | 50 | 50 | 30 | 50 | 20 | 30 |
| 0800 | 30 | 30 | 40 | 30 | 30 | 30 | 30 | 50 | 0 | 50 |
| 0900 | 30 | 30 | 40 | 50 | 30 | 30 | 30 | 30 | 30 | 30 |
| 1000 | 30 | 30 | 40 | 50 | 50 | 50 | 30 | 50 | 30 | 30 |
| 1100 | 10 | 30 | 40 | 30 | 30 | 30 | 30 | 30 | 40 | 50 |
| 9000 | 30 | 30 | 40 | 50 | 30 | 30 | 30 | 40 | 30 | 30 |
| 0610 | 10 | 50 | 60 | 50 | 50 | 50 | 30 | 50 | 40 | 50 |
| 0620 | 10 | 30 | 40 | 30 | 30 | 30 | 30 | 30 | 40 | 30 |
| 0630 | 10 | 40 | 50 | 30 | 30 | 30 | 30 | 30 | 40 | 30 |
| 0631 | 10 | 50 | 60 | 30 | 30 | 30 | 30 | 30 | 50 | 30 |
| 0632 | 10 | 30 | 20 | 30 | 30 | 30 | 30 | 30 | 10 | 10 |
| 0710 | 10 | 30 | 40 | 50 | 30 | 30 | 30 | 50 | 30 | 50 |
| 0720 | 10 | 30 | 20 | 30 | 30 | 30 | 30 | 30 | 40 | 30 |
| 0730 | 10 | 30 | 40 | 50 | 30 | 50 | 30 | 50 | 30 | 30 |
| 0740 | 10 | 30 | 0 | 30 | 30 | 30 | 30 | 30 | 10 | 30 |
| 0750 | 10 | 30 | 60 | 30 | 30 | 30 | 30 | 30 | 20 | 10 |
| 0760 | 10 | 30 | 0 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| 0770 | 10 | 30 | 20 | 30 | 30 | 30 | 30 | 30 | 0 | 10 |
| 0780 | 10 | 50 | 40 | 30 | 30 | 30 | 30 | 30 | 20 | 30 |

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Table A.6.1-2. Walston-Felix: Values of the Measures for 25 Systems (2 of 4)

| PRCO | WF21 | WF22 | WF23 | WF24 | WF25 | WF82 |
|------|------|------|------|------|------|------|
| 0100 | 30 | 30 | 15 | 0 | 0 | 365 |
| 0200 | 30 | 30 | 7 | 0 | 0 | 357 |
| 0300 | 30 | 30 | 19 | 0 | 0 | 389 |
| 0400 | 50 | 50 | 26 | 0 | 0 | 496 |
| 0500 | 30 | 30 | 7 | 0 | 0 | 367 |
| 0600 | 30 | 30 | 73 | 0 | 0 | 573 |
| 0700 | 30 | 30 | 28 | 0 | 0 | 448 |
| 0800 | 30 | 30 | 11 | 0 | 0 | 391 |
| 0900 | 30 | 50 | 8 | 0 | 0 | 418 |
| 1000 | 50 | 50 | 11 | 0 | 0 | 501 |
| 1100 | 30 | 30 | 5 | 0 | 0 | 385 |
| 9000 | 40 | 50 | 24 | 0 | 0 | 454 |
| 0610 | 30 | 30 | 60 | 0 | 0 | 560 |
| 0620 | 30 | 10 | 19 | 0 | 0 | 359 |
| 0630 | 30 | 10 | 15 | 0 | 0 | 375 |
| 0631 | 30 | 10 | 14 | 0 | 0 | 404 |
| 0632 | 30 | 10 | 2 | 0 | 0 | 272 |
| 0710 | 30 | 30 | 11 | 0 | 0 | 421 |
| 0720 | 30 | 30 | 9 | 0 | 0 | 349 |
| 0730 | 30 | 50 | 11 | 0 | 0 | 441 |
| 0740 | 30 | 10 | 8 | 0 | 0 | 278 |
| 0750 | 30 | 30 | 8 | 0 | 0 | 348 |
| 0760 | 30 | 10 | 3 | 0 | 0 | 293 |
| 0770 | 30 | 10 | 4 | 0 | 0 | 264 |
| 0780 | 30 | 10 | 4 | 0 | 0 | 344 |

| PRCO | WF31 | WF32 | WF33 | WF34 | WF35 | WF36 | WF37 | WF38 | WF39 | WF40 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 666 | 334 | 0 | 750 | 250 | 17 | 317 | 0 | 666 | 0 |
| 0200 | 485 | 515 | 0 | 700 | 200 | 26 | 489 | 0 | 436 | 49 |
| 0300 | 576 | 424 | 0 | 714 | 286 | 29 | 395 | 0 | 461 | 115 |
| 0400 | 503 | 497 | 0 | 750 | 875 | 25 | 472 | 0 | 302 | 201 |
| 0500 | 527 | 471 | 2 | 999 | 800 | 24 | 449 | 0 | 527 | 0 |
| 0600 | 585 | 370 | 45 | 545 | 182 | 19 | 351 | 45 | 526 | 59 |
| 0700 | 384 | 616 | 0 | 545 | 273 | 30 | 586 | 0 | 216 | 168 |
| 0800 | 990 | 10 | 0 | 333 | 0 | 0 | 10 | 0 | 990 | 0 |
| 0900 | 648 | 352 | 0 | 800 | 200 | 17 | 335 | 0 | 454 | 194 |
| 1000 | 631 | 369 | 0 | 710 | 714 | 18 | 351 | 0 | 315 | 316 |
| 1100 | 425 | 575 | 0 | 950 | 999 | 29 | 546 | 0 | 0 | 425 |
| 9000 | 619 | 381 | 0 | 775 | 636 | 19 | 362 | 0 | 327 | 292 |
| 0610 | 596 | 404 | 0 | 667 | 222 | 20 | 384 | 0 | 536 | 60 |
| 0620 | 950 | 50 | 0 | 950 | 999 | 3 | 47 | 0 | 855 | 95 |
| 0630 | 198 | 516 | 286 | 667 | 200 | 25 | 491 | 286 | 121 | 77 |
| 0631 | 100 | 900 | 0 | 500 | 333 | 45 | 855 | 0 | 90 | 10 |
| 0632 | 320 | 40 | 640 | 999 | 999 | 2 | 38 | 640 | 160 | 160 |
| 0710 | 419 | 581 | 0 | 500 | 999 | 29 | 552 | 0 | 210 | 209 |
| 0720 | 250 | 750 | 0 | 999 | 999 | 38 | 712 | 0 | 250 | 0 |
| 0730 | 223 | 777 | 0 | 500 | 0 | 39 | 738 | 0 | 167 | 56 |
| 0740 | 999 | 1 | 0 | 750 | 0 | 0 | 0 | 0 | 250 | 750 |
| 0750 | 608 | 392 | 0 | 500 | 0 | 20 | 372 | 0 | 304 | 304 |
| 0760 | 77 | 923 | 0 | 999 | 999 | 46 | 877 | 0 | 77 | 0 |
| 0770 | 999 | 1 | 0 | 500 | 999 | 0 | 0 | 0 | 500 | 500 |
| 0780 | 934 | 66 | 0 | 500 | 0 | 3 | 63 | 0 | 700 | 234 |

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Table A.6.1-2. Walston-Felix: Values of the Measures
for 25 Systems (3 of 4)

| PRCO | WF41 | WF42 | WF43 | WF44 | WF45 | WF46 | WF47 | WF48 | WF49 | WF50 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 600 | 650 | 800 | 900 | 125 | 20 | 640 | 0 | 0 | 215 |
| 0200 | 500 | 100 | 200 | 750 | 120 | 20 | 777 | 0 | 0 | 83 |
| 0300 | 400 | 300 | 200 | 500 | 246 | 30 | 643 | 0 | 0 | 81 |
| 0400 | 650 | 100 | 200 | 400 | 196 | 30 | 696 | 0 | 0 | 78 |
| 0500 | 750 | 950 | 600 | 950 | 206 | 30 | 607 | 0 | 0 | 157 |
| 0600 | 650 | 800 | 800 | 850 | 142 | 21 | 678 | 0 | 0 | 159 |
| 0700 | 600 | 250 | 700 | 500 | 145 | 20 | 722 | 0 | 0 | 113 |
| 0800 | 900 | 500 | 800 | 999 | 153 | 77 | 559 | 0 | 0 | 211 |
| 0900 | 750 | 100 | 200 | 400 | 171 | 43 | 661 | 0 | 0 | 125 |
| 1000 | 750 | 300 | 400 | 650 | 175 | 44 | 618 | 0 | 0 | 163 |
| 1100 | 750 | 100 | 600 | 999 | 178 | 44 | 643 | 0 | 0 | 135 |
| 9000 | 750 | 200 | 300 | 500 | 173 | 44 | 640 | 0 | 0 | 143 |
| 0610 | 650 | 850 | 800 | 850 | 140 | 19 | 681 | 0 | 0 | 160 |
| 0620 | 500 | 100 | 800 | 999 | 158 | 26 | 615 | 0 | 0 | 201 |
| 0630 | 750 | 800 | 800 | 900 | 134 | 29 | 709 | 0 | 0 | 128 |
| 0631 | 750 | 999 | 900 | 999 | 158 | 39 | 630 | 0 | 0 | 173 |
| 0632 | 750 | 500 | 800 | 750 | 70 | 0 | 927 | 0 | 0 | 3 |
| 0710 | 700 | 200 | 800 | 900 | 168 | 27 | 702 | 0 | 0 | 103 |
| 0720 | 750 | 0 | 800 | 999 | 79 | 7 | 783 | 0 | 0 | 131 |
| 0730 | 550 | 300 | 600 | 850 | 169 | 16 | 713 | 0 | 0 | 102 |
| 0740 | 600 | 100 | 400 | 999 | 155 | 33 | 645 | 0 | 0 | 167 |
| 0750 | 750 | 0 | 800 | 999 | 188 | 33 | 625 | 0 | 0 | 154 |
| 0760 | 750 | 800 | 400 | 800 | 94 | 8 | 797 | 0 | 0 | 101 |
| 0770 | 750 | 0 | 600 | 900 | 202 | 64 | 603 | 0 | 0 | 131 |
| 0780 | 750 | 200 | 800 | 999 | 115 | 6 | 767 | 0 | 0 | 112 |

| PRCO | WF51 | WF52 | WF54 | WF55 |
|------|-------|-------|------|------|
| 0100 | 11582 | 11176 | 831 | 83 |
| 0200 | 9600 | 9875 | 758 | 66 |
| 0300 | 7902 | 8671 | 905 | 63 |
| 0400 | 9080 | 9749 | 844 | 64 |
| 0500 | 3964 | 4120 | 864 | 44 |
| 0600 | 13829 | 13849 | 938 | 81 |
| 0700 | 9836 | 10090 | 900 | 70 |
| 0800 | 3266 | 3296 | 918 | 61 |
| 0900 | 10628 | 11098 | 947 | 94 |
| 1000 | 10604 | 10898 | 943 | 88 |
| 1100 | 2769 | 2888 | 934 | 76 |
| 9000 | 24002 | 24885 | 947 | 94 |
| 0610 | 9874 | 9866 | 938 | 81 |
| 0620 | 1563 | 1550 | 897 | 68 |
| 0630 | 2392 | 2434 | 878 | 41 |
| 0631 | 1758 | 1780 | 878 | 41 |
| 0632 | 633 | 654 | 561 | 41 |
| 0710 | 1892 | 1980 | 814 | 70 |
| 0720 | 1033 | 1010 | 902 | 61 |
| 0730 | 2848 | 2966 | 857 | 70 |
| 0740 | 696 | 703 | 816 | 49 |
| 0750 | 1298 | 932 | 476 | 63 |
| 0760 | 732 | 732 | 895 | 38 |
| 0770 | 496 | 529 | 999 | 48 |
| 0780 | 840 | 844 | 720 | 25 |

Table A.6.1-2. Walston-Felix: Values of the Measures for 25 Systems (4 of 4)

| PRCO | WF61 | WF62 | WF63 | WF64 | WF65 | WF66 | WF67 | WF68 | WF69 | WF70 |
|------|------|------|------|------|------|------|------|-------|-------|--------|
| 0100 | 523 | 316 | 111 | 50 | 0 | 277 | 1736 | 9343 | 79077 | 90156 |
| 0200 | 515 | 328 | 107 | 50 | 0 | 267 | 507 | 5925 | 39780 | 46212 |
| 0300 | 598 | 190 | 162 | 50 | 0 | 405 | 962 | 6254 | 39243 | 46459 |
| 0400 | 631 | 240 | 79 | 50 | 0 | 197 | 3049 | 5952 | 45530 | 54531 |
| 0500 | 544 | 319 | 87 | 50 | 0 | 217 | 489 | 3422 | 27233 | 31144 |
| 0600 | 511 | 260 | 179 | 50 | 0 | 447 | 774 | 19214 | 80784 | 100772 |
| 0700 | 565 | 270 | 115 | 50 | 0 | 287 | 506 | 10287 | 56670 | 67463 |
| 0800 | 370 | 480 | 100 | 50 | 0 | 0 | 5 | 0 | 14945 | 14950 |
| 0900 | 502 | 328 | 120 | 50 | 0 | 300 | 247 | 6703 | 42519 | 49469 |
| 1000 | 504 | 317 | 129 | 50 | 0 | 322 | 330 | 8129 | 40509 | 48968 |
| 1100 | 571 | 214 | 165 | 50 | 0 | 412 | 280 | 2846 | 8986 | 12112 |
| 9000 | 518 | 303 | 129 | 50 | 0 | 322 | 857 | 17678 | 92014 | 110550 |
| 0610 | 549 | 220 | 181 | 50 | 0 | 452 | 676 | 15284 | 62620 | 78580 |
| 0620 | 277 | 480 | 193 | 50 | 0 | 482 | 0 | 1960 | 7776 | 9736 |
| 0630 | 466 | 323 | 161 | 50 | 0 | 402 | 98 | 1970 | 10388 | 12456 |
| 0631 | 248 | 480 | 222 | 50 | 0 | 555 | 98 | 1618 | 5180 | 6896 |
| 0632 | 878 | 10 | 62 | 50 | 0 | 155 | 0 | 352 | 5208 | 5560 |
| 0710 | 800 | 10 | 140 | 50 | 0 | 350 | 355 | 2074 | 10325 | 12754 |
| 0720 | 409 | 390 | 151 | 50 | 0 | 377 | 0 | 2155 | 8356 | 10511 |
| 0730 | 533 | 290 | 127 | 50 | 0 | 317 | 113 | 4177 | 17219 | 21509 |
| 0740 | 890 | 10 | 50 | 50 | 0 | 100 | 38 | 0 | 3022 | 3060 |
| 0750 | 519 | 330 | 101 | 50 | 0 | 252 | 0 | 457 | 3776 | 4233 |
| 0760 | 324 | 480 | 146 | 50 | 0 | 365 | 0 | 1424 | 6401 | 7825 |
| 0770 | 420 | 480 | 50 | 50 | 0 | 0 | 0 | 0 | 2052 | 2052 |
| 0780 | 840 | 10 | 100 | 50 | 0 | 200 | 0 | 0 | 4978 | 4978 |

| PRCO | WF71 | WF72 | WF73 | WF74 | WF75 | WF76 |
|------|-------|-------|--------|--------|------|------|
| 0100 | 2970 | 12417 | 96481 | 111868 | 290 | 2473 |
| 0200 | 1157 | 5925 | 48155 | 55237 | 138 | 1104 |
| 0300 | 2016 | 8270 | 42641 | 50911 | 380 | 1613 |
| 0400 | 14682 | 5952 | 54759 | 75393 | 529 | 1793 |
| 0500 | 1683 | 6524 | 67213 | 75420 | 145 | 1120 |
| 0600 | 1778 | 19790 | 88738 | 110306 | 1455 | 3017 |
| 0700 | 1594 | 10287 | 77632 | 89513 | 553 | 2695 |
| 0800 | 26 | 0 | 15232 | 15258 | 218 | 763 |
| 0900 | 1233 | 8086 | 58006 | 67325 | 165 | 2107 |
| 1000 | 1649 | 8543 | 56074 | 66266 | 219 | 2360 |
| 1100 | 685 | 2846 | 13740 | 17271 | 93 | 760 |
| 9000 | 3567 | 19475 | 127820 | 150862 | 477 | 5227 |
| 0610 | 1290 | 15447 | 68632 | 85399 | 1208 | 2458 |
| 0620 | 0 | 1966 | 8206 | 10172 | 372 | 255 |
| 0630 | 488 | 2370 | 11900 | 14758 | 299 | 366 |
| 0631 | 488 | 2025 | 6613 | 9126 | 284 | 300 |
| 0632 | 0 | 352 | 5287 | 5639 | 40 | 66 |
| 0710 | 841 | 2074 | 11948 | 14863 | 222 | 527 |
| 0720 | 0 | 2155 | 12127 | 14282 | 185 | 511 |
| 0730 | 564 | 4177 | 28081 | 32822 | 225 | 873 |
| 0740 | 189 | 0 | 5308 | 5497 | 161 | 136 |
| 0750 | 0 | 457 | 4068 | 4525 | 155 | 214 |
| 0760 | 0 | 1424 | 8303 | 9727 | 54 | 284 |
| 0770 | 0 | 0 | 2052 | 2052 | 78 | 61 |
| 0780 | 0 | 0 | 5204 | 5204 | 82 | 163 |

Table A.6.1-3. Walston-Felix: Summary Statistics for 11 Projects (1 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|-------|------------------------|-------|--------|-------|-------|---------|---------|--------|---------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| WFO1 | EAPPLICA | 0 | 50 | 50 | 50 | 50 | 50 | 50 | 50.0 | 0.0 | 50.0 | 50.0 |
| WFO2 | EREQDEF | 0 | 50 | 30 | 30 | 50 | 50 | 50 | 44.5 | 9.3 | 35.2 | 53.9 |
| WFO3 | EPPDESGN | 0 | 99 | 33 | 55 | 71 | 80 | 99 | 71.2 | 19.1 | 52.1 | 90.3 |
| WFO4 | EPQUALFX | 0 | 60 | 10 | 20 | 40 | 40 | 60 | 33.6 | 15.0 | 18.6 | 48.7 |
| WFO5 | EPMACHIN | 0 | 50 | 30 | 30 | 30 | 30 | 50 | 31.8 | 6.0 | 25.8 | 37.8 |
| WFO6 | EPLANGE | 0 | 50 | 50 | 50 | 50 | 50 | 50 | 50.0 | 0.0 | 50.0 | 50.0 |
| WFO7 | EPGRAPHX | 0 | 50 | 30 | 30 | 50 | 50 | 50 | 42.7 | 10.1 | 32.6 | 52.8 |
| WFO8 | EPAPPLIC | 0 | 50 | 10 | 30 | 30 | 30 | 50 | 30.0 | 8.9 | 21.1 | 38.9 |
| WFO9 | EPTOGETH | 0 | 50 | 10 | 10 | 10 | 10 | 30 | 13.6 | 8.1 | 5.5 | 21.7 |
| WF11 | CREQDEF | 0 | 50 | 10 | 10 | 10 | 30 | 30 | 15.5 | 9.3 | 6.1 | 24.8 |
| WF12 | CINTERFC | 0 | 50 | 30 | 30 | 30 | 40 | 50 | 33.6 | 6.7 | 26.9 | 40.4 |
| WF13 | CDCHANGS | 0 | 60 | 20 | 20 | 40 | 40 | 60 | 36.4 | 12.1 | 24.3 | 48.4 |
| WF14 | CPROCESS | 0 | 50 | 30 | 30 | 30 | 50 | 50 | 39.1 | 10.4 | 28.6 | 49.5 |
| WF15 | CFLOW | 0 | 50 | 30 | 30 | 30 | 50 | 50 | 37.3 | 10.1 | 27.2 | 47.4 |
| WF16 | CPROGCOM | 0 | 50 | 30 | 30 | 30 | 50 | 50 | 37.3 | 10.1 | 27.2 | 47.4 |
| WF17 | CEXTCOM | 0 | 50 | 30 | 30 | 30 | 30 | 30 | 30.0 | 0.0 | 30.0 | 30.0 |
| WF18 | CDBSTRUC | 0 | 50 | 30 | 30 | 50 | 50 | 50 | 40.9 | 10.4 | 30.5 | 51.4 |
| WF19 | CGRAPHX | 0 | 50 | 0 | 20 | 20 | 30 | 40 | 23.6 | 12.1 | 11.6 | 35.7 |
| WF20 | CSTORAGE | 0 | 50 | 30 | 30 | 50 | 50 | 50 | 44.5 | 9.3 | 35.2 | 53.9 |
| WF21 | CTIMING | 0 | 50 | 30 | 30 | 30 | 30 | 50 | 33.6 | 8.1 | 25.5 | 41.7 |
| WF22 | CIO | 0 | 50 | 30 | 30 | 30 | 50 | 50 | 35.5 | 9.3 | 26.1 | 44.8 |
| WF23 | CDBITEMS | 0 | 99 | 5 | 7 | 11 | 26 | 73 | 19.1 | 19.5 | -0.4 | 38.6 |
| WF24 | CHW | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WF25 | CCLASIFD | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WF31 | PDEV95 | 0 | 999 | 384 | 485 | 576 | 648 | 990 | 583.6 | 162.1 | 421.5 | 745.8 |
| WF32 | PDEV75 | 0 | 999 | 10 | 352 | 424 | 515 | 616 | 412.1 | 162.6 | 249.4 | 574.7 |
| WF33 | PDEVSTL | 0 | 999 | 0 | 0 | 0 | 0 | 45 | 4.3 | 13.5 | -9.2 | 17.8 |
| WF34 | PPPDESGN | 0 | 999 | 333 | 545 | 714 | 800 | 999 | 708.7 | 186.8 | 521.9 | 895.6 |
| WF35 | PTOGETHR | 0 | 999 | 0 | 200 | 273 | 800 | 999 | 434.5 | 341.9 | 92.5 | 776.4 |
| WF36 | PECLOSED | 0 | 50 | 0 | 17 | 24 | 29 | 30 | 21.3 | 8.6 | 12.6 | 29.9 |
| WF37 | PEOPENWR | 0 | 999 | 10 | 335 | 395 | 489 | 586 | 391.0 | 154.5 | 236.5 | 545.5 |
| WF38 | PEOPEN | 0 | 999 | 0 | 0 | 0 | 0 | 45 | 4.1 | 13.6 | -9.5 | 17.7 |
| WF39 | PERJE | 0 | 999 | 0 | 302 | 454 | 527 | 990 | 444.8 | 254.4 | 190.4 | 699.3 |
| WF40 | PETSO | 0 | 999 | 0 | 0 | 115 | 201 | 425 | 138.8 | 139.2 | -0.4 | 278.1 |
| WF41 | PCSTRUC | 0 | 999 | 400 | 600 | 650 | 750 | 900 | 663.6 | 138.0 | 525.6 | 801.6 |
| WF42 | PCREAD | 0 | 999 | 100 | 100 | 300 | 650 | 950 | 377.3 | 305.3 | 72.0 | 682.5 |
| WF43 | PCTOPDWN | 0 | 999 | 200 | 200 | 600 | 800 | 800 | 500.0 | 264.6 | 235.4 | 764.6 |
| WF44 | PCCHIEF | 0 | 999 | 400 | 500 | 750 | 950 | 999 | 718.0 | 237.7 | 480.3 | 955.7 |
| WF45 | PEMANAGE | 0 | 250 | 120 | 142 | 171 | 196 | 246 | 168.8 | 37.5 | 131.3 | 206.3 |
| WF46 | PEADMIN | 0 | 100 | 20 | 20 | 30 | 44 | 77 | 34.5 | 17.1 | 17.3 | 51.6 |
| WF47 | PEPROG | 0 | 950 | 559 | 618 | 643 | 696 | 777 | 658.5 | 59.1 | 599.5 | 717.6 |
| WF48 | PEANALYT | 0 | 950 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WF49 | PEOPER | 0 | 333 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WF50 | PEOTHERS | 0 | 250 | 78 | 83 | 135 | 163 | 215 | 138.2 | 48.3 | 89.8 | 186.5 |
| WF51 | PTOTALHR | 0 | 96000 | 2769 | 3964 | 9600 | 10628 | 13829 | 8460.0 | 3624.1 | 4835.9 | 12084.1 |

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Table A.6.1-3. Walston-Felix: Summary Statistics for 11 Projects (2 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|--------|------------------------|-------|--------|-------|--------|---------|---------|---------|---------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| WF52 | PCOSTPHR | 0 | 99999 | 2888 | 4120 | 9875 | 11098 | 13849 | 8700.9 | 3627.6 | 5073.3 | 12328.5 |
| WF54 | PPSCHACC | 450 | 999 | 758 | 844 | 905 | 938 | 947 | 889.3 | 59.2 | 830.0 | 948.5 |
| WF55 | PTWEEKS | 16 | 104 | 44 | 63 | 70 | 83 | 94 | 71.8 | 14.3 | 57.5 | 86.1 |
| WF61 | DCNONMTH | 0 | 999 | 370 | 504 | 523 | 571 | 631 | 530.4 | 67.5 | 462.8 | 597.9 |
| WF62 | DCMATH | 0 | 500 | 190 | 240 | 316 | 328 | 480 | 296.5 | 77.7 | 218.9 | 374.2 |
| WF63 | DCIOCNTL | 0 | 250 | 79 | 100 | 115 | 162 | 179 | 123.1 | 32.7 | 90.4 | 155.8 |
| WF64 | DCRECOVR | 0 | 100 | 50 | 50 | 50 | 50 | 50 | 50.0 | 0.0 | 50.0 | 50.0 |
| WF65 | DCOTHER | 0 | 999 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WF66 | DCGRAPHX | 0 | 625 | 0 | 217 | 287 | 405 | 447 | 284.6 | 123.4 | 161.2 | 408.1 |
| WF67 | DDVLOL | 0 | 60000 | 5 | 280 | 506 | 962 | 3049 | 807.7 | 875.1 | -67.4 | 1682.9 |
| WF68 | DDVMOL | 0 | 60000 | 0 | 3422 | 6254 | 9343 | 19214 | 7097.7 | 4986.0 | 2111.7 | 12083.7 |
| WF69 | DDVHDL | 0 | 240000 | 8986 | 27233 | 40509 | 56670 | 80784 | 43206.9 | 22683.8 | 20523.1 | 65890.7 |
| WF70 | DDVTOT | 0 | 240000 | 12112 | 31144 | 48968 | 67463 | 100772 | 51112.4 | 27477.2 | 23635.2 | 78589.6 |
| WF71 | DDLLOL | 0 | 60000 | 26 | 1157 | 1649 | 2016 | 14682 | 2679.4 | 4050.4 | -1371.1 | 6729.8 |
| WF72 | DDLMOI | 0 | 60000 | 0 | 5925 | 8086 | 10287 | 19790 | 8058.2 | 5151.0 | 2907.2 | 13209.1 |
| WF73 | DDLHOL | 0 | 240000 | 13740 | 42641 | 56074 | 77632 | 96481 | 56242.8 | 26451.9 | 29790.9 | 82694.7 |
| WF74 | DDLTOT | 0 | 240000 | 15258 | 50911 | 67325 | 89513 | 111868 | 66797.1 | 31755.9 | 35041.2 | 98552.9 |
| WF75 | DDBITEMS | 0 | 2000 | 93 | 145 | 219 | 529 | 1455 | 380.5 | 388.6 | -8.2 | 769.1 |
| WF76 | DDOCPAGE | 0 | 9999 | 760 | 1104 | 1793 | 2473 | 3017 | 1800.5 | 792.6 | 1007.9 | 2593.0 |
| WF81 | EXPERIEN | 0 | 509 | 300 | 340 | 365 | 385 | 439 | 367.5 | 38.7 | 328.9 | 406.2 |
| WF82 | COMPLEX | 0 | 809 | 357 | 367 | 391 | 496 | 573 | 426.4 | 69.9 | 356.4 | 496.3 |

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| NUMBER OF CLUSTERS | PRCD | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| | 1 | 6 | 7 | 2 | 3 | 4 | 9 | 0 | 5 | 8 | 1 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | * |
| 9 | * | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * | * |

Figure A.6.1-1. Walston-Felix: Cluster Map for 11 Projects

Table A.6.1-4. Walston-Felix: Summary Statistics for 20 Independent Systems
(1 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|-------|------------------------|-------|--------|-------|-------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| WFO1 | EAPPLICA | 0 | 50 | 50 | 50 | 50 | 50 | 50 | 50.0 | 0.0 | 50.0 | 50.0 |
| WFO2 | EREQDEF | 0 | 50 | 30 | 50 | 50 | 50 | 50 | 47.0 | 7.3 | 39.7 | 54.3 |
| WFO3 | EPPDESGN | 0 | 99 | 33 | 50 | 71 | 91 | 99 | 71.3 | 19.9 | 51.4 | 91.1 |
| WFO4 | EPQUALFX | 0 | 60 | 10 | 20 | 40 | 40 | 60 | 35.5 | 14.7 | 20.8 | 50.2 |
| WFO5 | EPMACHIN | 0 | 50 | 10 | 30 | 30 | 41 | 50 | 33.8 | 10.1 | 23.6 | 43.9 |
| WFO6 | EPLANGE | 0 | 50 | 30 | 50 | 50 | 50 | 50 | 49.0 | 4.5 | 44.5 | 53.5 |
| WFO7 | EPGRAPHX | 0 | 50 | 10 | 30 | 50 | 50 | 50 | 42.0 | 13.6 | 28.4 | 55.6 |
| WFO8 | EPAPPLIC | 0 | 50 | 10 | 30 | 30 | 34 | 50 | 30.8 | 12.4 | 18.4 | 43.1 |
| WFO9 | EPTOGETH | 0 | 50 | 10 | 10 | 10 | 10 | 30 | 12.8 | 6.8 | 6.0 | 19.5 |
| WF11 | CREQDEF | 0 | 50 | 10 | 10 | 10 | 10 | 30 | 13.0 | 7.3 | 5.7 | 20.3 |
| WF12 | CINTERFC | 0 | 50 | 30 | 30 | 30 | 38 | 50 | 33.5 | 6.7 | 26.8 | 40.2 |
| WF13 | CDCHANGS | 0 | 60 | 0 | 20 | 40 | 40 | 60 | 33.5 | 16.6 | 16.9 | 50.1 |
| WF14 | CPROCESS | 0 | 50 | 30 | 30 | 30 | 50 | 50 | 36.0 | 9.4 | 26.6 | 45.4 |
| WF15 | CFLOW | 0 | 50 | 30 | 30 | 30 | 30 | 50 | 33.0 | 7.3 | 25.7 | 40.3 |
| WF16 | CPRGCOM | 0 | 50 | 30 | 30 | 30 | 30 | 50 | 34.0 | 8.2 | 25.8 | 42.2 |
| WF17 | CEXTCOM | 0 | 50 | 30 | 30 | 30 | 30 | 30 | 30.0 | 0.0 | 30.0 | 30.0 |
| WF18 | CDBSTRUC | 0 | 50 | 30 | 30 | 30 | 50 | 50 | 37.0 | 9.8 | 27.2 | 46.8 |
| WF19 | CGRAPHX | 0 | 50 | 0 | 20 | 30 | 38 | 40 | 25.0 | 12.8 | 12.2 | 37.8 |
| WF20 | CSTORAGE | 0 | 50 | 10 | 30 | 30 | 50 | 50 | 37.0 | 13.4 | 23.6 | 50.4 |
| WF21 | CTIMING | 0 | 50 | 30 | 30 | 30 | 30 | 50 | 32.0 | 6.2 | 25.8 | 38.2 |
| WF22 | CIO | 0 | 50 | 10 | 10 | 30 | 30 | 50 | 28.0 | 14.4 | 13.6 | 42.4 |
| WF23 | CDBITEMS | 0 | 99 | 3 | 7 | 10 | 15 | 60 | 13.0 | 12.5 | 0.6 | 25.5 |
| WF24 | CHW | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WF25 | CCLASIFD | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WF31 | PDEV95 | 0 | 999 | 77 | 421 | 586 | 867 | 999 | 585.2 | 280.9 | 304.3 | 866.1 |
| WF32 | PDEV75 | 0 | 999 | 1 | 133 | 414 | 560 | 923 | 400.4 | 267.1 | 133.3 | 667.5 |
| WF33 | PDEVSTL | 0 | 999 | 0 | 0 | 0 | 0 | 286 | 14.4 | 63.9 | -49.5 | 78.3 |
| WF34 | PPPDESGN | 0 | 999 | 333 | 500 | 712 | 913 | 999 | 711.9 | 198.0 | 513.9 | 909.9 |
| WF35 | PTOGETHR | 0 | 999 | 0 | 50 | 268 | 999 | 999 | 487.0 | 427.5 | 59.5 | 914.6 |
| WF36 | PECLOSED | 0 | 50 | 0 | 7 | 22 | 29 | 46 | 20.4 | 13.6 | 6.8 | 34.0 |
| WF37 | PEOPENWR | 0 | 999 | 0 | 127 | 390 | 532 | 877 | 380.0 | 253.8 | 126.2 | 633.8 |
| WF38 | PEOPEN | 0 | 999 | 0 | 0 | 0 | 0 | 286 | 14.3 | 64.0 | -49.7 | 78.3 |
| WF39 | PERJE | 0 | 999 | 0 | 220 | 376 | 534 | 990 | 406.0 | 258.7 | 147.4 | 664.7 |
| WF40 | PETSO | 0 | 999 | 0 | 12 | 105 | 287 | 750 | 179.3 | 199.5 | -20.3 | 378.8 |
| WF41 | PCSTRUC | 0 | 999 | 400 | 600 | 750 | 750 | 900 | 677.5 | 119.7 | 557.8 | 797.2 |
| WF42 | PCREAD | 0 | 999 | 0 | 100 | 200 | 613 | 950 | 322.5 | 316.8 | 5.7 | 639.3 |
| WF43 | PCTOPDWN | 0 | 999 | 200 | 400 | 600 | 800 | 800 | 580.0 | 241.9 | 338.1 | 821.9 |
| WF44 | PCCHIEF | 0 | 999 | 400 | 763 | 900 | 999 | 999 | 837.1 | 199.0 | 638.2 | 1036.1 |
| WF45 | PEMANAGE | 0 | 250 | 79 | 127 | 163 | 186 | 246 | 158.6 | 40.4 | 118.2 | 199.0 |
| WF46 | PEADMIN | 0 | 100 | 6 | 19 | 30 | 41 | 77 | 30.3 | 17.9 | 12.4 | 48.2 |
| WF47 | PEPROG | 0 | 950 | 559 | 620 | 653 | 712 | 797 | 674.2 | 67.4 | 606.8 | 741.6 |
| WF48 | PEANALYT | 0 | 950 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WF49 | PEOPER | 0 | 333 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WF50 | PEOTHERS | 0 | 250 | 78 | 102 | 131 | 162 | 215 | 136.9 | 41.4 | 95.5 | 178.3 |
| WF51 | PTOTALHR | 0 | 96000 | 496 | 1099 | 2809 | 9470 | 11582 | 4652.9 | 4102.1 | 550.9 | 8755.0 |
| WF52 | PCOSTPHR | 0 | 99999 | 529 | 952 | 2927 | 9837 | 11176 | 4765.8 | 4222.7 | 543.2 | 8988.5 |

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Table A.6.1-4. Walston-Felix: Summary Statistics for 20 Independent Systems (2 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|--------|------------------------|-------|--------|-------|--------|---------|---------|---------|---------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| WF54 | PPSCHACC | 450 | 999 | 476 | 820 | 887 | 930 | 999 | 856.8 | 111.9 | 744.9 | 968.7 |
| WF55 | PTWEEKS | 16 | 104 | 25 | 48 | 64 | 75 | 94 | 62.6 | 17.7 | 44.9 | 80.4 |
| WF61 | DCNONMTH | 0 | 999 | 277 | 432 | 521 | 591 | 890 | 539.3 | 158.7 | 380.5 | 698.0 |
| WF62 | DCMATH | 0 | 500 | 10 | 216 | 318 | 375 | 480 | 287.8 | 148.8 | 139.0 | 436.5 |
| WF63 | DCIOCNTL | 0 | 250 | 50 | 100 | 124 | 159 | 193 | 123.0 | 40.1 | 82.9 | 163.1 |
| WF64 | DCRECOVR | 0 | 100 | 50 | 50 | 50 | 50 | 50 | 50.0 | 0.0 | 50.0 | 50.0 |
| WF65 | DCOTHER | 0 | 999 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WF66 | DCGRAPHX | 0 | 625 | 0 | 204 | 309 | 396 | 482 | 284.7 | 135.8 | 148.9 | 420.5 |
| WF67 | DDVL0L | 0 | 60000 | 0 | 0 | 180 | 503 | 3049 | 444.3 | 748.3 | -304.1 | 1192.6 |
| WF68 | DDVMOL | 0 | 60000 | 0 | 699 | 2501 | 6179 | 15284 | 3903.8 | 3926.5 | -22.7 | 7830.2 |
| WF69 | DDVHOL | 0 | 240000 | 2052 | 6745 | 12667 | 40327 | 79077 | 23736.8 | 22160.2 | 1576.5 | 45897.0 |
| WF70 | DDVTOT | 0 | 240000 | 2052 | 8303 | 13852 | 48341 | 90156 | 28084.8 | 26241.7 | 1843.1 | 54326.4 |
| WF71 | DDLLOL | 0 | 60000 | 0 | 0 | 625 | 1559 | 14682 | 1473.6 | 3218.8 | -1745.2 | 4692.5 |
| WF72 | DDLMOl | 0 | 60000 | 0 | 699 | 2608 | 7696 | 15447 | 4431.6 | 4389.4 | 42.3 | 8821.0 |
| WF73 | DDLHOL | 0 | 240000 | 2052 | 8230 | 14486 | 55745 | 96481 | 30906.5 | 28032.0 | 2874.5 | 58938.5 |
| WF74 | DDLTOT | 0 | 240000 | 2052 | 9838 | 16265 | 67060 | 111868 | 36712.5 | 33499.1 | 3213.4 | 70211.6 |
| WF75 | DDBITEMS | 0 | 2000 | 54 | 140 | 202 | 297 | 1208 | 260.9 | 251.9 | 9.0 | 512.8 |
| WF76 | DDOCPAGE | 0 | 9999 | 61 | 262 | 762 | 1748 | 2473 | 997.0 | 840.1 | 157.0 | 1897.1 |
| WF81 | EXPERIEN | 0 | 509 | 275 | 343 | 382 | 408 | 469 | 372.0 | 53.1 | 318.9 | 425.1 |
| WF82 | COMPLEX | 0 | 809 | 264 | 348 | 371 | 420 | 560 | 385.0 | 73.7 | 311.4 | 458.7 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| | 1 | 6 | 2 | 3 | 4 | 9 | 0 | 5 | 6 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 1 | 0 | 0 |
| | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 6 | 4 | 5 | 8 | 7 | 3 | 1 | 2 | 0 | 0 | 3 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 19 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 18 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 17 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 16 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 15 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 14 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 13 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 12 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 11 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 9 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |

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Figure A.6.1-2. Walston-Felix: Cluster Map for 20 Independent Systems

Summary Statistics for 9 Large

Table 6.1

Systems (102)

| CODE | 3RD Q | HIGH | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|-------|-------|-------|---------|---------|---------|---------|
| 50 | 50 | 50 | 50.0 | 0.0 | 50.0 | 50.0 |
| 50 | 50 | 50 | 45.6 | 8.8 | 54.4 | 54.4 |
| 78 | 99 | 99 | 73.1 | 12.8 | 85.9 | 85.9 |
| 40 | 50 | 50 | 32.2 | 13.0 | 45.2 | 45.2 |
| 30 | 50 | 50 | 32.2 | 6.7 | 38.9 | 38.9 |
| 50 | 50 | 50 | 50.0 | 0.0 | 50.0 | 50.0 |
| 30 | 50 | 50 | 43.3 | 10.0 | 53.3 | 53.3 |
| 50 | 50 | 50 | 30.0 | 10.0 | 40.0 | 40.0 |
| 30 | 30 | 30 | 14.4 | 8.8 | 23.3 | 23.3 |
| 30 | 30 | 30 | 14.4 | 8.8 | 23.3 | 23.3 |
| 10 | 40 | 50 | 34.4 | 7.3 | 41.7 | 41.7 |
| 10 | 50 | 50 | 35.6 | 13.3 | 48.9 | 48.9 |
| 30 | 50 | 50 | 41.1 | 10.5 | 51.7 | 51.7 |
| 20 | 50 | 50 | 36.7 | 10.0 | 46.7 | 46.7 |
| 30 | 50 | 50 | 38.9 | 10.5 | 49.4 | 49.4 |
| 30 | 30 | 30 | 30.0 | 0.0 | 30.0 | 30.0 |
| 30 | 50 | 50 | 41.1 | 10.5 | 51.7 | 51.7 |
| 30 | 30 | 40 | 25.6 | 8.8 | 34.4 | 34.4 |
| 30 | 50 | 50 | 43.3 | 10.0 | 53.3 | 53.3 |
| 20 | 40 | 50 | 34.4 | 8.8 | 43.3 | 43.3 |
| 30 | 50 | 50 | 38.9 | 10.5 | 49.4 | 49.4 |
| 30 | 30 | 60 | 18.2 | 16.9 | 35.1 | 35.1 |
| 30 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 60 | 666 | 666 | 539.4 | 134.8 | 674.2 | 674.2 |
| 506 | 777 | 777 | 460.3 | 134.7 | 595.1 | 595.1 |
| 0 | 2 | 2 | 0.2 | 0.7 | 0.9 | 0.9 |
| 715 | 999 | 999 | 732.2 | 130.6 | 862.8 | 862.8 |
| 757 | 875 | 875 | 394.1 | 314.5 | 708.6 | 708.6 |
| 39 | 39 | 39 | 23.9 | 7.1 | 31.0 | 31.0 |
| 481 | 738 | 738 | 436.7 | 128.2 | 564.8 | 564.8 |
| 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 532 | 666 | 666 | 429.3 | 148.6 | 577.9 | 577.9 |
| 198 | 316 | 316 | 110.1 | 106.7 | 216.8 | 216.8 |
| 750 | 750 | 750 | 622.2 | 122.8 | 745.0 | 745.0 |
| 750 | 950 | 950 | 405.6 | 329.2 | 734.8 | 734.8 |
| 700 | 800 | 800 | 444.4 | 260.3 | 704.8 | 704.8 |
| 875 | 950 | 950 | 694.4 | 115.7 | 910.1 | 910.1 |
| 201 | 246 | 246 | 172.0 | 40.6 | 212.6 | 212.6 |
| 201 | 44 | 44 | 28.0 | 10.3 | 38.3 | 38.3 |
| 705 | 777 | 777 | 670.7 | 53.0 | 723.7 | 723.7 |
| 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 162 | 215 | 215 | 129.3 | 47.5 | 176.8 | 176.8 |
| 1066 | 11582 | 11582 | 8453.6 | 3056.7 | 11510.2 | 11510.2 |
| 10998 | 11176 | 11176 | 8713.2 | 3049.7 | 11763.0 | 11763.0 |
| 2848 | 5931 | 5931 | 3600 | 1111 | 5000 | 5000 |
| 2936 | 6196 | 6196 | 3600 | 1111 | 5000 | 5000 |

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Table A.6.1-5. Walston-Felix: Summary Statistics for 9 Large Systems (2 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|--------|------------------------|-------|--------|-------|--------|---------|---------|---------|---------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| WF54 | PPSCHACC | 450 | 999 | 758 | 838 | 864 | 941 | 947 | 876.3 | 62.9 | 813.4 | 939.3 |
| WF55 | PTWEEKS | 16 | 104 | 44 | 64 | 70 | 86 | 94 | 72.6 | 15.4 | 57.1 | 88.0 |
| WF61 | DCNONMTH | 0 | 999 | 502 | 510 | 533 | 574 | 631 | 544.3 | 43.7 | 500.6 | 588.0 |
| WF62 | DCMATH | 0 | 500 | 190 | 230 | 316 | 324 | 328 | 283.1 | 52.6 | 230.5 | 335.7 |
| WF63 | DCIOCNTL | 0 | 250 | 79 | 97 | 120 | 146 | 181 | 122.6 | 32.7 | 89.8 | 155.3 |
| WF64 | DCRECOVR | 0 | 100 | 50 | 50 | 50 | 50 | 50 | 50.0 | 0.0 | 50.0 | 50.0 |
| WF65 | DCOTHER | 0 | 999 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WF66 | DCGRAPHX | 0 | 625 | 197 | 242 | 300 | 364 | 452 | 306.0 | 81.9 | 224.1 | 387.9 |
| WF67 | DDVL0L | 0 | 60000 | 113 | 289 | 507 | 1349 | 3049 | 901.0 | 939.8 | -38.8 | 1840.8 |
| WF68 | DDVM0L | 0 | 60000 | 3422 | 5051 | 6254 | 8736 | 15284 | 7243.2 | 3509.4 | 3733.8 | 10752.6 |
| WF69 | DDVH0L | 0 | 240000 | 17219 | 33238 | 40509 | 54075 | 79077 | 43747.8 | 18138.5 | 25609.3 | 61886.3 |
| WF70 | DDVT0T | 0 | 240000 | 21509 | 38678 | 48968 | 66556 | 90156 | 51892.0 | 21251.9 | 30640.1 | 73143.9 |
| WF71 | DDL0L | 0 | 60000 | 564 | 1195 | 1649 | 2493 | 14682 | 3027.1 | 4421.1 | -1394.0 | 7448.2 |
| WF72 | DDL0L | 0 | 60000 | 4177 | 5939 | 8086 | 10480 | 15447 | 8371.2 | 3524.8 | 4846.4 | 11896.1 |
| WF73 | DDLH0L | 0 | 240000 | 28081 | 45398 | 56074 | 67923 | 96481 | 57782.4 | 19106.5 | 38676.0 | 76888.9 |
| WF74 | DDL0T | 0 | 240000 | 32822 | 53074 | 67325 | 80410 | 111868 | 68960.1 | 22428.8 | 46531.3 | 91389.0 |
| WF75 | DDBITEMS | 0 | 2000 | 138 | 155 | 225 | 455 | 1208 | 366.6 | 339.9 | 26.7 | 706.4 |
| WF76 | DDOCPAGE | 0 | 9999 | 873 | 1112 | 1793 | 2409 | 2473 | 1766.8 | 625.0 | 1141.8 | 2391.8 |
| WF81 | EXPERIEN | 0 | 509 | 300 | 346 | 377 | 393 | 439 | 370.9 | 39.1 | 331.8 | 410.0 |
| WF82 | COMPLEX | 0 | 809 | 357 | 366 | 418 | 499 | 560 | 432.7 | 72.2 | 360.5 | 504.9 |

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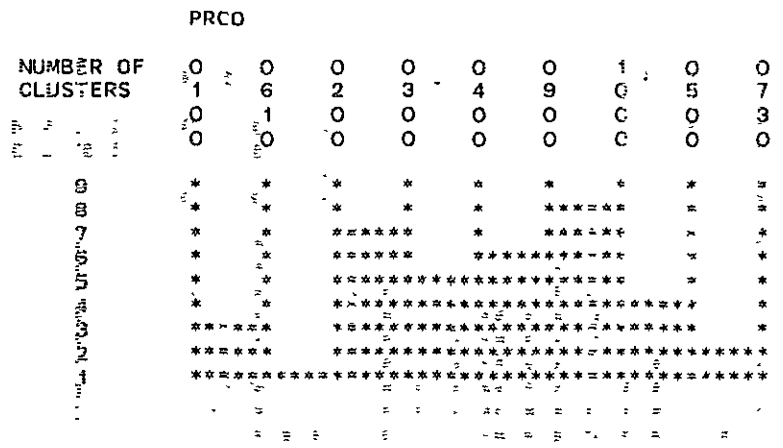


Figure A.6.1-3, Walston-Felix: Cluster Map for 9 Large Systems

Table A.6.1-6. Walston-Felix: Summary Statistics for 11 Small Systems (1 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|-------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| WFO1 | EAPPLICA | 0 | 50 | 50 | 50 | 50 | 50 | 50 | 50.0 | 0.0 | 50.0 | 50.0 |
| WFO2 | EREQDEF | 0 | 50 | 30 | 50 | 50 | 50 | 50 | 48.2 | 6.0 | 42.2 | 54.2 |
| WFO3 | EPPDESGN | 0 | 99 | 33 | 50 | 67 | 99 | 99 | 69.7 | 24.8 | 44.9 | 94.5 |
| WFO4 | EPQUALFX | 0 | 60 | 10 | 20 | 40 | 50 | 60 | 38.2 | 16.0 | 22.2 | 54.2 |
| WFO5 | EPMACHIN | 0 | 50 | 10 | 30 | 30 | 50 | 50 | 35.0 | 12.4 | 22.6 | 47.4 |
| WFO6 | EPLANGE | 0 | 50 | 30 | 50 | 50 | 50 | 50 | 48.2 | 6.0 | 42.2 | 54.2 |
| WFO7 | EPGRAPHX | 0 | 50 | 10 | 30 | 50 | 50 | 50 | 40.9 | 16.4 | 24.5 | 57.3 |
| WFO8 | EPAPPLIC | 0 | 50 | 10 | 20 | 30 | 50 | 50 | 31.4 | 14.5 | 16.9 | 45.9 |
| WFO9 | EPTOGETH | 0 | 50 | 10 | 10 | 10 | 10 | 25 | 11.4 | 4.5 | 6.8 | 15.9 |
| WF11 | CREQDEF | 0 | 50 | 10 | 10 | 10 | 10 | 30 | 11.8 | 6.0 | 5.8 | 17.8 |
| WF12 | CINTERFC | 0 | 50 | 30 | 30 | 30 | 30 | 50 | 32.7 | 6.5 | 26.3 | 39.2 |
| WF13 | CDCHANGS | 0 | 60 | 0 | 20 | 40 | 40 | 60 | 31.8 | 19.4 | 12.4 | 51.2 |
| WF14 | CPROCESS | 0 | 50 | 30 | 30 | 30 | 30 | 50 | 31.8 | 6.0 | 25.8 | 37.8 |
| WF15 | CFLOW | 0 | 50 | 30 | 30 | 30 | 30 | 30 | 30.0 | 0.0 | 30.0 | 30.0 |
| WF16 | CPRGCOM | 0 | 50 | 30 | 30 | 30 | 30 | 30 | 30.0 | 0.0 | 30.0 | 30.0 |
| WF17 | CEXTCOM | 0 | 50 | 30 | 30 | 30 | 30 | 30 | 30.0 | 0.0 | 30.0 | 30.0 |
| WF18 | CDBSTRUC | 0 | 50 | 30 | 30 | 30 | 30 | 50 | 33.6 | 8.1 | 25.5 | 41.7 |
| WF19 | CGRAPHX | 0 | 50 | 0 | 10 | 30 | 40 | 40 | 24.5 | 15.7 | 8.8 | 40.3 |
| WF20 | CSTORAGE | 0 | 50 | 10 | 30 | 30 | 50 | 50 | 31.8 | 14.0 | 17.8 | 45.8 |
| WF21 | CTIMING | 0 | 50 | 30 | 30 | 30 | 30 | 30 | 30.0 | 0.0 | 30.0 | 30.0 |
| WF22 | CIO | 0 | 50 | 10 | 10 | 10 | 30 | 30 | 19.1 | 10.4 | 8.6 | 29.5 |
| WF23 | CDBITEMS | 0 | 99 | 3 | 4 | 8 | 11 | 19 | 8.8 | 5.0 | 3.8 | 13.8 |
| WF24 | CHW | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WF25 | CCLASIFD | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WF31 | PDEV95 | 0 | 999 | 77 | 250 | 608 | 990 | 999 | 622.6 | 363.3 | 259.3 | 986.0 |
| WF32 | PDEV75 | 0 | 999 | 1 | 10 | 392 | 581 | 923 | 351.4 | 339.3 | 12.0 | 690.7 |
| WF33 | PDEVSTL | 0 | 999 | 0 | 0 | 0 | 0 | 286 | 26.0 | 86.2 | -60.2 | 112.2 |
| WF34 | PPDESGN | 0 | 999 | 333 | 500 | 667 | 950 | 999 | 695.3 | 245.3 | 449.9 | 940.6 |
| WF35 | PTOGETHR | 0 | 999 | 0 | 0 | 999 | 999 | 999 | 563.1 | 504.0 | 59.1 | 1067.1 |
| WF36 | PECLOSED | 0 | 50 | 0 | 0 | 20 | 29 | 46 | 17.5 | 17.0 | 0.5 | 34.6 |
| WF37 | PEOPENWR | 0 | 999 | 0 | 10 | 372 | 552 | 877 | 333.6 | 322.5 | 11.1 | 656.2 |
| WF38 | PEOPEN | 0 | 999 | 0 | 0 | 0 | 0 | 286 | 26.0 | 86.2 | -60.2 | 112.2 |
| WF39 | PERJE | 0 | 999 | 0 | 121 | 250 | 700 | 990 | 387.0 | 329.5 | 57.5 | 716.5 |
| WF40 | PETSO | 0 | 999 | 0 | 0 | 209 | 425 | 750 | 235.8 | 242.3 | -6.5 | 478.1 |
| WF41 | PCSTRUC | 0 | 999 | 500 | 700 | 750 | 750 | 900 | 722.7 | 100.9 | 621.8 | 823.6 |
| WF42 | PCREAD | 0 | 999 | 0 | 0 | 100 | 500 | 800 | 254.5 | 304.5 | -50.0 | 559.1 |
| WF43 | PCTOPDWN | 0 | 999 | 400 | 600 | 800 | 800 | 800 | 690.9 | 164.0 | 526.9 | 854.9 |
| WF44 | PCCHIEF | 0 | 999 | 800 | 900 | 999 | 999 | 999 | 953.9 | 68.3 | 885.6 | 1022.2 |
| WF45 | PEMANAGE | 0 | 250 | 79 | 115 | 155 | 178 | 202 | 147.6 | 38.7 | 109.0 | 186.3 |
| WF46 | PEADMIN | 0 | 100 | 6 | 8 | 29 | 44 | 77 | 32.2 | 22.7 | 9.5 | 54.9 |
| WF47 | PEPROG | 0 | 950 | 559 | 615 | 645 | 767 | 797 | 677.1 | 79.7 | 597.4 | 756.8 |
| WF48 | PEANALYT | 0 | 950 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WF49 | PEOPER | 0 | 333 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WF50 | PEOTHERS | 0 | 250 | 101 | 112 | 131 | 167 | 211 | 143.1 | 36.9 | 106.2 | 180.0 |
| WF51 | PTOTALHR | 0 | 96000 | 496 | 732 | 1298 | 2392 | 3266 | 1543.4 | 927.4 | 616.0 | 2470.8 |
| WF52 | PCOSTPHR | 0 | 99999 | 529 | 732 | 1010 | 2434 | 3296 | 1536.2 | 969.7 | 566.4 | 2505.9 |

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Table A.6.1-6. Walston-Felix: Summary Statistics for 11 Small Systems (2 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|--------|------------------------|-------|--------|-------|-------|---------|---------|--------|---------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| WF54 | PPSCHACC | 450 | 999 | 476 | 814 | 895 | 918 | 999 | 840.8 | 141.4 | 699.4 | 982.2 |
| WF55 | PTWEEKS | 16 | 104 | 25 | 41 | 61 | 68 | 76 | 54.5 | 15.6 | 38.9 | 70.2 |
| WF61 | DCNONMTH | 0 | 999 | 277 | 370 | 466 | 800 | 890 | 535.1 | 215.2 | 319.9 | 750.3 |
| WF62 | DCMATH | 0 | 500 | 10 | 10 | 330 | 480 | 480 | 291.5 | 199.5 | 92.0 | 491.1 |
| WF63 | DCIOCNTL | 0 | 250 | 50 | 100 | 140 | 161 | 193 | 123.4 | 46.8 | 76.6 | 170.2 |
| WF64 | DCRECOVR | 0 | 100 | 50 | 50 | 50 | 50 | 50 | 50.0 | 0.0 | 50.0 | 50.0 |
| WF65 | DCOTHER | 0 | 999 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WF66 | DCGRAPHX | 0 | 625 | 0 | 100 | 350 | 402 | 482 | 267.3 | 170.1 | 97.2 | 437.3 |
| WF67 | DDVLOL | 0 | 60000 | 0 | 0 | 0 | 98 | 355 | 70.5 | 126.8 | -56.2 | 197.3 |
| WF68 | DDVMOL | 0 | 60000 | 0 | 0 | 1424 | 2074 | 2846 | 1171.5 | 1091.3 | 80.2 | 2262.7 |
| WF69 | DDVHOL | 0 | 240000 | 2052 | 3776 | 7776 | 10325 | 14945 | 7364.1 | 3817.5 | 3546.6 | 11181.6 |
| WF70 | DDVTOT | 0 | 240000 | 2052 | 4233 | 9736 | 12456 | 14950 | 8606.1 | 4428.1 | 4178.0 | 13034.2 |
| WF71 | DDLLOL | 0 | 60000 | 0 | 0 | 0 | 488 | 841 | 202.6 | 316.1 | -113.5 | 518.8 |
| WF72 | DDLMOI | 0 | 60000 | 0 | 0 | 1424 | 2155 | 2846 | 1208.4 | 1127.0 | 81.3 | 2335.4 |
| WF73 | DDLHOL | 0 | 240000 | 2052 | 5204 | 8303 | 12127 | 15232 | 8917.1 | 4357.3 | 4559.7 | 13274.4 |
| WF74 | DDLTOT | 0 | 240000 | 2052 | 5204 | 10172 | 14863 | 17271 | 10328.1 | 5296.1 | 5032.0 | 15624.1 |
| WF75 | DOBITEMS | 0 | 2000 | 54 | 82 | 161 | 222 | 372 | 174.5 | 99.2 | 75.3 | 273.6 |
| WF76 | DDOCPAGE | 0 | 9999 | 61 | 163 | 284 | 527 | 763 | 367.3 | 242.7 | 124.6 | 610.0 |
| WF81 | EXPERIEN | 0 | 509 | 275 | 290 | 400 | 412 | 469 | 372.9 | 64.3 | 308.6 | 437.2 |
| WF82 | COMPLEX | 0 | 809 | 264 | 293 | 349 | 385 | 421 | 346.1 | 49.4 | 296.7 | 395.4 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | 6 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 1 | 8 |
| | 2 | 6 | 4 | 5 | 8 | 7 | 3 | 1 | 2 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | ***** | * | * | * | * |
| 9 | * | * | * | ***** | * | * | ***** | * | * | * | * |
| 8 | * | * | ***** | ***** | * | * | ***** | * | * | * | * |
| 7 | ***** | ***** | ***** | ***** | * | * | ***** | * | * | * | * |
| 6 | ***** | ***** | ***** | ***** | * | * | ***** | * | * | * | * |
| 5 | ***** | ***** | ***** | ***** | * | * | ***** | * | * | * | * |
| 4 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * | * |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |

Figure A.6.1-4. Walston-Felix: Cluster Map for 11 Small Systems

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A.6.2 PRICE S3 MODEL

| | | | |
|----------|------------|----------|-------------|
| <u>X</u> | Objective | -- | Subjective |
| <u>X</u> | Absolute | -- | Relative |
| <u>X</u> | Explicit | -- | Derived |
| <u>X</u> | Static | -- | Dynamic |
| -- | Predictive | <u>X</u> | Explanatory |

This category measures all four components of software development. All the measures are objective, absolute, explicit, static, and explanatory at the end of the project. However, estimates (dynamic) of the measures must be made for prediction. A certain number of measures become static as each phase of development is completed.

The remainder of this subsection contains tables and figures that describe the PRICE S3 measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.6.2-1)
- Values of the measures for 25 systems (Table A.6.2-2)
- Summary statistics for 11 projects (Table A.6.2-3)
- Cluster map for 11 projects (Figure A.6.2-1)
- Summary statistics for 20 independent systems (Table A.6.2-4)
- Cluster map for 20 independent systems (Figure A.6.2-2)
- Summary statistics for 9 large systems (Table A.6.2-5)
- Cluster map for 9 large systems (Figure A.6.2-3)

- Summary statistics for 11 small systems (Table A.6.2-6)
- Cluster map for 11 small systems (Figure A.6.2-4)

Table A.6.2-1. PRICE S3: Description of Measures (1 of 2)

| Code | Measure | Range | | Description |
|------|----------|-------|------|--|
| | | Low | High | |
| | | | | Percentage of Schedule |
| PS01 | DESGPHAS | 200 | 500 | Design Phase (From Start) |
| PS02 | DESGACT | 200 | 800 | Design Activity (From Start) |
| PS03 | CODEPHAS | 150 | 500 | Coding Phase (From Design Phase) |
| PS04 | CODEACT | 150 | 600 | Coding Activity (From Design Phase) |
| PS05 | TESTPHAS | 100 | 500 | Test Phase (From Coding Phase) |
| PS06 | TESTACT | 100 | 800 | Test Activity (From Documentation Phase) |
| PS07 | SDOCPHAS | 050 | 300 | System Documentation Phase (From End) |
| PS08 | SDOCACT | 250 | 600 | Documentation Activity (From End) |
| PS09 | SCH67 | 0239 | 1552 | Ratio of Actual Schedule to 67-Week Schedule |
| | | | | Complexity Factor |
| PS10 | CMPLXTOT | 060 | 240 | Total |
| PS11 | CMPXPERS | 080 | 120 | Personnel Only |
| PS12 | CMPXPROD | 080 | 120 | Product Only |
| PS13 | CMPXEXTR | 100 | 200 | External Effects Only |
| PS14 | NEWDESGN | 000 | 999 | New Design - Percentage of Code in Wholly New Components |
| PS15 | NEWCODE | 000 | 999 | New Code - Percentage of Code in New and Extensively Modified Components |
| PS16 | NEWTEST | 000 | 999 | New Test - Percentage of Code in New or Modified Components |
| PS17 | APLICATN | 086 | 999 | Application - Instruction Mix |
| PS18 | RESOURCE | 100 | 400 | Resource - Skill Mix and Experience for Cost |
| PS19 | UTILITY | 065 | 100 | Utility - Fraction of Storage and Timing Capacity |

Table A.6.2-1. PRICE S3: Description of Measures (2 of 2)

| <u>Code</u> | <u>Measure</u> | <u>Range</u> | | <u>Description</u> |
|-------------|----------------|--------------|-------------|--|
| | | <u>Low</u> | <u>High</u> | |
| PS20 | PLATFORM | 060 | 250 | Platform - Strictness of Standards, e.g., MIL-Spec |
| PS81 | CMPLXITY | 320 | 680 | Sum PS10 Through PS13 |

Table A.6.2-2. PRICE S3: Values of the Measures for 25 Systems

| PRC0 | PS01 | PS02 | PS03 | PS04 | PS05 | PS06 | PS07 | PS08 | PS09 | PS10 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 229 | 627 | 398 | 506 | 217 | 614 | 157 | 572 | 1239 | 110 |
| 0200 | 318 | 636 | 318 | 379 | 121 | 439 | 242 | 523 | 985 | 120 |
| 0300 | 254 | 667 | 413 | 556 | 238 | 651 | 95 | 540 | 940 | 90 |
| 0400 | 266 | 641 | 375 | 453 | 203 | 578 | 156 | 547 | 955 | 130 |
| 0500 | 364 | 682 | 318 | 409 | 182 | 500 | 136 | 477 | 657 | 100 |
| 0600 | 296 | 593 | 296 | 407 | 346 | 642 | 62 | 556 | 1209 | 150 |
| 0700 | 286 | 629 | 343 | 471 | 271 | 614 | 100 | 543 | 1045 | 90 |
| 0800 | 459 | 787 | 328 | 393 | 131 | 459 | 82 | 377 | 910 | 70 |
| 0900 | 340 | 787 | 447 | 489 | 160 | 606 | 53 | 436 | 1403 | 80 |
| 1000 | 364 | 739 | 375 | 466 | 205 | 580 | 57 | 449 | 1313 | 80 |
| 1100 | 316 | 776 | 461 | 513 | 158 | 618 | 66 | 454 | 1134 | 100 |
| 9000 | 351 | 734 | 383 | 468 | 213 | 596 | 53 | 457 | 1403 | 80 |
| 0610 | 296 | 593 | 296 | 407 | 346 | 642 | 62 | 556 | 1209 | 150 |
| 0620 | 441 | 662 | 221 | 338 | 221 | 779 | 118 | 522 | 1015 | 120 |
| 0630 | 390 | 634 | 244 | 341 | 244 | 488 | 122 | 488 | 612 | 140 |
| 0631 | 390 | 634 | 244 | 341 | 244 | 488 | 122 | 488 | 612 | 130 |
| 0632 | 463 | 683 | 220 | 268 | 195 | 415 | 122 | 427 | 612 | 110 |
| 0710 | 257 | 571 | 314 | 443 | 271 | 586 | 100 | 529 | 1045 | 110 |
| 0720 | 328 | 721 | 393 | 508 | 164 | 557 | 115 | 475 | 910 | 60 |
| 0730 | 286 | 629 | 343 | 471 | 271 | 614 | 100 | 543 | 1045 | 100 |
| 0740 | 367 | 592 | 224 | 408 | 265 | 490 | 143 | 520 | 731 | 100 |
| 0750 | 286 | 587 | 302 | 365 | 302 | 603 | 111 | 563 | 940 | 120 |
| 0760 | 474 | 658 | 184 | 263 | 158 | 342 | 184 | 434 | 567 | 70 |
| 0770 | 375 | 750 | 375 | 438 | 104 | 479 | 146 | 438 | 716 | 80 |
| 0780 | 400 | 560 | 160 | 240 | 160 | 320 | 280 | 520 | 373 | 120 |

| PRC0 | PS11 | PS12 | PS13 | PS14 | PS15 | PS16 | PS17 | PS18 | PS19 | PS20 | PS81 |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 100 | 90 | 120 | 681 | 757 | 936 | 350 | 211 | 80 | 100 | 420 |
| 0200 | 110 | 90 | 120 | 654 | 795 | 859 | 350 | 211 | 80 | 100 | 440 |
| 0300 | 100 | 90 | 100 | 891 | 891 | 983 | 350 | 211 | 80 | 100 | 380 |
| 0400 | 110 | 100 | 120 | 640 | 654 | 710 | 350 | 211 | 80 | 100 | 460 |
| 0500 | 100 | 80 | 120 | 153 | 267 | 356 | 350 | 211 | 80 | 100 | 400 |
| 0600 | 90 | 100 | 160 | 763 | 892 | 960 | 350 | 211 | 80 | 100 | 500 |
| 0700 | 100 | 80 | 110 | 517 | 692 | 852 | 350 | 211 | 80 | 100 | 380 |
| 0800 | 80 | 90 | 100 | 975 | 975 | 975 | 350 | 211 | 80 | 100 | 340 |
| 0900 | 100 | 80 | 100 | 512 | 668 | 813 | 350 | 211 | 80 | 100 | 360 |
| 1000 | 100 | 80 | 100 | 573 | 674 | 804 | 350 | 211 | 80 | 100 | 360 |
| 1100 | 100 | 100 | 100 | 627 | 627 | 762 | 350 | 211 | 80 | 100 | 400 |
| 9000 | 100 | 80 | 100 | 552 | 666 | 803 | 350 | 211 | 80 | 100 | 360 |
| 0610 | 90 | 100 | 160 | 750 | 900 | 966 | 350 | 211 | 80 | 100 | 500 |
| 0620 | 90 | 100 | 130 | 911 | 946 | 998 | 350 | 211 | 80 | 100 | 440 |
| 0630 | 90 | 100 | 150 | 738 | 805 | 895 | 350 | 211 | 80 | 100 | 480 |
| 0631 | 80 | 100 | 150 | 587 | 695 | 840 | 350 | 211 | 80 | 100 | 460 |
| 0632 | 110 | 100 | 100 | 982 | 982 | 982 | 350 | 211 | 80 | 100 | 420 |
| 0710 | 100 | 90 | 120 | 770 | 822 | 928 | 350 | 211 | 80 | 100 | 420 |
| 0720 | 80 | 80 | 100 | 624 | 670 | 732 | 350 | 211 | 80 | 100 | 320 |
| 0730 | 100 | 80 | 120 | 306 | 570 | 809 | 350 | 211 | 80 | 100 | 400 |
| 0740 | 120 | 80 | 100 | 260 | 446 | 800 | 350 | 211 | 80 | 100 | 400 |
| 0750 | 120 | 100 | 100 | 919 | 919 | 919 | 350 | 211 | 80 | 100 | 440 |
| 0760 | 90 | 80 | 100 | 290 | 756 | 967 | 350 | 211 | 80 | 100 | 340 |
| 0770 | 100 | 80 | 100 | 999 | 999 | 999 | 350 | 211 | 80 | 100 | 360 |
| 0780 | 100 | 100 | 120 | 946 | 946 | 946 | 350 | 211 | 80 | 100 | 440 |

Table A.6.2-3. PRICE S3: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE- | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|-----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| PS01 | DESGPHAS | 200 | 500 | 229 | 266 | 316 | 364 | 459 | 317.5 | 63.9 | 253.6 | 381.4 |
| PS02 | DESGACT | 200 | 800 | 593 | 629 | 667 | 776 | 787 | 687.6 | 71.8 | 615.8 | 759.4 |
| PS03 | CODEPHAS | 150 | 500 | 296 | 318 | 375 | 413 | 461 | 370.2 | 55.0 | 315.2 | 425.2 |
| PS04 | CODEACT | 150 | 600 | 379 | 407 | 466 | 506 | 556 | 458.4 | 56.2 | 402.1 | 514.6 |
| PS05 | TESTPHAS | 100 | 500 | 121 | 158 | 203 | 238 | 346 | 202.9 | 65.4 | 137.5 | 268.3 |
| PS06 | TESTACT | 100 | 800 | 439 | 500 | 606 | 618 | 651 | 572.8 | 73.3 | 499.6 | 646.1 |
| PS07 | SDOCPHAS | 50 | 300 | 53 | 62 | 95 | 156 | 242 | 109.6 | 58.2 | 51.5 | 167.8 |
| PS08 | SDOCACT | 250 | 600 | 377 | 449 | 523 | 547 | 572 | 497.6 | 62.4 | 435.3 | 560.0 |
| PS09 | SCH67 | 239 | 1552 | 657 | 940 | 1045 | 1239 | 1403 | 1071.8 | 213.5 | 858.3 | 1285.4 |
| PS10 | CMPLXTOT | 60 | 240 | 70 | 80 | 100 | 120 | 150 | 101.8 | 24.0 | 77.8 | 125.8 |
| PS11 | CMPXPERS | 80 | 120 | 80 | 100 | 100 | 100 | 110 | 99.1 | 8.3 | 90.8 | 107.4 |
| PS12 | CMPXPROD | 80 | 120 | 80 | 80 | 90 | 100 | 100 | 89.1 | 8.3 | 80.8 | 97.4 |
| PS13 | CMPXEXTR | 100 | 200 | 100 | 100 | 110 | 120 | 160 | 113.6 | 18.0 | 95.6 | 131.7 |
| PS14 | NEWDESGN | 0 | 999 | 153 | 517 | 640 | 763 | 975 | 635.1 | 215.7 | 419.4 | 850.8 |
| PS15 | NEWCODE | 0 | 999 | 267 | 654 | 692 | 891 | 975 | 717.5 | 188.3 | 529.1 | 905.8 |
| PS16 | NEWTST | 0 | 999 | 356 | 762 | 852 | 960 | 983 | 819.1 | 178.1 | 641.0 | 997.2 |
| PS17 | APLICATN | 86 | 999 | 350 | 350 | 350 | 350 | 350 | 350.0 | 0.0 | 350.0 | 350.0 |
| PS18 | RESOURCE | 100 | 400 | 211 | 211 | 211 | 211 | 211 | 211.0 | 0.0 | 211.0 | 211.0 |
| PS19 | UTILITY | 65 | 100 | 80 | 80 | 80 | 80 | 80 | 80.0 | 0.0 | 80.0 | 80.0 |
| PS20 | PLATFORM | 60 | 250 | 100 | 100 | 100 | 100 | 100 | 100.0 | 0.0 | 100.0 | 100.0 |
| PS81 | CMPLXITY | 320 | 680 | 340 | 360 | 400 | 440 | 500 | 403.6 | 48.0 | 355.6 | 451.7 |

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| NUMBER OF CLUSTERS | PRCD | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| 10 | 1 | 6 | 3 | 2 | 4 | 7 | 1 | 8 | 9 | 0 | 5 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | * | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * | * |

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Figure A.6.2-1. PRICE S3: Cluster Map for 11 Projects

Table A.6.2-4. PRICE S3: Summary Statistics for 20 Independent Systems

| CODE | NAME | --ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|-----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| PS01 | DESGPHAS | 200 | 500 | 229 | 286 | 334 | 386 | 474 | 340.5 | 69.8 | 270.7 | 410.3 |
| PS02 | DESGACT | 200 | 800 | 560 | 602 | 650 | 735 | 787 | 664.9 | 72.5 | 592.5 | 737.4 |
| PS03 | CODEPHAS | 150 | 500 | 160 | 257 | 323 | 389 | 461 | 324.4 | 84.3 | 240.1 | 408.8 |
| PS04 | CODEACT | 150 | 600 | 240 | 369 | 424 | 485 | 556 | 419.3 | 82.6 | 336.7 | 501.9 |
| PS05 | TESTPHAS | 100 | 500 | 104 | 159 | 204 | 260 | 346 | 206.0 | 64.1 | 142.0 | 270.1 |
| PS06 | TESTACT | 100 | 800 | 320 | 481 | 579 | 614 | 779 | 547.3 | 108.7 | 438.6 | 655.9 |
| PS07 | SDOCPHAS | 50 | 300 | 53 | 85 | 117 | 154 | 280 | 126.3 | 58.8 | 67.5 | 185.0 |
| PS08 | SDOACT | 250 | 600 | 377 | 450 | 520 | 542 | 572 | 498.1 | 53.3 | 444.9 | 551.4 |
| PS09 | SCH67 | 239 | 1552 | 373 | 720 | 948 | 1112 | 1403 | 934.9 | 264.2 | 670.7 | 1199.2 |
| PS10 | CMPLXTOT | 60 | 240 | 60 | 80 | 100 | 120 | 150 | 102.5 | 24.5 | 78.0 | 127.0 |
| PS11 | CMPXPERS | 80 | 120 | 80 | 90 | 100 | 100 | 120 | 99.0 | 10.7 | 88.3 | 109.7 |
| PS12 | CMPXPROD | 80 | 120 | 80 | 90 | 100 | 100 | 100 | 89.5 | 8.9 | 80.6 | 98.4 |
| PS13 | CMPXEXTR | 100 | 200 | 100 | 100 | 110 | 120 | 160 | 114.0 | 17.6 | 96.4 | 131.6 |
| PS14 | NEWDESGN | 0 | 999 | 153 | 527 | 668 | 906 | 999 | 660.9 | 253.2 | 407.8 | 914.1 |
| PS15 | NEWCODE | 0 | 999 | 267 | 658 | 776 | 914 | 999 | 754.3 | 188.0 | 566.3 | 942.4 |
| PS16 | NEWTEST | 0 | 999 | 356 | 801 | 907 | 967 | 999 | 857.8 | 149.7 | 708.1 | 1007.6 |
| PS17 | APLICATN | 86 | 999 | 350 | 350 | 350 | 350 | 350 | 350.0 | 0.0 | 350.0 | 350.0 |
| PS18 | RESOURCE | 100 | 400 | 211 | 211 | 211 | 211 | 211 | 211.0 | 0.0 | 211.0 | 211.0 |
| PS19 | UTILITY | 65 | 100 | 80 | 80 | 80 | 80 | 80 | 80.0 | 0.0 | 80.0 | 80.0 |
| PS20 | PLATFORM | 60 | 250 | 100 | 100 | 100 | 100 | 100 | 100.0 | 0.0 | 100.0 | 100.0 |
| PS81 | CMPLXITY | 320 | 680 | 320 | 360 | 400 | 440 | 500 | 405.0 | 48.9 | 356.1 | 453.9 |

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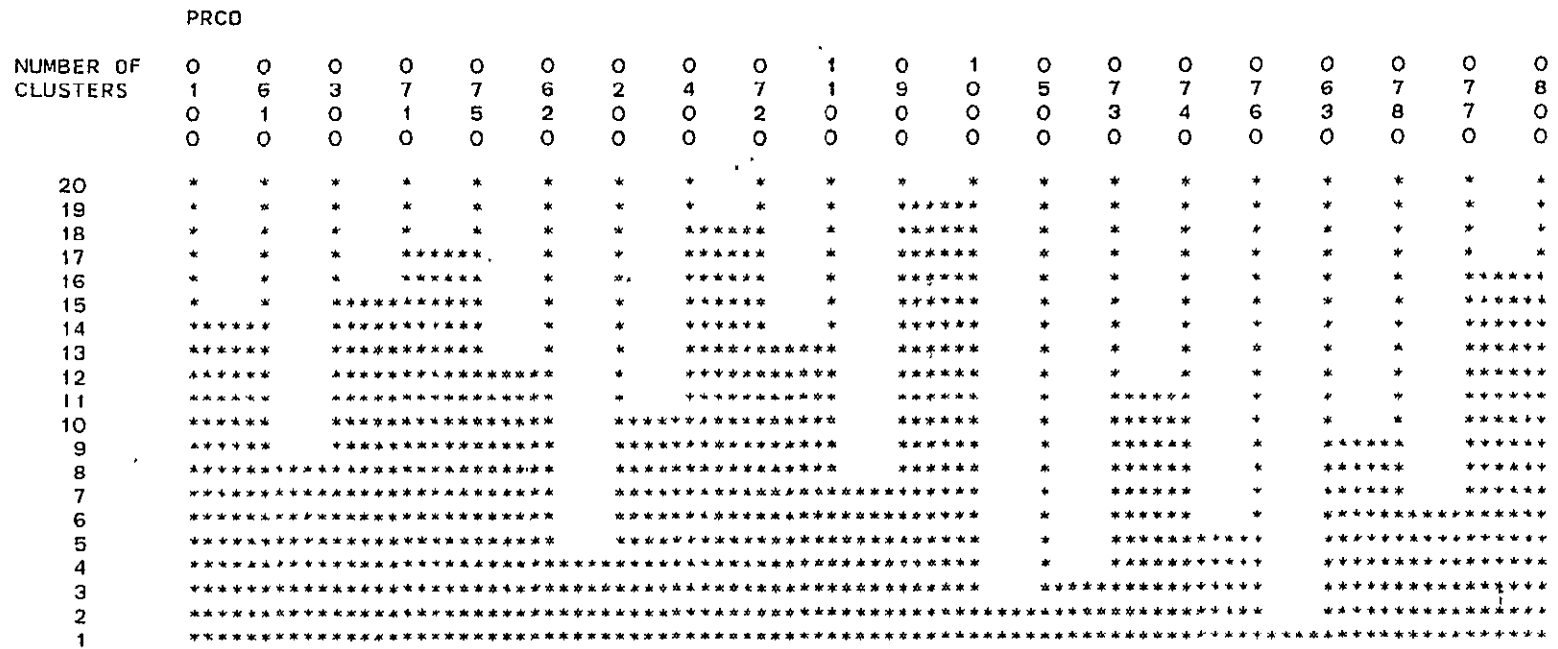


Figure A.6.2-2. PRICE S3: Cluster Map for 20 Independent Systems

Table A.6.2-5. PRICE S3: Summary Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| PS01 | DESGPHAS | 200 | 500 | 229 | 260 | 296 | 352 | 364 | 301.9 | 48.2 | 253.7 | 350.1 |
| PS02 | DESGACT | 200 | 800 | 593 | 628 | 641 | 711 | 787 | 666.8 | 61.2 | 605.6 | 728.0 |
| PS03 | CODEPHAS | 150 | 500 | 296 | 318 | 375 | 406 | 447 | 364.8 | 50.0 | 314.8 | 414.8 |
| PS04 | CODEACT | 150 | 600 | 379 | 408 | 466 | 498 | 556 | 459.6 | 55.2 | 404.4 | 514.7 |
| PS05 | TESTPHAS | 100 | 500 | 121 | 171 | 205 | 255 | 346 | 215.9 | 65.2 | 150.7 | 281.1 |
| PS06 | TESTACT | 100 | 800 | 439 | 539 | 606 | 628 | 651 | 580.4 | 69.1 | 511.4 | 649.5 |
| PS07 | SDOCPHAS | 50 | 300 | 53 | 60 | 100 | 157 | 242 | 117.6 | 61.8 | 55.7 | 179.4 |
| PS08 | SDOACT | 250 | 600 | 436 | 463 | 540 | 552 | 572 | 515.9 | 49.3 | 466.6 | 565.2 |
| PS09 | SCH67 | 239 | 1552 | 657 | 948 | 1045 | 1276 | 1403 | 1082.9 | 230.5 | 852.4 | 1313.3 |
| PS10 | CMPLXTOT | 60 | 240 | 80 | 85 | 100 | 125 | 150 | 106.7 | 23.5 | 83.2 | 130.1 |
| PS11 | CMPXPERS | 80 | 120 | 90 | 100 | 100 | 105 | 110 | 101.1 | 6.0 | 95.1 | 107.1 |
| PS12 | CMPXPROD | 80 | 120 | 80 | 80 | 90 | 95 | 100 | 87.8 | 8.3 | 79.4 | 96.1 |
| PS13 | CMPXEXTR | 100 | 200 | 100 | 100 | 120 | 120 | 160 | 117.8 | 18.6 | 99.2 | 136.3 |
| PS14 | NEWDESGN | 0 | 999 | 153 | 409 | 640 | 716 | 891 | 573.3 | 225.4 | 347.9 | 798.8 |
| PS15 | NEWCODE | 0 | 999 | 267 | 612 | 674 | 843 | 900 | 686.2 | 192.1 | 494.1 | 878.3 |
| PS16 | NEWTST | 0 | 999 | 356 | 757 | 813 | 951 | 983 | 804.0 | 189.9 | 614.1 | 993.9 |
| PS17 | APLICATN | 86 | 999 | 350 | 350 | 350 | 350 | 350 | 350.0 | 0.0 | 350.0 | 350.0 |
| PS18 | RESOURCE | 100 | 400 | 211 | 211 | 211 | 211 | 211 | 211.0 | 0.0 | 211.0 | 211.0 |
| PS19 | UTILITY | 65 | 100 | 80 | 80 | 80 | 80 | 80 | 80.0 | 0.0 | 80.0 | 80.0 |
| PS20 | PLATFORM | 60 | 250 | 100 | 100 | 100 | 100 | 100 | 100.0 | 0.0 | 100.0 | 100.0 |
| PS81 | CMPLXITY | 320 | 680 | 360 | 370 | 400 | 450 | 500 | 413.3 | 46.9 | 366.4 | 460.2 |

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| | PRCO | | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|---|---|
| NUMBER OF CLUSTERS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | 1 | 6 | 3 | 2 | 4 | 7 | 9 | 0 | 5 |
| | 0 | 1 | 0 | 0 | 0 | 3 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | ***** | * | * |
| 7 | * | * | * | ***** | * | ***** | * | * | * |
| 6 | ***** | * | ***** | * | ***** | * | * | * | * |
| 5 | ***** | ***** | * | ***** | * | ***** | * | * | * |
| 4 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |

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Figure A.6.2-3. PRICE S3: Cluster Map for 9 Large Systems

Table A.6.2-6. PRICE S3: Summary Statistics for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE- | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|-----------------|------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| PSO1 | DESGPHAS | 200 | 500 | 257 | 316 | 375 | 441 | 474 | 372.1 | 70.4 | 301.7 | 442.5 |
| PSO2 | DESGACT | 200 | 800 | 560 | 587 | 658 | 750 | 787 | 663.5 | 83.6 | 579.9 | 747.0 |
| PSO3 | CODEPHAS | 150 | 500 | 160 | 221 | 302 | 375 | 461 | 291.5 | 94.1 | 197.3 | 385.6 |
| PSO4 | CODEACT | 150 | 600 | 240 | 338 | 393 | 443 | 513 | 386.4 | 88.7 | 297.6 | 475.1 |
| PSO5 | TESTPHAS | 100 | 500 | 104 | 158 | 164 | 265 | 302 | 198.0 | 65.1 | 132.9 | 263.1 |
| PSO6 | TESTACT | 100 | 800 | 320 | 459 | 490 | 603 | 779 | 520.1 | 129.7 | 390.4 | 649.8 |
| PSO7 | SDOCPHAS | 50 | 300 | 66 | 100 | 118 | 146 | 280 | 133.4 | 58.1 | 75.2 | 191.5 |
| PSO8 | SDOACT | 250 | 600 | 377 | 438 | 488 | 522 | 563 | 483.6 | 54.2 | 429.4 | 537.8 |
| PSO9 | SCH67 | 239 | 1552 | 373 | 612 | 910 | 1015 | 1134 | 813.9 | 233.1 | 580.8 | 1047.0 |
| PS10 | CMPLXTOT | 60 | 240 | 60 | 70 | 100 | 120 | 140 | 99.1 | 25.9 | 73.2 | 125.0 |
| PS11 | CMPXPERS | 80 | 120 | 80 | 90 | 100 | 100 | 120 | 97.3 | 13.5 | 83.8 | 110.8 |
| PS12 | CMPXPROD | 80 | 120 | 80 | 80 | 90 | 100 | 100 | 90.9 | 9.4 | 81.5 | 100.3 |
| PS13 | CMPXEXTR | 100 | 200 | 100 | 100 | 100 | 120 | 150 | 110.9 | 17.0 | 93.9 | 127.9 |
| PS14 | NEWDESGN | 0 | 999 | 260 | 624 | 770 | 946 | 999 | 732.6 | 261.8 | 470.8 | 994.4 |
| PS15 | NEWCODE | 0 | 999 | 446 | 670 | 822 | 946 | 999 | 810.1 | 173.3 | 636.7 | 983.4 |
| PS16 | NEWTST | 0 | 999 | 732 | 800 | 928 | 975 | 999 | 901.9 | 94.9 | 807.0 | 996.8 |
| PS17 | APLICATN | 86 | 999 | 350 | 350 | 350 | 350 | 350 | 350.0 | 0.0 | 350.0 | 350.0 |
| PS18 | RESOURCE | 100 | 400 | 211 | 211 | 211 | 211 | 211 | 211.0 | 0.0 | 211.0 | 211.0 |
| PS19 | UTILITY | 65 | 100 | 80 | 80 | 80 | 80 | 80 | 80.0 | 0.0 | 80.0 | 80.0 |
| PS20 | PLATFORM | 60 | 250 | 100 | 100 | 100 | 100 | 100 | 100.0 | 0.0 | 100.0 | 100.0 |
| PSB1 | CMPLXITY | 320 | 680 | 320 | 340 | 400 | 440 | 480 | 398.2 | 51.7 | 346.4 | 449.9 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 6 | 7 | 7 | 7 | 8 | 7 | 1 | 6 | 7 | 7 | 7 | 7 |
| 2 | 1 | 5 | 7 | 0 | 2 | 0 | 3 | 8 | 4 | 6 | 6 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | |
|----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | ***** | * | * | * | * | * | * | * | * | * |
| 9 | * | ***** | ***** | * | * | * | * | * | * | * | * |
| 8 | * | ***** | ***** | ***** | ***** | * | * | * | * | * | * |
| 7 | ***** | ***** | ***** | ***** | ***** | * | * | * | * | * | * |
| 6 | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * | * | * |
| 5 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * | * |
| 4 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |

Figure A.6.2-4. PRICE S3: Cluster Map for 11 Small Systems

A.6.3 COCOMO MODEL

| | | | |
|----------|------------|----------|-------------|
| <u>X</u> | Objective | <u>X</u> | Subjective |
| -- | Absolute | <u>X</u> | Relative |
| -- | Explicit | <u>X</u> | Derived |
| -- | Static | <u>X</u> | Dynamic |
| <u>X</u> | Predictive | -- | Explanatory |

This category measures all four components of software development. All the measures are subjective in the manner in which they are scaled and in the interpretation of the scale values, although objective data are needed to determine values. The estimates of the measures are predictive but also dynamic, since changes in requirements and the composition of the development team may (and usually do) occur during development.

The remainder of this subsection contains tables that describe the COCOMO measures. These tables include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.6.3-1)
- Values of the measures for 25 systems (Table A.6.3-2)

Table A.6.3-1. COCOMO: Description of Measures

| Code | Measure | Range | | Description |
|-----------|---------|-------|------|-------------------------------------|
| | | Low | High | |
| Product | | | | |
| CO01 | RELY | 075 | 140 | Required Software Reliability |
| CO02 | DATA | 094 | 116 | Data Base Size |
| CO03 | CPLX | 070 | 165 | Product Complexity |
| Computer | | | | |
| CO04 | TIME | 100 | 166 | Execution-Time Constraint |
| CO05 | STOR | 100 | 156 | Main Storage Constraint |
| CO06 | VIRT | 087 | 130 | Virtual Machine Volatility |
| CO07 | TURN | 087 | 115 | Computer Turnaround Time |
| Personnel | | | | |
| CO08 | ACAP | 071 | 146 | Analyst Capability |
| CO09 | AEXP | 082 | 129 | Applications Experience |
| CO10 | PCAP | 070 | 142 | Programmer Capability |
| CO11 | VEXP | 090 | 121 | Virtual Machine Experience |
| CO12 | LEXP | 095 | 114 | Programming Language Experience |
| Project | | | | |
| CO13 | MODP | 082 | 124 | Use of Modern Programming Practices |
| CO14 | TOOL | 083 | 124 | Use of Software Tools |
| CO15 | SCED | 110 | 123 | Required Development Schedule |

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Table A.6.3-2. COCOMO: Values of the Measures
for 25 Systems

| OBS | PRCO | C011 | C012 | C013 | C014 | C015 | | | | | |
|-----|------|------|------|------|------|------|--|--|--|--|--|
| 1 | 0100 | 100 | 95 | 82 | 83 | 104 | | | | | |
| 2 | 0200 | 100 | 95 | 124 | 124 | 100 | | | | | |
| 3 | 0300 | 100 | 95 | 124 | 110 | 100 | | | | | |
| 4 | 0400 | 100 | 95 | 110 | 110 | 100 | | | | | |
| 5 | 0500 | 100 | 95 | 82 | 83 | 100 | | | | | |
| 6 | 0600 | 100 | 95 | 82 | 83 | 100 | | | | | |
| 7 | 0700 | 100 | 95 | 91 | 100 | 104 | | | | | |
| 8 | 0800 | 100 | 95 | 82 | 83 | 104 | | | | | |
| 9 | 0900 | 100 | 95 | 110 | 100 | 104 | | | | | |
| 10 | 1000 | 100 | 95 | 91 | 100 | 104 | | | | | |
| 11 | 1100 | 100 | 95 | 100 | 110 | 104 | | | | | |
| 12 | 9000 | 100 | 95 | 100 | 100 | 104 | | | | | |
| 13 | 0610 | 100 | 95 | 82 | 83 | 104 | | | | | |
| 14 | 0620 | 100 | 95 | 91 | 91 | 104 | | | | | |
| 15 | 0630 | 100 | 95 | 82 | 91 | 108 | | | | | |
| 16 | 0631 | 100 | 95 | 82 | 83 | 108 | | | | | |
| 17 | 0632 | 100 | 95 | 100 | 124 | 108 | | | | | |
| 18 | 0710 | 100 | 95 | 91 | 110 | 104 | | | | | |
| 19 | 0720 | 100 | 95 | 82 | 91 | 104 | | | | | |
| 20 | 0730 | 100 | 95 | 100 | 100 | 104 | | | | | |
| 21 | 0740 | 100 | 100 | 100 | 110 | 104 | | | | | |
| 22 | 0750 | 100 | 100 | 100 | 124 | 104 | | | | | |
| 23 | 0760 | 100 | 95 | 100 | 100 | 123 | | | | | |
| 24 | 0770 | 100 | 95 | 91 | 91 | 104 | | | | | |
| 25 | 0780 | 100 | 100 | 91 | 100 | 108 | | | | | |

| OBS | PRCO | C001 | C002 | C003 | C004 | C005 | C006 | C007 | C008 | C009 | C010 |
|-----|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 0100 | 88 | 94 | 100 | 100 | 100 | 87 | 107 | 86 | 100 | 86 |
| 2 | 0200 | 88 | 94 | 100 | 100 | 100 | 87 | 107 | 86 | 100 | 117 |
| 3 | 0300 | 88 | 94 | 100 | 100 | 106 | 87 | 107 | 100 | 100 | 117 |
| 4 | 0400 | 88 | 94 | 100 | 111 | 106 | 87 | 107 | 100 | 113 | 117 |
| 5 | 0500 | 88 | 94 | 100 | 100 | 100 | 87 | 107 | 86 | 100 | 86 |
| 6 | 0600 | 88 | 94 | 100 | 100 | 106 | 87 | 107 | 100 | 100 | 86 |
| 7 | 0700 | 88 | 94 | 100 | 111 | 100 | 87 | 107 | 119 | 113 | 117 |
| 8 | 0800 | 100 | 94 | 115 | 100 | 100 | 87 | 107 | 100 | 91 | 70 |
| 9 | 0900 | 88 | 94 | 100 | 111 | 100 | 87 | 107 | 100 | 100 | 117 |
| 10 | 1000 | 88 | 94 | 100 | 111 | 100 | 87 | 107 | 100 | 100 | 100 |
| 11 | 1100 | 88 | 94 | 100 | 111 | 106 | 87 | 107 | 100 | 100 | 117 |
| 12 | 9000 | 88 | 94 | 100 | 111 | 100 | 87 | 107 | 100 | 100 | 100 |
| 13 | 0610 | 88 | 94 | 100 | 100 | 106 | 87 | 107 | 100 | 100 | 100 |
| 14 | 0620 | 88 | 94 | 100 | 100 | 100 | 87 | 107 | 100 | 100 | 86 |
| 15 | 0630 | 88 | 94 | 100 | 100 | 100 | 87 | 107 | 100 | 113 | 70 |
| 16 | 0631 | 88 | 94 | 100 | 100 | 100 | 87 | 107 | 100 | 91 | 86 |
| 17 | 0632 | 88 | 94 | 100 | 100 | 100 | 87 | 107 | 100 | 100 | 86 |
| 18 | 0710 | 88 | 94 | 100 | 111 | 106 | 87 | 107 | 100 | 91 | 142 |
| 19 | 0720 | 88 | 94 | 100 | 111 | 100 | 87 | 107 | 119 | 113 | 117 |
| 20 | 0730 | 88 | 94 | 100 | 111 | 100 | 87 | 107 | 119 | 91 | 70 |
| 21 | 0740 | 88 | 94 | 100 | 100 | 100 | 87 | 107 | 119 | 113 | 117 |
| 22 | 0750 | 88 | 94 | 100 | 100 | 100 | 87 | 107 | 119 | 113 | 142 |
| 23 | 0760 | 88 | 94 | 100 | 100 | 100 | 87 | 107 | 119 | 113 | 142 |
| 24 | 0770 | 88 | 94 | 100 | 100 | 100 | 87 | 107 | 119 | 100 | 70 |
| 25 | 0780 | 88 | 94 | 100 | 100 | 100 | 87 | 107 | 119 | 100 | 117 |

A.7 ADDITIONAL DETAIL CLASS OF MEASURES

The Additional Detail class primarily measures the development product, although a few of the measures measure the development process. The additional detail includes

- Miscellaneous Detail (MS01 through MS40)
 - Product Attributes (MS01 through MS10)
 - Processing Attributes (MS11 through MS20)
 - Documentation (MS21 through MS25)
 - Average Staff (MS26 through MS28)
 - Other (MS29 through MS40)
- Code Breakdown (SW01 through SW90)
 - Baseline Diagram Components (SW01 through SW05)
 - Decision Modules (SW06 through SW10)
 - Low-Order Language LOC (SW11 through SW15)
 - Middle-Order Language LOC (SW16 through SW20)
 - High-Order Language LOC (SW21 through SW25)
 - Total LOC (SW26 through SW34)
 - Low-Order Executable LOC (SW31 through SW35)
 - Middle-Order Executable LOC (SW36 through SW40)
 - High-Order Executable LOC (SW41 through SW45)
 - Total Executable LOC (SW46 through SW50)
 - Decisions (SW51 through SW55)
 - Library Changes (SW56 through SW60)
 - Software Changes (SW61 through SW65)
 - Software Errors (SW66 through SW70)
 - Comments (SW71 through SW75)
 - Derived Values (SW76 through SW90)
- Estimated Statistics (ES01 through ES19)
 - Components (ES01)
 - Modules (ES02 through ES04)
 - Computer Runs (ES05)

- Source Code Changes (ES06)
- Pages of Documentation (ES07)
- Lines of Code (ES08 through ES10)
- Executable Statements (ES11 through ES13)
- Work Hours (ES14 through ES16)
- Computer Hours (ES17 and ES19)

A.7.1 MISCELLANEOUS

| | | | |
|--------------|------------|--------------|-------------|
| - <u>X</u> - | Objective | - - - | Subjective |
| - <u>X</u> - | Absolute | - - - | Relative |
| - <u>X</u> - | Explicit | - - - | Derived |
| - <u>X</u> - | Static | - - - | Dynamic |
| - - - | Predictive | - <u>X</u> - | Explanatory |

This category primarily measures the development product. A few of the measures measure the development process. All but a few of the measures are objective, absolute, explicit, static, and explanatory at the end of the project; the others (average staff) are derived. Estimates (dynamic) of the measures must be made for prediction. A certain number of the measures become static during implementation; the rest become static at the end of the project.

The remainder of this subsection contains tables and figures that describe the Miscellaneous measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.7.1-1)
- Values of the measures for 25 systems (Table A.7.1-2)
- Summary statistics for 11 projects (Table A.7.1-3)
- Cluster map for 11 projects (Figure A.7.1-1)
- Summary statistics for 20 independent systems (Table A.7.1-4)

- Cluster map for 20 independent systems (Figure A.7.1-2)
- Summary statistics for 9 large systems (Table A.7.1-5)
- Cluster map for 9 large systems (Figure A.7.1-3)
- Summary statistics for 11 small systems (Table A.7.1-6)
- Cluster map for 11 small systems (Figure A.7.1-4)

Table A.7.1-1. Miscellaneous: Description of Measures
(1 of 2)

| Code | Measure | Range | | Description |
|-----------------------|----------|-------|------|--------------------------|
| | | Low | High | |
| Product Attributes | | | | |
| MS01 | PRNPROGS | 01 | 12 | Number of Programs |
| MS02 | PRNSUBS | 01 | 36 | Number of Subsystems |
| Data Sets | | | | |
| MS03 | PRNDSIN | 00 | 12 | Input |
| MS04 | PRNDSIO | 00 | 24 | Input/Output |
| MS05 | PRNDSOUT | 00 | 12 | Output |
| MS06 | PRNDSTOT | 00 | 48 | Total |
| Data Base | | | | |
| MS07 | PRDBIN | 0000 | 2000 | Input |
| MS08 | PRDBIO | 0000 | 2000 | Input/Output |
| MS09 | PRDBOUT | 0000 | 2000 | Output |
| MS10 | PRDBTOT | 0000 | 2000 | Total |
| Processing Attributes | | | | |
| MS11 | CPNPROGS | 01 | 12 | Number of Programs |
| MS12 | CPNSUBS | 01 | 36 | Number of Subsystems |
| Data Sets | | | | |
| MS13 | CPNDSIN | 00 | 12 | Input |
| MS14 | CPNDSIO | 00 | 24 | Input/Output |
| MS15 | CPNDSOUT | 00 | 12 | Output |
| MS16 | CPNDSTOT | 00 | 48 | Total |
| Data Base | | | | |
| MS17 | CPDBIN | 0000 | 2000 | Input |
| MS18 | CPDBIO | 0000 | 2000 | Input/Output |
| MS19 | CPDBOUT | 0000 | 2000 | Output |
| MS20 | CPDBTOT | 0000 | 2000 | Total |
| Documentation | | | | |
| MS21 | PAGDESGN | 0000 | 2400 | Pages of Design Document |
| MS22 | PAGTPLAN | 0000 | 1200 | Pages of Test Plan |

Table A.7.1-1. Miscellaneous: Description of Measures
(2 of 2)

| Code | Measure | Range | | Description |
|---------------------------|----------|-------|-------|--|
| | | Low | High | |
| Documentation (Continued) | | | | |
| MS23 | PAGUSERS | 0000 | 4800 | Pages of User's Guide/System Description |
| MS24 | PAGPROLG | 0000 | 4800 | Pages of Prologs |
| MS25 | PAGTOTAL | 00000 | 13200 | Total Pages |
| Average Staff | | | | |
| MS26 | AVGSP | 000 | 169 | Programmers |
| MS27 | AVGSPM | 000 | 267 | Programmers and Managers |
| MS28 | AVGSPMO | 000 | 267 | All Personnel |
| MS29 | | 0000 | 0000 | Not Defined |
| MS30 | | 0000 | 0000 | Not Defined |
| MS31 | | 0000 | 0000 | Not Defined |
| MS32 | | 0000 | 0000 | Not Defined |
| MS33 | | 0000 | 0000 | Not Defined |
| MS34 | | 0000 | 0000 | Not Defined |
| MS35 | | 0000 | 0000 | Not Defined |
| MS36 | | 0000 | 0000 | Not Defined |
| MS37 | | 0000 | 0000 | Not Defined |
| MS38 | | 0000 | 0000 | Not Defined |
| MS39 | | 0000 | 0000 | Not Defined |
| MS40 | | 0000 | 0000 | Not Defined |

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Table A.7.1-2. Miscellaneous: Values of the Measures for 25 Systems (1 of 2)

| PRCD | MS01 | MS02 | MS03 | MS04 | MS05 | MS06 | MS07 | MS08 | MS09 | MS10 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 3 | 14 | 11 | 2 | 7 | 20 | 197 | 27 | 66 | 290 |
| 0200 | 1 | 8 | 6 | 0 | 4 | 10 | 102 | 0 | 36 | 138 |
| 0300 | 2 | 6 | 7 | 3 | 4 | 14 | 171 | 145 | 64 | 380 |
| 0400 | 7 | 11 | 8 | 3 | 7 | 18 | 141 | 159 | 229 | 529 |
| 0500 | 1 | 9 | 6 | 3 | 2 | 11 | 105 | 15 | 25 | 145 |
| 0600 | 4 | 17 | 7 | 13 | 4 | 24 | 133 | 1076 | 246 | 1455 |
| 0700 | 8 | 15 | 8 | 12 | 4 | 24 | 137 | 320 | 96 | 553 |
| 0800 | 1 | 3 | 6 | 0 | 11 | 17 | 80 | 0 | 138 | 218 |
| 0900 | 1 | 8 | 3 | 3 | 3 | 9 | 71 | 47 | 40 | 158 |
| 1000 | 2 | 7 | 4 | 3 | 3 | 10 | 94 | 64 | 39 | 197 |
| 1100 | 1 | 3 | 3 | 2 | 1 | 6 | 57 | 20 | 16 | 93 |
| 9000 | 4 | 18 | 8 | 7 | 6 | 21 | 155 | 143 | 83 | 381 |
| 0610 | 2 | 12 | 7 | 11 | 3 | 21 | 133 | 1036 | 39 | 1208 |
| 0620 | 1 | 2 | 5 | 0 | 2 | 7 | 150 | 0 | 222 | 372 |
| 0630 | 1 | 3 | 4 | 2 | 0 | 6 | 221 | 103 | 0 | 324 |
| 0631 | 1 | 2 | 4 | 1 | 0 | 5 | 206 | 78 | 0 | 284 |
| 0632 | 1 | 1 | 1 | 0 | 1 | 2 | 15 | 0 | 25 | 40 |
| 0710 | 1 | 2 | 1 | 0 | 2 | 3 | 65 | 0 | 157 | 222 |
| 0720 | 1 | 3 | 3 | 1 | 2 | 6 | 146 | 15 | 24 | 185 |
| 0730 | 1 | 4 | 4 | 1 | 3 | 8 | 165 | 15 | 145 | 225 |
| 0740 | 1 | 1 | 3 | 3 | 1 | 7 | 3 | 145 | 13 | 161 |
| 0750 | 1 | 1 | 0 | 2 | 1 | 3 | 0 | 142 | 13 | 155 |
| 0760 | 1 | 2 | 3 | 1 | 0 | 4 | 48 | 6 | 0 | 54 |
| 0770 | 1 | 1 | 5 | 0 | 1 | 6 | 72 | 0 | 6 | 78 |
| 0780 | 1 | 1 | 2 | 4 | 0 | 6 | 45 | 37 | 0 | 82 |

| PRCD | MS11 | MS12 | MS13 | MS14 | MS15 | MS16 | MS17 | MS18 | MS19 | MS20 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 3 | 7 | 6 | 0 | 5 | 11 | 123 | 0 | 49 | 172 |
| 0200 | 1 | 4 | 3 | 0 | 3 | 6 | 58 | 0 | 23 | 81 |
| 0300 | 2 | 6 | 4 | 3 | 1 | 8 | 168 | 145 | 47 | 360 |
| 0400 | 5 | 8 | 4 | 3 | 7 | 14 | 125 | 159 | 229 | 513 |
| 0500 | 1 | 4 | 3 | 2 | 1 | 6 | 61 | 10 | 13 | 84 |
| 0600 | 3 | 11 | 4 | 13 | 3 | 20 | 85 | 1076 | 233 | 1394 |
| 0700 | 4 | 7 | 4 | 6 | 2 | 12 | 129 | 274 | 79 | 482 |
| 0800 | 1 | 3 | 6 | 0 | 11 | 17 | 80 | 0 | 138 | 218 |
| 0900 | 1 | 6 | 3 | 2 | 3 | 8 | 71 | 47 | 40 | 158 |
| 1000 | 2 | 7 | 4 | 3 | 3 | 10 | 94 | 64 | 39 | 197 |
| 1100 | 1 | 3 | 3 | 2 | 1 | 6 | 57 | 20 | 16 | 93 |
| 9000 | 4 | 16 | 8 | 7 | 6 | 21 | 155 | 143 | 83 | 381 |
| 0610 | 2 | 6 | 4 | 11 | 2 | 17 | 85 | 1036 | 26 | 1147 |
| 0620 | 1 | 2 | 4 | 0 | 2 | 6 | 150 | 0 | 222 | 372 |
| 0630 | 1 | 2 | 3 | 2 | 0 | 5 | 221 | 103 | 0 | 324 |
| 0631 | 1 | 1 | 3 | 1 | 0 | 4 | 206 | 78 | 0 | 284 |
| 0632 | 1 | 1 | 1 | 0 | 1 | 2 | 15 | 0 | 25 | 40 |
| 0710 | 1 | 1 | 1 | 0 | 2 | 3 | 65 | 0 | 157 | 222 |
| 0720 | 1 | 3 | 3 | 1 | 1 | 5 | 146 | 15 | 13 | 174 |
| 0730 | 1 | 4 | 4 | 1 | 2 | 7 | 165 | 15 | 142 | 222 |
| 0740 | 1 | 1 | 0 | 3 | 1 | 4 | 0 | 145 | 13 | 158 |
| 0750 | 1 | 1 | 0 | 2 | 1 | 3 | 0 | 142 | 13 | 155 |
| 0760 | 1 | 2 | 3 | 1 | 0 | 4 | 48 | 6 | 0 | 54 |
| 0770 | 1 | 1 | 5 | 0 | 1 | 6 | 72 | 0 | 6 | 78 |
| 0780 | 1 | 1 | 2 | 4 | 0 | 6 | 45 | 37 | 0 | 82 |

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Table A.7.1-2. Miscellaneous: Values of the Measures for
25 Systems (2 of 2)

| PRCD | MS21 | MS22 | MS23 | MS24 | MS25 | MS26 | MS27 | MS28 |
|------|------|------|------|------|------|------|------|------|
| 0100 | 600 | 100 | 1305 | 468 | 2473 | 39 | 47 | 60 |
| 0200 | 300 | 0 | 583 | 221 | 1104 | 49 | 56 | 63 |
| 0300 | 800 | 60 | 562 | 191 | 1613 | 35 | 50 | 54 |
| 0400 | 600 | 225 | 600 | 358 | 1793 | 43 | 57 | 61 |
| 0500 | 300 | 60 | 638 | 122 | 1120 | 24 | 33 | 39 |
| 0600 | 751 | 159 | 1480 | 627 | 3017 | 50 | 62 | 71 |
| 0700 | 945 | 100 | 1157 | 493 | 2695 | 44 | 54 | 61 |
| 0800 | 340 | 68 | 253 | 93 | 754 | 13 | 18 | 23 |
| 0900 | 825 | 280 | 629 | 252 | 1986 | 32 | 43 | 49 |
| 1000 | 940 | 247 | 782 | 281 | 2250 | 32 | 44 | 52 |
| 1100 | 240 | 106 | 280 | 96 | 722 | 10 | 14 | 16 |
| 9000 | 2005 | 633 | 1691 | 629 | 4958 | 71 | 95 | 111 |
| 0610 | 650 | 158 | 1131 | 477 | 2416 | 36 | 44 | 53 |
| 0620 | 50 | 0 | 150 | 53 | 253 | 6 | 8 | 10 |
| 0630 | 51 | 1 | 199 | 97 | 348 | 18 | 22 | 25 |
| 0631 | 42 | 0 | 184 | 58 | 284 | 12 | 15 | 19 |
| 0632 | 9 | 1 | 15 | 39 | 64 | 6 | 7 | 7 |
| 0710 | 176 | 10 | 205 | 121 | 512 | 8 | 11 | 12 |
| 0720 | 165 | 15 | 231 | 78 | 489 | 6 | 6 | 7 |
| 0730 | 338 | 44 | 343 | 101 | 826 | 13 | 16 | 18 |
| 0740 | 33 | 6 | 59 | 28 | 126 | 4 | 5 | 6 |
| 0750 | 58 | 5 | 110 | 38 | 211 | 4 | 5 | 6 |
| 0760 | 88 | 13 | 120 | 56 | 277 | 7 | 8 | 8 |
| 0770 | 11 | 5 | 22 | 23 | 61 | 3 | 4 | 4 |
| 0780 | 46 | 2 | 67 | 41 | 156 | 11 | 13 | 15 |

Table A.7.1-3. Miscellaneous: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|-------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| MSO1 | PRNPROGS | 1 | 12 | 1 | 1 | 2 | 4 | 8 | 2.8 | 2.5 | 0.3 | 5.3 |
| MSO2 | PRNSUBS | 1 | 36 | 3 | 6 | 8 | 14 | 17 | 9.2 | 4.6 | 4.5 | 13.8 |
| MSO3 | PRNDSIN | 0 | 12 | 3 | 4 | 6 | 8 | 11 | 6.3 | 2.4 | 3.9 | 8.6 |
| MSO4 | PRNDSIO | 0 | 24 | 0 | 2 | 3 | 3 | 13 | 4.0 | 4.4 | -0.4 | 8.4 |
| MSO5 | PRNDSOUT | 0 | 12 | 1 | 3 | 4 | 7 | 11 | 4.5 | 2.8 | 1.7 | 7.4 |
| MSO6 | PRNDSTOT | 0 | 48 | 6 | 10 | 14 | 20 | 24 | 14.8 | 6.2 | 8.6 | 21.0 |
| MSO7 | PRDBIN | 0 | 2000 | 57 | 80 | 105 | 141 | 197 | 117.1 | 43.0 | 74.0 | 160.1 |
| MSO8 | PRDBIO | 0 | 2000 | 0 | 15 | 47 | 159 | 1076 | 170.3 | 315.5 | -145.2 | 485.7 |
| MSO9 | PRDBOUT | 0 | 2000 | 16 | 36 | 64 | 138 | 246 | 90.5 | 80.6 | 9.9 | 171.1 |
| MS10 | PRDBTOT | 0 | 2000 | 93 | 145 | 218 | 529 | 1455 | 377.8 | 390.0 | -12.2 | 767.8 |
| MS11 | CPNPROGS | 1 | 12 | 1 | 1 | 2 | 3 | 5 | 2.2 | 1.4 | 0.8 | 3.6 |
| MS12 | CPNSUBS | 1 | 36 | 3 | 4 | 6 | 7 | 11 | 6.0 | 2.4 | 3.6 | 8.4 |
| MS13 | CPNDSIN | 0 | 12 | 3 | 3 | 4 | 4 | 6 | 4.0 | 1.1 | 2.9 | 5.1 |
| MS14 | CPNDSIO | 0 | 24 | 0 | 0 | 2 | 3 | 13 | 3.1 | 3.7 | -0.6 | 6.8 |
| MS15 | CPNDSOUT | 0 | 12 | 1 | 1 | 3 | 5 | 11 | 3.6 | 3.0 | 0.6 | 6.7 |
| MS16 | CPNDSTOT | 0 | 48 | 6 | 6 | 10 | 14 | 20 | 10.7 | 4.7 | 6.0 | 15.4 |
| MS17 | CPDBIN | 0 | 2000 | 57 | 61 | 85 | 125 | 168 | 95.5 | 36.1 | 59.4 | 131.7 |
| MS18 | CPDBIO | 0 | 2000 | 0 | 0 | 47 | 159 | 1076 | 163.2 | 315.1 | -151.9 | 478.3 |
| MS19 | CPDBOUT | 0 | 2000 | 13 | 23 | 47 | 138 | 233 | 82.4 | 81.3 | 1.1 | 163.7 |
| MS20 | CPDBTOT | 0 | 2000 | 81 | 93 | 197 | 482 | 1394 | 341.1 | 381.0 | -39.9 | 722.1 |
| MS21 | PAGDESGN | 0 | 2400 | 240 | 300 | 600 | 825 | 945 | 603.7 | 269.3 | 334.5 | 873.0 |
| MS22 | PAGTPLAN | 0 | 1200 | 0 | 60 | 100 | 225 | 280 | 127.7 | 88.8 | 38.9 | 216.6 |
| MS23 | PAGUSERS | 0 | 4800 | 253 | 562 | 629 | 1157 | 1480 | 751.7 | 398.5 | 353.2 | 1150.3 |
| MS24 | PAGPROLG | 0 | 4800 | 93 | 122 | 252 | 468 | 627 | 292.0 | 177.0 | 115.0 | 469.0 |
| MS25 | PAGTOTAL | 0 | 13200 | 722 | 1104 | 1793 | 2473 | 3017 | 1775.2 | 787.6 | 987.6 | 2562.8 |
| MS26 | AVGSP | 0 | 169 | 10 | 24 | 35 | 44 | 50 | 33.7 | 13.5 | 20.3 | 47.2 |
| MS27 | AVGSPM | 0 | 227 | 14 | 33 | 47 | 57 | 62 | 43.6 | 15.9 | 27.7 | 59.5 |
| MS28 | AVGSPMO | 0 | 267 | 16 | 39 | 54 | 61 | 74 | 50.2 | 17.6 | 32.5 | 67.8 |

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| | PRCO | | | | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|---|---|---|
| NUMBER OF CLUSTERS | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| | 1 | 7 | 3 | 4 | 9 | 0 | 2 | 5 | 8 | 1 | 6 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | ***** | * | * | * | * |
| 9 | * | * | * | * | * | * | ***** | ***** | * | * | * |
| 8 | * | * | * | * | ***** | ***** | ***** | ***** | * | * | * |
| 7 | * | * | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * |
| 6 | * | * | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * |
| 5 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * |
| 4 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * |

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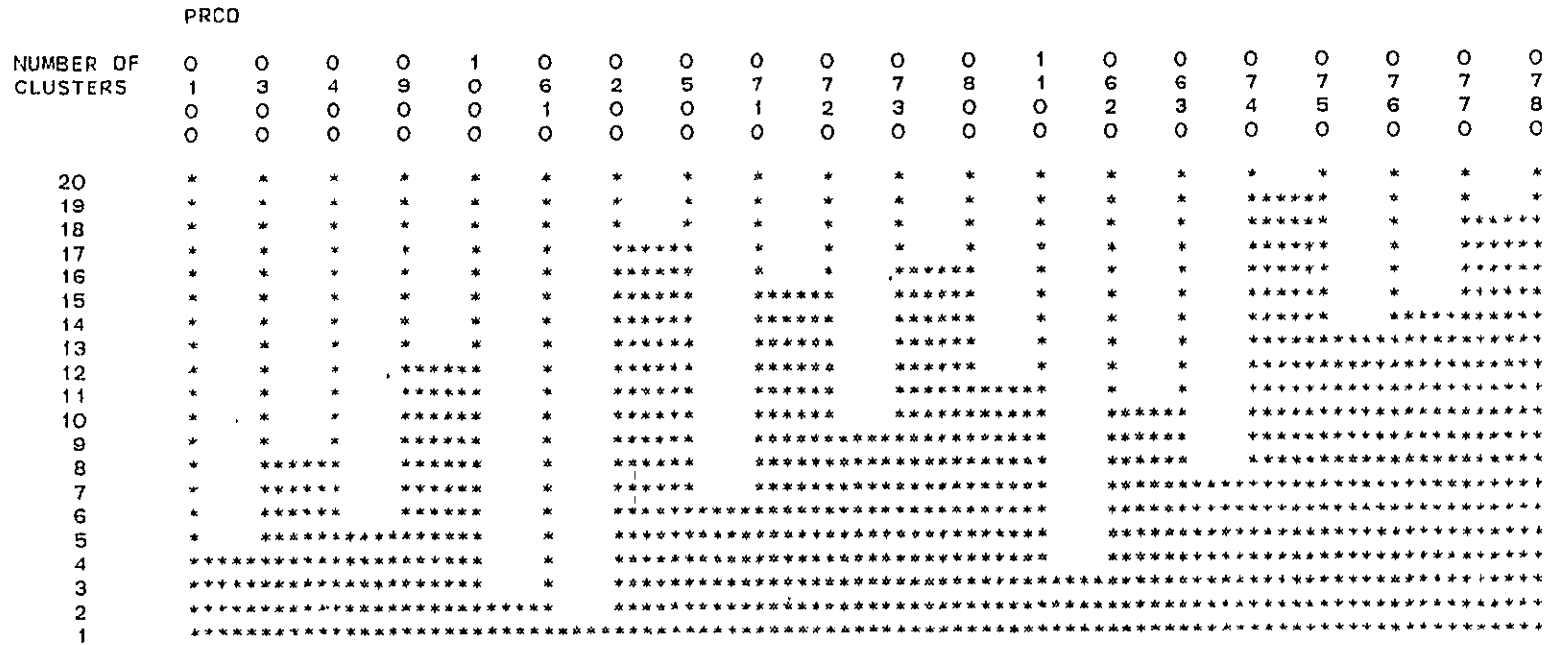
Figure A.7.1-1. Miscellaneous: Cluster Map for 11 Projects

Table A.7.1-4. Miscellaneous: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE- | | -ACTUAL-RANGE- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|-----------------|-------|----------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| MSO1 | PRNPROGS | 1 | 12 | 1 | 1 | 1 | 2 | 7 | 1.5 | 1.4 | 0.2 | 2.9 |
| MSO2 | PRNSUBS | 1 | 36 | 1 | 2 | 3 | 8 | 14 | 5.0 | 4.1 | 1.0 | 9.1 |
| MSO3 | PRNDSIN | 0 | 12 | 0 | 3 | 4 | 6 | 11 | 4.5 | 2.6 | 2.0 | 7.1 |
| MSO4 | PRNDSIO | 0 | 24 | 0 | 0 | 2 | 3 | 11 | 2.2 | 2.4 | -0.2 | 4.6 |
| MSO5 | PRNDSOUT | 0 | 12 | 0 | 1 | 2 | 4 | 11 | 2.8 | 2.8 | 0.1 | 5.6 |
| MSO6 | PRNDSTOT | 0 | 48 | 3 | 6 | 8 | 13 | 21 | 9.6 | 5.5 | 4.1 | 15.1 |
| MSO7 | PRDBIN | 0 | 2000 | 0 | 59 | 98 | 149 | 221 | 103.3 | 61.0 | 42.3 | 164.3 |
| MSO8 | PRDBIO | 0 | 2000 | 0 | 2 | 24 | 132 | 1036 | 98.8 | 227.8 | -129.0 | 326.6 |
| MSO9 | PRDBOUT | 0 | 2000 | 0 | 13 | 38 | 120 | 229 | 63.6 | 73.2 | -9.6 | 136.8 |
| MS10 | PRDBTOT | 0 | 2000 | 54 | 140 | 191 | 316 | 1208 | 260.7 | 252.5 | 8.2 | 513.2 |
| MS11 | CPNPROGS | 1 | 12 | 1 | 1 | 1 | 2 | 5 | 1.4 | 1.0 | 0.5 | 2.4 |
| MS12 | CPNSUBS | 1 | 36 | 1 | 1 | 3 | 6 | 8 | 3.6 | 2.3 | 1.3 | 5.9 |
| MS13 | CPNDSIN | 0 | 12 | 0 | 3 | 3 | 4 | 6 | 3.3 | 1.6 | 1.6 | 4.9 |
| MS14 | CPNDSIO | 0 | 24 | 0 | 0 | 2 | 3 | 11 | 2.0 | 2.5 | -0.5 | 4.5 |
| MS15 | CPNDSOUT | 0 | 12 | 0 | 1 | 2 | 3 | 11 | 2.3 | 2.7 | -0.3 | 5.0 |
| MS16 | CPNDSTOT | 0 | 48 | 3 | 5 | 6 | 10 | 17 | 7.6 | 4.2 | 3.4 | 11.8 |
| MS17 | CPDBIN | 0 | 2000 | 0 | 57 | 76 | 141 | 221 | 91.7 | 57.2 | 34.5 | 148.9 |
| MS18 | CPDBIO | 0 | 2000 | 0 | 0 | 18 | 132 | 1036 | 97.2 | 228.4 | -131.2 | 325.6 |
| MS19 | CPDBOUT | 0 | 2000 | 0 | 13 | 25 | 116 | 229 | 59.3 | 74.4 | -15.1 | 133.7 |
| MS20 | CPDBTOT | 0 | 2000 | 54 | 86 | 173 | 299 | 1147 | 243.2 | 243.4 | -0.2 | 486.6 |
| MS21 | PAGDESGN | 0 | 2400 | 11 | 53 | 270 | 600 | 940 | 330.5 | 299.7 | 30.8 | 630.3 |
| MS22 | PAGTPLAN | 0 | 1200 | 0 | 5 | 30 | 105 | 280 | 70.3 | 89.4 | -19.2 | 159.7 |
| MS23 | PAGUSERS | 0 | 4800 | 22 | 128 | 267 | 622 | 1305 | 413.4 | 358.8 | 54.7 | 772.2 |
| MS24 | PAGPROLG | 0 | 4800 | 23 | 54 | 99 | 244 | 477 | 160.3 | 141.4 | 18.9 | 301.6 |
| MS25 | PAGTOTAL | 0 | 13200 | 61 | 259 | 738 | 1748 | 2473 | 974.5 | 823.3 | 151.2 | 1797.8 |
| MS26 | AVGSP | 0 | 169 | 3 | 6 | 13 | 34 | 49 | 19.6 | 15.0 | 4.6 | 34.7 |
| MS27 | AVGSPM | 0 | 227 | 4 | 8 | 17 | 44 | 58 | 25.3 | 19.3 | 6.0 | 44.6 |
| MS28 | AVGSPMO | 0 | 267 | 4 | 9 | 21 | 53 | 63 | 29.0 | 22.0 | 7.1 | 51.0 |

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Figure A.7.1-2. Miscellaneous: Cluster Map for 20 Independent Systems

Table A.7.1-5. Miscellaneous: Summary Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|-------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| MS01 | PRNPROGS | 1 | 12 | 1 | 1 | 2 | 3 | 7 | 2.2 | 1.9 | 0.3 | 4.1 |
| MS02 | PRNSUBS | 1 | 36 | 4 | 7 | 8 | 12 | 14 | 8.8 | 3.1 | 5.7 | 11.9 |
| MS03 | PRNDSIN | 0 | 12 | 3 | 4 | 6 | 8 | 11 | 6.2 | 2.4 | 3.8 | 8.7 |
| MS04 | PRNDSIO | 0 | 24 | 0 | 2 | 3 | 3 | 11 | 3.2 | 3.1 | 0.1 | 6.3 |
| MS05 | PRNDSOUT | 0 | 12 | 2 | 3 | 3 | 6 | 7 | 4.0 | 1.8 | 2.2 | 5.8 |
| MS06 | PRNDSTOT | 0 | 48 | 8 | 10 | 11 | 19 | 21 | 13.4 | 5.0 | 8.4 | 18.4 |
| MS07 | PRDBIN | 0 | 2000 | 71 | 98 | 133 | 168 | 197 | 131.0 | 41.4 | 89.6 | 172.4 |
| MS08 | PRDBIO | 0 | 2000 | 0 | 15 | 47 | 152 | 1036 | 167.6 | 330.6 | -163.1 | 498.2 |
| MS09 | PRDBOUT | 0 | 2000 | 25 | 38 | 40 | 106 | 229 | 75.9 | 67.7 | 8.2 | 143.6 |
| MS10 | PRDBTOT | 0 | 2000 | 138 | 152 | 225 | 455 | 1208 | 363.3 | 341.7 | 21.7 | 705.0 |
| MS11 | CPNPROGS | 1 | 12 | 1 | 1 | 2 | 3 | 5 | 2.0 | 1.3 | 0.7 | 3.3 |
| MS12 | CPNSUBS | 1 | 36 | 4 | 4 | 6 | 7 | 8 | 5.8 | 1.5 | 4.3 | 7.3 |
| MS13 | CPNDSIN | 0 | 12 | 3 | 3 | 4 | 4 | 6 | 3.9 | 0.9 | 3.0 | 4.8 |
| MS14 | CPNDSIO | 0 | 24 | 0 | 1 | 2 | 3 | 11 | 2.8 | 3.3 | -0.5 | 6.1 |
| MS15 | CPNDSOUT | 0 | 12 | 1 | 2 | 3 | 4 | 7 | 3.0 | 1.9 | 1.1 | 4.9 |
| MS16 | CPNDSTOT | 0 | 48 | 6 | 7 | 8 | 13 | 17 | 9.7 | 3.8 | 5.9 | 13.4 |
| MS17 | CPDBIN | 0 | 2000 | 58 | 66 | 94 | 145 | 168 | 105.6 | 42.0 | 63.6 | 147.6 |
| MS18 | CPDBIO | 0 | 2000 | 0 | 5 | 47 | 152 | 1036 | 164.0 | 332.4 | -168.4 | 496.4 |
| MS19 | CPDBOUT | 0 | 2000 | 13 | 25 | 40 | 96 | 229 | 67.6 | 71.3 | -3.7 | 138.8 |
| MS20 | CPDBTOT | 0 | 2000 | 81 | 121 | 197 | 437 | 1147 | 326.0 | 336.9 | -10.9 | 662.9 |
| MS21 | PAGDESGN | 0 | 2400 | 300 | 319 | 600 | 813 | 940 | 594.8 | 239.0 | 355.7 | 833.8 |
| MS22 | PAGTPLAN | 0 | 1200 | 0 | 52 | 100 | 236 | 280 | 130.4 | 100.6 | 29.8 | 231.1 |
| MS23 | PAGUSERS | 0 | 4800 | 343 | 573 | 629 | 957 | 1305 | 730.3 | 301.9 | 428.4 | 1032.3 |
| MS24 | PAGPROLG | 0 | 4800 | 101 | 157 | 252 | 418 | 477 | 275.7 | 137.3 | 138.3 | 413.0 |
| MS25 | PAGTOTAL | 0 | 13200 | 826 | 1112 | 1793 | 2333 | 2473 | 1731.2 | 608.0 | 1123.2 | 2339.2 |
| MS26 | AVGSP | 0 | 169 | 13 | 28 | 35 | 41 | 49 | 33.7 | 10.5 | 23.2 | 44.2 |
| MS27 | AVGSPM | 0 | 227 | 16 | 38 | 44 | 54 | 58 | 43.6 | 12.8 | 30.7 | 56.4 |
| MS28 | AVGSPMO | 0 | 267 | 18 | 44 | 53 | 61 | 63 | 49.9 | 14.0 | 35.9 | 63.9 |

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| NUMBER OF CLUSTERS | PRCD | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | 1 | 3 | 4 | 9 | 0 | 2 | 5 | 7 | 6 | |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 9 | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * |

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Figure A.7.1-3. Miscellaneous: Cluster Map for 9 Large Systems

Table A.7.1-6. Miscellaneous: Summary Statistics for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE | | -ACTUAL-RANGE- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|-----------|----------------|-------|----------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| MS01 | PRNPROGS | 1 | 12 | 1 | 1 | 1 | 1 | 1 | 1.0 | 0.0 | 1.0 | 1.0 |
| MS02 | PRNSUBS | 1 | 36 | 1 | 1 | 2 | 3 | 3 | 2.0 | 0.9 | 1.1 | 2.9 |
| MS03 | PRNDSIN | 0 | 12 | 0 | 2 | 3 | 5 | 6 | 3.2 | 1.8 | 1.4 | 5.0 |
| MS04 | PRNDSIO | 0 | 24 | 0 | 0 | 1 | 2 | 4 | 1.4 | 1.4 | 0.0 | 2.7 |
| MS05 | PRNDSOUT | 0 | 12 | 0 | 0 | 1 | 2 | 11 | 1.9 | 3.1 | -1.2 | 5.0 |
| MS06 | PRNDSTOT | 0 | 48 | 3 | 4 | 6 | 7 | 17 | 6.5 | 3.8 | 2.7 | 10.2 |
| MS07 | PRDBIN | 0 | 2000 | 0 | 45 | 65 | 146 | 221 | 80.6 | 66.7 | 13.9 | 147.4 |
| MS08 | PRDBIO | 0 | 2000 | 0 | 0 | 15 | 103 | 145 | 42.5 | 58.2 | -15.7 | 100.8 |
| MS09 | PRDBOUT | 0 | 2000 | 0 | 0 | 13 | 138 | 222 | 53.5 | 79.1 | -25.6 | 132.7 |
| MS10 | PRDBTOT | 0 | 2000 | 54 | 82 | 161 | 222 | 372 | 176.7 | 102.5 | 74.2 | 279.3 |
| MS11 | CPNPROGS | 1 | 12 | 1 | 1 | 1 | 1 | 1 | 1.0 | 0.0 | 1.0 | 1.0 |
| MS12 | CPNSUBS | 1 | 36 | 1 | 1 | 2 | 3 | 3 | 1.8 | 0.9 | 0.9 | 2.7 |
| MS13 | CPNDSIN | 0 | 12 | 0 | 1 | 3 | 4 | 6 | 2.7 | 1.9 | 0.8 | 4.6 |
| MS14 | CPNDSIO | 0 | 24 | 0 | 0 | 1 | 2 | 4 | 1.4 | 1.4 | 0.0 | 2.7 |
| MS15 | CPNDSOUT | 0 | 12 | 0 | 0 | 1 | 2 | 11 | 1.8 | 3.1 | -1.3 | 4.9 |
| MS16 | CPNDSTOT | 0 | 48 | 3 | 4 | 5 | 6 | 17 | 5.9 | 3.9 | 2.1 | 9.8 |
| MS17 | CPDBIN | 0 | 2000 | 0 | 45 | 65 | 146 | 221 | 80.4 | 67.1 | 13.3 | 147.4 |
| MS18 | CPDBIO | 0 | 2000 | 0 | 0 | 15 | 103 | 145 | 42.5 | 58.2 | -15.7 | 100.8 |
| MS19 | CPDBOUT | 0 | 2000 | 0 | 0 | 13 | 138 | 222 | 52.5 | 79.6 | -27.1 | 132.2 |
| MS20 | CPDBTOT | 0 | 2000 | 54 | 82 | 158 | 222 | 372 | 175.5 | 102.6 | 72.9 | 278.0 |
| MS21 | PAGDESIGN | 0 | 2400 | 11 | 46 | 58 | 176 | 340 | 114.4 | 103.5 | 10.9 | 217.8 |
| MS22 | PAGTPLAN | 0 | 1200 | 0 | 2 | 6 | 15 | 106 | 21.0 | 34.0 | -13.0 | 55.0 |
| MS23 | PAGUSERS | 0 | 4800 | 22 | 67 | 150 | 231 | 280 | 154.2 | 85.6 | 68.5 | 239.8 |
| MS24 | PAGPROLG | 0 | 4800 | 23 | 38 | 56 | 96 | 121 | 65.8 | 32.8 | 33.1 | 98.6 |
| MS25 | PAGTOTAL | 0 | 13200 | 61 | 156 | 277 | 512 | 754 | 355.4 | 235.0 | 120.4 | 590.4 |
| MS26 | AVGSP | 0 | 169 | 3 | 4 | 7 | 11 | 18 | 8.2 | 4.5 | 3.7 | 12.7 |
| MS27 | AVGSPM | 0 | 227 | 4 | 5 | 8 | 14 | 22 | 10.4 | 5.9 | 4.5 | 16.2 |
| MS28 | AVGSPMC | 0 | 267 | 4 | 6 | 10 | 16 | 25 | 12.0 | 7.0 | 5.0 | 19.0 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | 6 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 1 | 8 |
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | ***** | * | * | * | * | * | * | * | * |
| 9 | * | * | ***** | * | ***** | * | * | * | * | * | * |
| 8 | * | * | ***** | * | ***** | ***** | ***** | ***** | * | * | * |
| 7 | * | * | ***** | ***** | ***** | ***** | ***** | ***** | * | * | * |
| 6 | * | * | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 5 | * | * | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 4 | * | * | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |

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Figure A.7.1-4. Miscellaneous: Cluster Map for 11 Small Systems

A.7.2 CODE BREAKDOWN

| | | | | |
|--------------|------------|-----------|--------------|-------------|
| <u> X </u> | Objective | <u> </u> | <u> </u> | Subjective |
| <u> X </u> | Absolute | <u> </u> | <u> </u> | Relative |
| <u> X </u> | Explicit | <u> </u> | <u> </u> | Derived |
| <u> X </u> | Static | <u> </u> | <u> </u> | Dynamic |
| <u> </u> | <u> </u> | <u> </u> | <u> X </u> | Explanatory |
| <u> </u> | Predictive | <u> </u> | <u> </u> | |

This category primarily measures the development product. A few subcategories (changes/errors) measure the development process. Most of the subcategories contain objective, absolute, explicit, static, and explanatory type measures at the end of the project. Several subcategories (SW76 through SW90) contain derived values. The only subjectivity in these measures is in the sense of how to count things. Estimates (dynamic) of the measures must be made for prediction. A certain number of the measures become static during implementation; the rest become static at the end of the project.

The remainder of this subsection contains tables and figures that describe the Code Breakdown measures with brief phrases, raw numbers, simple statistics, and graphics. These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.7.2-1)
- Values of the measures for 25 systems (Table A.7.2-2)
- Summary statistics for 11 projects (Table A.7.2-3)
- Cluster map for 11 projects (Figure A.7.2-1)
- Summary statistics for 20 independent systems (Table A.7.2-4)
- Cluster map for 20 independent systems (Figure A.7.2-2)

- Summary statistics for 9 large systems
(Table A.7.2-5)
- Cluster map for 9 large systems (Figure A.7.2-3)
- Summary statistics for 11 small systems
(Table A.7.2-6)
- Cluster map for 11 small systems (Figure A.7.2-4)

Table A.7.2-1. Code Breakdown: Description of Measures
(1 of 4)

| Code | Measure | Range | | Description |
|-----------------------------|---------|--------|--------|----------------------|
| | | Low | High | |
| Baseline Diagram Components | | | | |
| SW01 | COMPSN | 0000 | 7200 | New |
| SW02 | COMPSE | 0000 | 1800 | Extensively Modified |
| SW03 | COMPSS | 0000 | 3600 | Slightly Modified |
| SW04 | COMP SO | 0000 | 5400 | Old |
| SW05 | COMPST | 0000 | 7200 | Total |
| Decision Modules | | | | |
| SW06 | MODSN | 0000 | 4800 | New |
| SW07 | MODSE | 0000 | 1200 | Extensively Modified |
| SW08 | MODSS | 0000 | 2400 | Slightly Modified |
| SW09 | MODSO | 0000 | 3600 | Old |
| SW10 | MODST | 0000 | 4800 | Total |
| LOC ALC | | | | |
| SW11 | LOCLOLN | 000000 | 060000 | New |
| SW12 | LOCLOLE | 000000 | 015000 | Extensively Modified |
| SW13 | LOCLOLS | 000000 | 030000 | Slightly Modified |
| SW14 | LOCLOLO | 000000 | 045000 | Old |
| SW15 | LOCLOLT | 000000 | 060000 | Total |
| LOC Macros | | | | |
| SW16 | LOCMOLN | 000000 | 060000 | New |
| SW17 | LOCMOLE | 000000 | 015000 | Extensively Modified |
| SW18 | LOCMOLS | 000000 | 030000 | Slightly Modified |
| SW19 | LOCMOLO | 000000 | 045000 | Old |
| SW20 | LOCMOLT | 000000 | 060000 | Total |
| LOC FORTRAN | | | | |
| SW21 | LOCHOLN | 000000 | 240000 | New |
| SW22 | LOCHOLE | 000000 | 060000 | Extensively Modified |

Table A.7.2-1. Code Breakdown: Description of Measures
(2 of 4)

| Code | Measure | Range | | Description |
|-------------------------|---------|--------|--------|----------------------|
| | | Low | High | |
| LOC FORTRAN (Continued) | | | | |
| SW23 | LOCHOLS | 000000 | 120000 | Slightly Modified |
| SW24 | LOCHOLO | 000000 | 180000 | Old |
| SW25 | LOCHOLT | 000000 | 240000 | Total |
| LOC Total | | | | |
| SW26 | LOCN | 000000 | 240000 | New |
| SW27 | LOCE | 000000 | 060000 | Extensively Modified |
| SW28 | LOCS | 000000 | 120000 | Slightly Modified |
| SW29 | LOCO | 000000 | 180000 | Old |
| SW30 | LOCT | 000000 | 240000 | Total |
| Executable ALC | | | | |
| SW31 | EXLOLN | 000000 | 030000 | New |
| SW32 | EXLOLE | 000000 | 007500 | Extensively Modified |
| SW33 | EXLOLS | 000000 | 015000 | Slightly Modified |
| SW34 | EXLOLO | 000000 | 022500 | Old |
| SW35 | EXLOLT | 000000 | 030000 | Total |
| Executable Macros | | | | |
| SW36 | EXMOLN | 000000 | 030000 | New |
| SW37 | EXMOLE | 000000 | 007500 | Extensively Modified |
| SW38 | EXMOLS | 000000 | 015000 | Slightly Modified |
| SW39 | EXMOLO | 000000 | 022500 | Old |
| SW40 | EXMOLT | 000000 | 030000 | Total |
| Executable FORTRAN | | | | |
| SW41 | EXHOLN | 000000 | 120000 | New |
| SW42 | EXHOLE | 000000 | 030000 | Extensively Modified |
| SW43 | EXHOLS | 000000 | 060000 | Slightly Modified |
| SW44 | EXHOLO | 000000 | 090000 | Old |
| SW45 | EXHOLT | 000000 | 120000 | Total |

Table A.7.2-1. Code Breakdown: Description of Measures
(3 of 4)

| Code | Measure | Range | | Description |
|------------------|----------|--------|--------|----------------------|
| | | Low | High | |
| Executable Total | | | | |
| SW46 | EXLOCN | 000000 | 120000 | New |
| SW47 | EXLOCE | 000000 | 030000 | Extensively Modified |
| SW48 | EXLOCS | 000000 | 060000 | Slightly Modified |
| SW49 | EXLOCO | 000000 | 090000 | Old |
| SW50 | EXLOCT | 000000 | 120000 | Total |
| Decisions | | | | |
| SW51 | DECISONN | 00000 | 48000 | New |
| SW52 | DECISONE | 00000 | 12000 | Extensively Modified |
| SW53 | DECISONS | 00000 | 24000 | Slightly Modified |
| SW54 | DECISONO | 00000 | 36000 | Old |
| SW55 | DECISONT | 00000 | 48000 | Total |
| Library Changes | | | | |
| SW56 | LCHANGEN | 00000 | 12000 | New |
| SW57 | LCHANGEE | 00000 | 09000 | Extensively Modified |
| SW58 | LCHANGES | 00000 | 06000 | Slightly Modified |
| SW59 | LCHANGEO | 00000 | 03000 | Old |
| SW60 | LCHANGET | 00000 | 12000 | Total |
| Software Changes | | | | |
| SW61 | SCHANGEN | 0000 | 9000 | New |
| SW62 | SCHANGEE | 0000 | 6750 | Extensively Modified |
| SW63 | SCHANGES | 0000 | 4500 | Slightly Modified |
| SW64 | SCHANGEO | 0000 | 2250 | Old |
| SW65 | SCHANGET | 0000 | 9000 | Total |
| Software Errors | | | | |
| SW66 | SWERRSN | 0000 | 6000 | New |
| SW67 | SWERRSE | 0000 | 4500 | Extensively Modified |
| SW68 | SWERRSS | 0000 | 3000 | Slightly Modified |
| SW69 | SWERRSO | 0000 | 1500 | Old |
| SW70 | SWERRST | 0000 | 6000 | Total |

Table A.7.2-1. Code Breakdown: Description of Measures
(4 of 4)

| Code | Measure | Range | | Description |
|------|----------|-------|------|---------------------------------|
| | | Low | High | |
| | | | | Percentage of Comments |
| SW71 | PCOMNTSN | 00 | 99 | New |
| SW72 | PCOMNTSE | 00 | 99 | Extensively Modified |
| SW73 | PCOMNTSS | 00 | 99 | Slightly Modified |
| SW74 | PCOMNTSO | 00 | 99 | Old |
| SW75 | PCOMNTST | 00 | 99 | Total |
| | | | | Errors per |
| SW76 | ERRLOC | 0000 | 2500 | 1000 LOC |
| SW77 | ERREXLOC | 0000 | 5000 | 1000 Executable LOC |
| SW78 | ERRDECSN | 0000 | 3750 | 1000 Decision |
| SW79 | ERRCOMP | 000 | 167 | Baseline Diagram Component |
| SW80 | ERRMOD | 000 | 250 | Decision Module |
| | | | | Decisions per |
| SW81 | DECLOC | 000 | 200 | 1000 LOC |
| SW82 | DECEXLOC | 000 | 400 | 1000 Executable LOC |
| SW83 | DECCOMP | 000 | 200 | Baseline Diagram Component |
| SW84 | DECMOD | 000 | 300 | Decision Module |
| SW85 | RATIOEXP | 000 | 999 | Ratio of LOC to Expanded LOC |
| | | | | Executable LOC per |
| SW86 | EXLOCLOC | 000 | 500 | 1000 LOC |
| SW87 | EXLOCOMP | 000 | 667 | Baseline Diagram Component |
| SW88 | EXLOCMOD | 000 | 250 | Decision Module |
| SW89 | COMPCHNG | 000 | 500 | Data Set Components per Change |
| SW90 | PERRCHNG | 00 | 99 | Percentage of Errors in Changes |

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Table A.7.2-2.. Code Breakdown: Values of the Measures for
25 Systems (1 of 5)

| PRCD | SW01 | SW02 | SW03 | SW04 | SW05 | SW06 | SW07 | SW08 | SW09 | SW10 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 418 | 45 | 162 | 74 | 699 | 257 | 20 | 113 | 23 | 413 |
| 0200 | 327 | 29 | 21 | 58 | 435 | 118 | 20 | 22 | 58 | 218 |
| 0300 | 365 | 0 | 19 | 10 | 394 | 153 | 0 | 19 | 10 | 182 |
| 0400 | 527 | 6 | 32 | 167 | 732 | 219 | 6 | 26 | 162 | 413 |
| 0500 | 128 | 26 | 65 | 319 | 538 | 50 | 23 | 24 | 206 | 303 |
| 0600 | 805 | 94 | 119 | 77 | 1095 | 340 | 67 | 56 | 46 | 509 |
| 0700 | 725 | 56 | 109 | 113 | 1003 | 200 | 53 | 87 | 109 | 419 |
| 0800 | 103 | 3 | 0 | 7 | 113 | 83 | 3 | 0 | 7 | 93 |
| 0900 | 284 | 40 | 90 | 127 | 541 | 115 | 30 | 47 | 110 | 302 |
| 1000 | 346 | 37 | 66 | 106 | 555 | 165 | 17 | 50 | 97 | 329 |
| 1100 | 124 | 0 | 27 | 39 | 190 | 44 | 0 | 19 | 33 | 96 |
| 9000 | 754 | 77 | 183 | 272 | 1286 | 324 | 47 | 116 | 240 | 727 |
| 0610 | 602 | 83 | 85 | 49 | 819 | 252 | 59 | 45 | 32 | 388 |
| 0620 | 74 | 4 | 9 | 2 | 89 | 29 | 4 | 6 | 1 | 40 |
| 0630 | 129 | 7 | 25 | 26 | 187 | 59 | 4 | 5 | 13 | 81 |
| 0631 | 84 | 7 | 24 | 24 | 139 | 28 | 4 | 5 | 11 | 48 |
| 0632 | 45 | 0 | 1 | 2 | 48 | 31 | 0 | 0 | 2 | 33 |
| 0710 | 182 | 5 | 17 | 20 | 224 | 46 | 5 | 17 | 20 | 88 |
| 0720 | 90 | 2 | 7 | 12 | 111 | 34 | 2 | 6 | 12 | 51 |
| 0730 | 203 | 25 | 31 | 36 | 295 | 25 | 25 | 30 | 36 | 116 |
| 0740 | 10 | 5 | 15 | 10 | 40 | 8 | 5 | 15 | 10 | 38 |
| 0750 | 52 | 0 | 0 | 3 | 55 | 35 | 0 | 0 | 3 | 38 |
| 0760 | 81 | 20 | 17 | 7 | 125 | 12 | 17 | 17 | 7 | 52 |
| 0770 | 31 | 2 | 0 | 3 | 36 | 13 | 2 | 0 | 0 | 15 |
| 0780 | 42 | 0 | 16 | 7 | 65 | 25 | 0 | 0 | 6 | 31 |

| PRCD | SW11 | SW12 | SW13 | SW14 | SW15 | SW16 | SW17 | SW18 | SW19 | SW20 |
|------|------|------|------|-------|-------|-------|------|------|------|-------|
| 0100 | 1428 | 0 | 1148 | 394 | 2970 | 10873 | 598 | 1141 | 3738 | 16350 |
| 0200 | 344 | 0 | 506 | 307 | 1157 | 7692 | 0 | 0 | 0 | 7692 |
| 0300 | 698 | 0 | 1049 | 269 | 2016 | 8337 | 0 | 0 | 0 | 8337 |
| 0400 | 241 | 0 | 283 | 13623 | 14147 | 7279 | 0 | 0 | 0 | 7279 |
| 0500 | 191 | 0 | 506 | 986 | 1683 | 3516 | 0 | 1157 | 3748 | 8421 |
| 0600 | 0 | 708 | 1003 | 301 | 2012 | 22188 | 433 | 765 | 7 | 23400 |
| 0700 | 50 | 0 | 508 | 976 | 1534 | 12348 | 0 | 0 | 0 | 12348 |
| 0800 | 0 | 0 | 0 | 26 | 26 | 0 | 0 | 0 | 0 | 0 |
| 0900 | 0 | 0 | 0 | 1233 | 1233 | 6265 | 902 | 2148 | 0 | 9315 |
| 1000 | 0 | 0 | 0 | 1675 | 1675 | 6898 | 2155 | 526 | 0 | 9579 |
| 1100 | 179 | 0 | 0 | 506 | 685 | 3263 | 0 | 0 | 0 | 3263 |
| 9000 | 179 | 0 | 0 | 3414 | 3593 | 16426 | 3057 | 2674 | 0 | 22157 |
| 0610 | 0 | 708 | 816 | 0 | 1524 | 18071 | 276 | 228 | 7 | 18582 |
| 0620 | 0 | 0 | 0 | 0 | 0 | 2250 | 0 | 0 | 0 | 2250 |
| 0630 | 0 | 0 | 187 | 301 | 488 | 1867 | 157 | 537 | 7 | 2568 |
| 0631 | 0 | 0 | 187 | 301 | 488 | 1493 | 157 | 537 | 7 | 2194 |
| 0632 | 0 | 0 | 0 | 0 | 0 | 374 | 0 | 0 | 0 | 374 |
| 0710 | 50 | 0 | 508 | 505 | 1063 | 2862 | 0 | 0 | 0 | 2862 |
| 0720 | 0 | 0 | 0 | 0 | 0 | 2539 | 0 | 0 | 0 | 2539 |
| 0730 | 0 | 0 | 0 | 471 | 471 | 5189 | 0 | 0 | 0 | 5189 |
| 0740 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0750 | 0 | 0 | 0 | 0 | 0 | 557 | 0 | 0 | 0 | 557 |
| 0760 | 0 | 0 | 0 | 0 | 0 | 1395 | 0 | 0 | 0 | 1395 |
| 0770 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0780 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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Table A.7.2-2. Code Breakdown: Values of the Measures for
25 Systems (2 of 5)

| PRCO | SW21 | SW22 | SW23 | SW24 | SW25 | SW26 | SW27 | SW28 | SW29 | SW30 |
|------|-------|-------|-------|-------|--------|-------|-------|-------|-------|--------|
| 0100 | 66654 | 8072 | 17968 | 3787 | 96481 | 78955 | 8670 | 20257 | 7919 | 115801 |
| 0200 | 29875 | 7811 | 3000 | 7469 | 48155 | 37911 | 7811 | 3506 | 7776 | 57004 |
| 0300 | 38393 | 0 | 3624 | 624 | 42641 | 47428 | 0 | 4673 | 893 | 52994 |
| 0400 | 42157 | 1066 | 3969 | 7678 | 54870 | 49677 | 1066 | 4252 | 21301 | 76296 |
| 0500 | 8670 | 8568 | 5287 | 44688 | 67213 | 12377 | 8568 | 6950 | 49422 | 77317 |
| 0600 | 65531 | 13264 | 6429 | 3514 | 88738 | 87719 | 14405 | 8197 | 3829 | 114150 |
| 0700 | 35971 | 15458 | 13789 | 12414 | 77632 | 48369 | 15458 | 14297 | 13390 | 91514 |
| 0800 | 14826 | 125 | 0 | 281 | 15232 | 14826 | 125 | 0 | 307 | 15258 |
| 0900 | 28712 | 9935 | 7976 | 11383 | 58006 | 34977 | 10837 | 10124 | 12616 | 68554 |
| 1000 | 31771 | 4847 | 8089 | 11367 | 56074 | 38669 | 7002 | 8615 | 13042 | 67328 |
| 1100 | 7797 | 0 | 2331 | 3612 | 13740 | 11239 | 0 | 2331 | 4118 | 17688 |
| 9000 | 68280 | 14782 | 18396 | 26362 | 127820 | 84885 | 17839 | 21070 | 29776 | 153570 |
| 0610 | 49061 | 12056 | 5268 | 2247 | 68632 | 67132 | 13040 | 6312 | 2254 | 88738 |
| 0620 | 7309 | 359 | 527 | 11 | 8206 | 9559 | 359 | 527 | 11 | 10456 |
| 0630 | 9161 | 849 | 634 | 1256 | 11900 | 11028 | 1006 | 1358 | 1564 | 14956 |
| 0631 | 3973 | 849 | 634 | 1157 | 6613 | 5466 | 1006 | 1358 | 1465 | 9295 |
| 0632 | 5188 | 0 | 0 | 99 | 5287 | 5562 | 0 | 0 | 99 | 5661 |
| 0710 | 9324 | 595 | 1063 | 966 | 11948 | 12236 | 595 | 1571 | 1471 | 15873 |
| 0720 | 6750 | 663 | 892 | 3822 | 12127 | 9289 | 663 | 892 | 3822 | 14666 |
| 0730 | 5853 | 8650 | 7838 | 5740 | 28081 | 11042 | 8650 | 7838 | 6211 | 33741 |
| 0740 | 1430 | 1021 | 1947 | 910 | 5308 | 1430 | 1021 | 1947 | 910 | 5308 |
| 0750 | 3703 | 0 | 0 | 365 | 4068 | 4260 | 0 | 0 | 365 | 4625 |
| 0760 | 1547 | 4529 | 2049 | 328 | 8453 | 2942 | 4529 | 2049 | 328 | 9848 |
| 0770 | 1579 | 340 | 0 | 133 | 2052 | 1579 | 340 | 0 | 133 | 2052 |
| 0780 | 3977 | 0 | 944 | 283 | 5204 | 3977 | 0 | 944 | 283 | 5204 |

| SW31 | SW32 | SW33 | SW34 | SW35 | SW36 | SW37 | SW38 | SW39 | SW40 |
|------|------|------|------|------|-------|------|------|------|-------|
| 623 | 0 | 519 | 132 | 1274 | 10191 | 512 | 979 | 3498 | 15180 |
| 175 | 0 | 256 | 120 | 551 | 7038 | 0 | 0 | 0 | 7038 |
| 98 | 0 | 475 | 135 | 708 | 7976 | 0 | 0 | 0 | 7976 |
| 130 | 0 | 168 | 7303 | 7601 | 6704 | 0 | 0 | 0 | 6704 |
| 94 | 0 | 256 | 373 | 723 | 3285 | 0 | 994 | 3475 | 7754 |
| 0 | 164 | 238 | 405 | 807 | 17052 | 356 | 552 | 7 | 17967 |
| 30 | 0 | 259 | 478 | 767 | 11389 | 0 | 0 | 0 | 11389 |
| 0 | 0 | 0 | 26 | 26 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 578 | 578 | 5008 | 898 | 1785 | 0 | 7691 |
| 0 | 0 | 0 | 707 | 707 | 5321 | 1844 | 285 | 0 | 7450 |
| 94 | 0 | 0 | 230 | 324 | 2583 | 0 | 0 | 0 | 2583 |
| 94 | 0 | 0 | 1515 | 1609 | 12912 | 2742 | 2070 | 0 | 17724 |
| 0 | 164 | 99 | 269 | 532 | 14024 | 230 | 117 | 4 | 14375 |
| 0 | 0 | 0 | 0 | 0 | 1550 | 0 | 0 | 0 | 1550 |
| 0 | 0 | 139 | 136 | 275 | 1478 | 126 | 435 | 3 | 2042 |
| 0 | 0 | 139 | 136 | 275 | 1121 | 126 | 435 | 3 | 1685 |
| 0 | 0 | 0 | 0 | 0 | 357 | 0 | 0 | 0 | 357 |
| 30 | 0 | 259 | 234 | 523 | 2862 | 0 | 0 | 0 | 2862 |
| 0 | 0 | 0 | 0 | 0 | 2281 | 0 | 0 | 0 | 2281 |
| 0 | 0 | 0 | 244 | 244 | 4652 | 0 | 0 | 0 | 4652 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 543 | 0 | 0 | 0 | 543 |
| 0 | 0 | 0 | 0 | 0 | 1051 | 0 | 0 | 0 | 1051 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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Table A.7.2-2. Code Breakdown: Values of the Measures for 25 Systems (3 of 5)

| PRCO | SW41 | SW42 | SW43 | SW44 | SW45 | SW46 | SW47 | SW48 | SW49 | SW50 |
|------|-------|------|------|-------|-------|-------|------|------|-------|-------|
| 0100 | 20145 | 2339 | 5858 | 1475 | 29817 | 30959 | 2851 | 7356 | 5105 | 46271 |
| 0200 | 8746 | 2422 | 1147 | 3034 | 15349 | 15959 | 2422 | 1403 | 3154 | 22938 |
| 0300 | 10091 | 0 | 846 | 138 | 11075 | 18165 | 0 | 1321 | 273 | 19759 |
| 0400 | 12122 | 142 | 1011 | 2868 | 16143 | 18956 | 142 | 1179 | 10171 | 30448 |
| 0500 | 2536 | 2559 | 1767 | 13789 | 20651 | 5915 | 2559 | 3017 | 17637 | 29128 |
| 0600 | 21674 | 4833 | 2248 | 732 | 29487 | 38726 | 5353 | 3038 | 1148 | 48265 |
| 0700 | 10498 | 5014 | 4846 | 3622 | 23980 | 21917 | 5014 | 5105 | 4100 | 36136 |
| 0800 | 4341 | 72 | 0 | 43 | 4456 | 4341 | 72 | 0 | 69 | 4482 |
| 0900 | 6492 | 3622 | 2816 | 5121 | 18051 | 11500 | 4520 | 4601 | 5699 | 26320 |
| 1000 | 7971 | 1609 | 2615 | 4113 | 16308 | 13292 | 3453 | 2900 | 4820 | 24465 |
| 1100 | 2545 | 0 | 742 | 1432 | 4719 | 5322 | 0 | 742 | 1662 | 7726 |
| 9000 | 17008 | 5231 | 6173 | 10666 | 39078 | 30114 | 7973 | 8243 | 12181 | 58511 |
| 0610 | 16589 | 4196 | 1945 | 520 | 23250 | 30613 | 4590 | 2161 | 793 | 38157 |
| 0620 | 2433 | 248 | 182 | 4 | 2867 | 3983 | 248 | 182 | 8 | 4421 |
| 0630 | 2652 | 389 | 121 | 208 | 3370 | 4130 | 515 | 695 | 347 | 5687 |
| 0631 | 1033 | 389 | 121 | 192 | 1735 | 2154 | 515 | 695 | 331 | 3695 |
| 0632 | 1619 | 0 | 0 | 16 | 1635 | 1976 | 0 | 0 | 16 | 1992 |
| 0710 | 2280 | 192 | 598 | 384 | 3454 | 5172 | 192 | 857 | 618 | 6839 |
| 0720 | 2352 | 405 | 377 | 1385 | 4519 | 4633 | 405 | 377 | 1385 | 6800 |
| 0730 | 1677 | 2530 | 2242 | 792 | 7241 | 6329 | 2530 | 2242 | 1036 | 12137 |
| 0740 | 418 | 255 | 385 | 168 | 1226 | 418 | 255 | 385 | 168 | 1226 |
| 0750 | 1517 | 0 | 0 | 107 | 1624 | 2060 | 0 | 0 | 107 | 2167 |
| 0760 | 600 | 1599 | 1137 | 159 | 3495 | 1651 | 1599 | 1137 | 159 | 4546 |
| 0770 | 392 | 192 | 0 | 0 | 584 | 392 | 192 | 0 | 0 | 584 |
| 0780 | 1322 | 0 | 0 | 204 | 1526 | 1322 | 0 | 0 | 204 | 1526 |

| PRCO | SW51 | SW52 | SW53 | SW54 | SW55 | SW56 | SW57 | SW58 | SW59 | SW60 |
|------|------|------|------|------|-------|------|------|------|------|------|
| 0100 | 7062 | 851 | 1761 | 479 | 10153 | 2422 | 163 | 551 | 97 | 3233 |
| 0200 | 2395 | 807 | 351 | 793 | 4346 | 1266 | 215 | 110 | 155 | 1746 |
| 0300 | 2386 | 0 | 412 | 47 | 2845 | 1171 | 0 | 70 | 14 | 1255 |
| 0400 | 3273 | 47 | 335 | 1555 | 5210 | 1800 | 32 | 86 | 189 | 2107 |
| 0500 | 970 | 955 | 585 | 4632 | 7142 | 363 | 115 | 88 | 292 | 858 |
| 0600 | 6762 | 1215 | 455 | 265 | 8697 | 2663 | 410 | 297 | 88 | 3458 |
| 0700 | 3014 | 1331 | 1210 | 1099 | 6654 | 1886 | 336 | 385 | 154 | 2761 |
| 0800 | 1219 | 15 | 0 | 10 | 1244 | 241 | 8 | 0 | 7 | 256 |
| 0900 | 2223 | 1201 | 849 | 1555 | 5828 | 1464 | 206 | 240 | 167 | 2077 |
| 1000 | 2252 | 480 | 772 | 1275 | 4779 | 1048 | 163 | 252 | 146 | 1609 |
| 1100 | 699 | 0 | 214 | 355 | 1268 | 419 | 0 | 89 | 41 | 549 |
| 9000 | 5174 | 1681 | 1835 | 3185 | 11875 | 2931 | 369 | 581 | 354 | 4235 |
| 0610 | 5493 | 1143 | 340 | 200 | 7176 | 2042 | 379 | 230 | 59 | 2710 |
| 0620 | 647 | 16 | 40 | 0 | 703 | 186 | 12 | 19 | 2 | 219 |
| 0630 | 622 | 56 | 75 | 65 | 818 | 435 | 19 | 48 | 27 | 529 |
| 0631 | 233 | 56 | 75 | 65 | 429 | 184 | 19 | 46 | 25 | 274 |
| 0632 | 389 | 0 | 0 | 0 | 389 | 251 | 0 | 2 | 2 | 255 |
| 0710 | 770 | 64 | 175 | 138 | 1147 | 519 | 33 | 63 | 22 | 637 |
| 0720 | 723 | 119 | 99 | 430 | 1371 | 274 | 7 | 18 | 15 | 314 |
| 0730 | 446 | 702 | 475 | 252 | 1875 | 465 | 170 | 114 | 56 | 805 |
| 0740 | 139 | 61 | 165 | 67 | 432 | 38 | 11 | 45 | 10 | 104 |
| 0750 | 421 | 0 | 0 | 30 | 451 | 143 | 0 | 0 | 3 | 146 |
| 0760 | 71 | 375 | 254 | 33 | 733 | 156 | 99 | 47 | 8 | 310 |
| 0770 | 102 | 49 | 0 | 0 | 151 | 109 | 16 | 0 | 10 | 135 |
| 0780 | 284 | 0 | 0 | 42 | 326 | 209 | 0 | 68 | 12 | 289 |

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Table A.7.2-2. Code Breakdown: Values of the Measures for 25 Systems (4 of 5)

| PRCO | SW61 | SW62 | SW63 | SW64 | SW65 | SW66 | SW67 | SW68 | SW69 | SW70 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 2045 | 136 | 407 | 54 | 2642 | 315 | 21 | 63 | 8 | 406 |
| 0200 | 1027 | 186 | 89 | 97 | 1399 | 314 | 57 | 27 | 30 | 427 |
| 0300 | 911 | 0 | 51 | 4 | 966 | 388 | 0 | 22 | 2 | 411 |
| 0400 | 1581 | 26 | 60 | 27 | 1694 | 524 | 9 | 20 | 9 | 561 |
| 0500 | 290 | 89 | 55 | 3 | 437 | 86 | 26 | 16 | 1 | 129 |
| 0600 | 2087 | 318 | 189 | 11 | 2605 | 400 | 61 | 36 | 2 | 499 |
| 0700 | 1320 | 280 | 276 | 41 | 1917 | 368 | 78 | 77 | 11 | 535 |
| 0800 | 138 | 5 | 0 | 0 | 143 | 35 | 1 | 0 | 0 | 36 |
| 0900 | 1257 | 172 | 169 | 40 | 1638 | 302 | 41 | 41 | 10 | 394 |
| 1000 | 802 | 186 | 187 | 40 | 1054 | 230 | 53 | 54 | 11 | 303 |
| 1100 | 325 | 0 | 62 | 2 | 389 | 91 | 0 | 17 | 1 | 109 |
| 9000 | 2384 | 358 | 418 | 82 | 3081 | 625 | 94 | 110 | 21 | 808 |
| 0610 | 1618 | 298 | 147 | 10 | 2073 | 316 | 58 | 29 | 2 | 405 |
| 0620 | 127 | 8 | 10 | 0 | 145 | 24 | 2 | 2 | 0 | 28 |
| 0630 | 342 | 12 | 32 | 1 | 387 | 58 | 2 | 5 | 0 | 65 |
| 0631 | 130 | 12 | 31 | 1 | 174 | 22 | 2 | 5 | 0 | 29 |
| 0632 | 212 | 0 | 1 | 0 | 213 | 37 | 0 | 0 | 0 | 37 |
| 0710 | 382 | 28 | 46 | 2 | 458 | 94 | 7 | 11 | 0 | 112 |
| 0720 | 192 | 5 | 11 | 3 | 211 | 49 | 1 | 3 | 1 | 54 |
| 0730 | 322 | 145 | 83 | 20 | 570 | 98 | 44 | 25 | 6 | 174 |
| 0740 | 28 | 6 | 30 | 0 | 64 | 5 | 1 | 6 | 0 | 12 |
| 0750 | 103 | 0 | 0 | 0 | 103 | 25 | 0 | 0 | 0 | 25 |
| 0760 | 89 | 79 | 30 | 1 | 199 | 23 | 20 | 8 | 0 | 51 |
| 0770 | 78 | 14 | 0 | 7 | 99 | 13 | 2 | 0 | 1 | 17 |
| 0780 | 167 | 0 | 52 | 5 | 224 | 35 | 0 | 11 | 1 | 47 |

| PRCO | SW71 | SW72 | SW73 | SW74 | SW75 | SW76 | SW77 | SW78 | SW79 | SW80 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 53 | 62 | 62 | 35 | 55 | 351 | 924 | 400 | 58 | 98 |
| 0200 | 53 | 60 | 61 | 53 | 55 | 749 | 1862 | 983 | 98 | 196 |
| 0300 | 55 | 0 | 62 | 68 | 56 | 778 | 2080 | 1445 | 104 | 226 |
| 0400 | 43 | 59 | 59 | 50 | 46 | 735 | 1842 | 1077 | 77 | 136 |
| 0500 | 39 | 58 | 52 | 57 | 54 | 167 | 443 | 181 | 24 | 43 |
| 0600 | 41 | 46 | 47 | 59 | 43 | 437 | 1034 | 574 | 46 | 98 |
| 0700 | 38 | 54 | 53 | 58 | 46 | 585 | 1481 | 804 | 53 | 119 |
| 0800 | 44 | 70 | 0 | 73 | 45 | 236 | 803 | 2942 | 32 | 39 |
| 0900 | 52 | 51 | 46 | 52 | 51 | 575 | 1497 | 676 | 73 | 130 |
| 1000 | 49 | 43 | 52 | 55 | 50 | 450 | 1239 | 634 | 55 | 92 |
| 1100 | 41 | 0 | 49 | 66 | 45 | 616 | 1411 | 860 | 57 | 114 |
| 9000 | 49 | 48 | 49 | 55 | 50 | 526 | 1381 | 680 | 63 | 111 |
| 0610 | 40 | 47 | 49 | 58 | 42 | 456 | 1061 | 564 | 49 | 104 |
| 0620 | 45 | 25 | 42 | 42 | 44 | 268 | 633 | 398 | 31 | 70 |
| 0630 | 47 | 36 | 41 | 61 | 47 | 435 | 1143 | 795 | 35 | 80 |
| 0631 | 42 | 36 | 41 | 61 | 44 | 312 | 785 | 676 | 21 | 60 |
| 0632 | 51 | 0 | 0 | 74 | 52 | 654 | 1857 | 951 | 77 | 112 |
| 0710 | 38 | 37 | 38 | 52 | 39 | 706 | 1638 | 976 | 50 | 127 |
| 0720 | 37 | 26 | 42 | 51 | 39 | 368 | 794 | 394 | 49 | 100 |
| 0730 | 37 | 60 | 61 | 68 | 54 | 516 | 1434 | 928 | 59 | 150 |
| 0740 | 58 | 67 | 64 | 69 | 64 | 226 | 979 | 278 | 30 | 32 |
| 0750 | 33 | 0 | 0 | 71 | 36 | 541 | 1154 | 554 | 45 | 66 |
| 0760 | 22 | 49 | 28 | 41 | 37 | 518 | 1122 | 696 | 41 | 98 |
| 0770 | 50 | 39 | 0 | 76 | 50 | 828 | 2911 | 1126 | 47 | 113 |
| 0780 | 43 | 0 | 62 | 18 | 45 | 903 | 3080 | 1442 | 72 | 152 |

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Table A.7.2-2. Code Breakdown: Values of the Measures for 25 Systems (5 of 5)

| PRCO | SW81 | SW82 | SW83 | SW84 | SW85 | SW86 | SW87 | SW88 | SW89 | SW90 |
|------|------|------|------|------|------|------|------|------|------|------|
| 0100 | 88 | 219 | 145 | 246 | 917 | 400 | 662 | 112 | 247 | 38 |
| 0200 | 76 | 189 | 100 | 199 | 900 | 402 | 527 | 105 | 167 | 51 |
| 0300 | 54 | 144 | 72 | 156 | 898 | 373 | 501 | 109 | 148 | 63 |
| 0400 | 68 | 171 | 71 | 126 | 923 | 399 | 416 | 74 | 172 | 57 |
| 0500 | 92 | 245 | 133 | 236 | 918 | 377 | 541 | 70 | 166 | 49 |
| 0600 | 76 | 180 | 79 | 171 | 848 | 423 | 441 | 95 | 211 | 41 |
| 0700 | 73 | 184 | 66 | 148 | 886 | 395 | 360 | 80 | 129 | 36 |
| 0800 | 82 | 278 | 110 | 134 | 807 | 294 | 397 | 48 | 196 | 50 |
| 0900 | 85 | 221 | 108 | 193 | 932 | 384 | 487 | 87 | 208 | 50 |
| 1000 | 71 | 195 | 86 | 145 | 901 | 363 | 441 | 74 | 202 | 58 |
| 1100 | 72 | 164 | 67 | 132 | 943 | 437 | 407 | 80 | 215 | 60 |
| 9000 | 77 | 203 | 92 | 163 | 919 | 381 | 455 | 80 | 206 | 54 |
| 0610 | 81 | 188 | 88 | 185 | 839 | 430 | 466 | 98 | 215 | 42 |
| 0620 | 67 | 159 | 79 | 176 | 884 | 423 | 497 | 111 | 214 | 41 |
| 0630 | 55 | 144 | 44 | 101 | 877 | 380 | 304 | 70 | 225 | 38 |
| 0631 | 46 | 116 | 31 | 89 | 877 | 398 | 266 | 77 | 207 | 35 |
| 0632 | 69 | 195 | 81 | 118 | 876 | 352 | 415 | 60 | 260 | 45 |
| 0710 | 72 | 168 | 51 | 130 | 931 | 431 | 305 | 78 | 163 | 40 |
| 0720 | 93 | 202 | 124 | 254 | 914 | 464 | 613 | 126 | 196 | 50 |
| 0730 | 56 | 154 | 64 | 162 | 917 | 360 | 411 | 105 | 118 | 36 |
| 0740 | 81 | 352 | 108 | 114 | 866 | 231 | 307 | 32 | 176 | 33 |
| 0750 | 98 | 208 | 82 | 119 | 999 | 469 | 394 | 57 | 163 | 40 |
| 0760 | 74 | 161 | 59 | 141 | 945 | 462 | 364 | 87 | 196 | 50 |
| 0770 | 74 | 259 | 42 | 101 | 783 | 285 | 162 | 39 | 207 | 35 |
| 0780 | 63 | 214 | 50 | 105 | 693 | 293 | 235 | 49 | 234 | 49 |

Table A.7.2-3. Code Breakdown: Summary Statistics for 11 Projects (1 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|---------|----------------|--------|------------------------|-------|--------|-------|--------|---------|---------|---------|----------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| SW01 | COMPNS | 0 | 7200 | 103 | 128 | 346 | 527 | 805 | 377.5 | 232.8 | 144.7 | 610.2 |
| SW02 | COMPSE | 0 | 1800 | 0 | 3 | 29 | 45 | 94 | 30.5 | 28.7 | 1.8 | 59.3 |
| SW03 | COMPSS | 0 | 3600 | 0 | 21 | 65 | 109 | 162 | 64.5 | 50.7 | 13.9 | 115.2 |
| SW04 | COMPST | 0 | 5400 | 7 | 39 | 77 | 127 | 319 | 99.7 | 87.6 | 12.1 | 187.4 |
| SW05 | COMPST | 0 | 7200 | 113 | 394 | 541 | 732 | 1095 | 572.3 | 301.7 | 270.5 | 874.0 |
| SW06 | MODSN | 0 | 4800 | 44 | 83 | 153 | 219 | 340 | 158.5 | 90.7 | 67.9 | 249.2 |
| SW07 | MODSE | 0 | 1200 | 0 | 3 | 20 | 30 | 67 | 21.7 | 21.6 | 0.1 | 43.3 |
| SW08 | MODSS | 0 | 2400 | 0 | 19 | 26 | 56 | 113 | 42.1 | 33.4 | 8.7 | 75.5 |
| SW09 | MODSO | 0 | 3600 | 7 | 23 | 58 | 110 | 206 | 78.3 | 64.7 | 13.5 | 143.0 |
| SW10 | MODST | 0 | 4800 | 93 | 182 | 303 | 413 | 509 | 300.6 | 140.5 | 160.1 | 441.1 |
| SW11 | LOCL0LN | 0 | 60000 | 0 | 0 | 179 | 344 | 1428 | 284.6 | 433.9 | -149.3 | 718.5 |
| SW12 | LOCL0LE | 0 | 15000 | 0 | 0 | 0 | 0 | 708 | 64.4 | 213.5 | -149.1 | 277.8 |
| SW13 | LOCL0LS | 0 | 30000 | 0 | 0 | 506 | 1003 | 1148 | 454.8 | 447.1 | 7.7 | 901.9 |
| SW14 | LOCL0LO | 0 | 45000 | 26 | 301 | 506 | 1233 | 13623 | 1845.1 | 3937.7 | -2092.6 | 5782.8 |
| SW15 | LOCL0LT | 0 | 60000 | 26 | 1157 | 1675 | 2016 | 14147 | 2648.9 | 3888.5 | -1239.6 | 6537.4 |
| SW16 | LOCM0LN | 0 | 60000 | 0 | 3516 | 7279 | 10873 | 22188 | 8059.9 | 5830.2 | 2229.7 | 13890.2 |
| SW17 | LOCM0LE | 0 | 15000 | 0 | 0 | 0 | 598 | 2155 | 371.6 | 669.6 | -298.0 | 1041.2 |
| SW18 | LOCM0LS | 0 | 30000 | 0 | 0 | 0 | 1141 | 2148 | 521.5 | 715.8 | -194.3 | 1237.4 |
| SW19 | LOCM0LO | 0 | 45000 | 0 | 0 | 0 | 7 | 3748 | 681.2 | 1513.8 | -832.6 | 2195.0 |
| SW20 | LOCM0LT | 0 | 60000 | 0 | 7279 | 8421 | 12348 | 23400 | 9634.9 | 6228.6 | 3406.3 | 15863.5 |
| SW21 | LOCH0LN | 0 | 240000 | 7797 | 14826 | 31771 | 42157 | 66654 | 33668.8 | 19735.2 | 13933.6 | 53404.1 |
| SW22 | LOCH0LE | 0 | 60000 | 0 | 125 | 7811 | 9935 | 15458 | 6286.0 | 5506.0 | 780.0 | 11792.0 |
| SW23 | LOCH0LS | 0 | 120000 | 0 | 3000 | 5287 | 8089 | 17968 | 6587.5 | 5265.9 | 1321.5 | 11853.4 |
| SW24 | LOCH0LO | 0 | 180000 | 281 | 3514 | 7469 | 11383 | 44688 | 9710.6 | 12359.6 | -2648.9 | 22070.2 |
| SW25 | LOCH0LT | 0 | 240000 | 13740 | 42641 | 56074 | 77632 | 96481 | 56252.9 | 26451.3 | 29801.6 | 82704.2 |
| SW26 | LOCN | 0 | 240000 | 11239 | 14826 | 38669 | 49677 | 87719 | 42013.4 | 24948.3 | 17065.0 | 66961.7 |
| SW27 | LOCE | 0 | 60000 | 0 | 125 | 7811 | 10837 | 15458 | 6722.0 | 5715.1 | 1006.9 | 12437.1 |
| SW28 | LOCS | 0 | 120000 | 0 | 3506 | 6950 | 10124 | 20257 | 7563.8 | 5790.3 | 1773.5 | 13354.1 |
| SW29 | LOCO | 0 | 180000 | 307 | 3829 | 7919 | 13390 | 49422 | 12237.5 | 13831.7 | -1594.2 | 26069.3 |
| SW30 | LOCT | 0 | 240000 | 15258 | 52994 | 68554 | 91514 | 115801 | 68536.7 | 32832.9 | 35703.8 | 101369.6 |
| SW31 | EXL0LN | 0 | 30000 | 0 | 0 | 94 | 130 | 623 | 113.1 | 179.8 | -66.7 | 292.9 |
| SW32 | EXL0LE | 0 | 7500 | 0 | 0 | 0 | 0 | 164 | 14.9 | 49.4 | -34.5 | 64.4 |
| SW33 | EXL0LS | 0 | 15000 | 0 | 0 | 238 | 259 | 519 | 197.4 | 187.0 | 10.4 | 384.3 |
| SW34 | EXL0LO | 0 | 22500 | 26 | 132 | 373 | 578 | 7303 | 953.4 | 2116.7 | -1163.4 | 3070.1 |
| SW35 | EXL0LT | 0 | 30000 | 26 | 551 | 708 | 807 | 7601 | 1278.7 | 2119.4 | -840.7 | 3398.1 |
| SW36 | EXM0LN | 0 | 30000 | 0 | 3285 | 6704 | 10191 | 17052 | 6958.8 | 4696.9 | 2261.9 | 11655.7 |
| SW37 | EXM0LE | 0 | 7500 | 0 | 0 | 0 | 512 | 1844 | 328.2 | 584.0 | -255.8 | 912.2 |
| SW38 | EXM0LS | 0 | 15000 | 0 | 0 | 0 | 979 | 1785 | 417.7 | 599.9 | -182.2 | 1017.7 |
| SW39 | EXM0LO | 0 | 22500 | 0 | 0 | 0 | 7 | 3498 | 634.5 | 1410.1 | -775.5 | 2044.6 |
| SW40 | EXM0LT | 0 | 30000 | 0 | 6704 | 7691 | 11389 | 17967 | 8339.3 | 5074.6 | 3264.6 | 13413.9 |
| SW41 | EXH0LN | 0 | 120000 | 2536 | 4341 | 8746 | 12122 | 21674 | 9741.9 | 6360.3 | 3381.6 | 16102.2 |
| SW42 | EXH0LE | 0 | 30000 | 0 | 72 | 2339 | 3622 | 5014 | 2055.6 | 1887.7 | 167.9 | 3943.4 |
| SW43 | EXH0LS | 0 | 60000 | 0 | 846 | 1767 | 2816 | 5858 | 2172.4 | 1801.0 | 371.3 | 3973.4 |
| SW44 | EXH0LO | 0 | 90000 | 43 | 732 | 2868 | 4113 | 13789 | 3306.1 | 3852.0 | -545.9 | 7158.1 |
| SW45 | EXH0LT | 0 | 120000 | 4456 | 11075 | 16308 | 23980 | 29817 | 17276.0 | 8542.5 | 8733.5 | 25818.5 |

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Table A.7.2-3. Code Breakdown: Summary Statistics for 11 Projects (2 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|--------|------------------------|-------|--------|-------|-------|---------|---------|---------|---------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| SW46 | EXLOCN | 0 | 120000 | 4341 | 5915 | 15959 | 21917 | 38726 | 16822.9 | 10772.5 | 6050.4 | 27595.4 |
| SW47 | EXLOCE | 0 | 30000 | 0 | 72 | 2559 | 4520 | 5353 | 2398.7 | 2083.8 | 314.9 | 4482.6 |
| SW48 | EXLOCS | 0 | 60000 | 0 | 1179 | 2900 | 4601 | 7356 | 2787.5 | 2197.0 | 590.5 | 4984.4 |
| SW49 | EXLOCD | 0 | 90000 | 69 | 1148 | 4100 | 5699 | 17637 | 4894.4 | 5135.2 | -240.8 | 10029.5 |
| SW50 | EXLOCT | 0 | 120000 | 4482 | 19759 | 26320 | 36136 | 48265 | 26903.5 | 13703.0 | 13200.5 | 40606.4 |
| SW51 | DECISONN | 0 | 48000 | 699 | 1219 | 2386 | 3273 | 7062 | 2932.3 | 2125.3 | 806.9 | 5057.6 |
| SW52 | DECISONE | 0 | 12000 | 0 | 15 | 807 | 1201 | 1331 | 627.5 | 536.6 | 90.8 | 1164.1 |
| SW53 | DECISONS | 0 | 24000 | 0 | 335 | 455 | 849 | 1761 | 631.3 | 499.9 | 131.4 | 1131.1 |
| SW54 | DECISONO | 0 | 36000 | 10 | 265 | 793 | 1555 | 4632 | 1096.8 | 1301.9 | -205.1 | 2398.7 |
| SW55 | DECISONT | 0 | 48000 | 1244 | 2845 | 5210 | 7142 | 10153 | 5287.8 | 2837.6 | 2450.2 | 8125.4 |
| SW56 | LCHANGEN | 0 | 12000 | 241 | 419 | 1266 | 1886 | 2663 | 1340.3 | 810.9 | 529.3 | 2151.2 |
| SW57 | LCHANGE | 0 | 9000 | 0 | 8 | 163 | 215 | 410 | 149.8 | 137.9 | 11.9 | 287.7 |
| SW58 | LCHANGES | 0 | 6000 | 0 | 86 | 110 | 297 | 551 | 197.1 | 165.5 | 31.6 | 362.6 |
| SW59 | LCHANGED | 0 | 3000 | 7 | 41 | 146 | 167 | 292 | 122.7 | 84.5 | 38.3 | 207.2 |
| SW60 | LCHANGET | 0 | 12000 | 256 | 858 | 1746 | 2761 | 3458 | 1809.9 | 1052.1 | 757.8 | 2862.0 |
| SW61 | SCHANGEN | 0 | 9000 | 138 | 325 | 1027 | 1581 | 2087 | 1071.2 | 668.9 | 402.3 | 1740.1 |
| SW62 | SCHANGE | 0 | 6750 | 0 | 5 | 136 | 186 | 318 | 127.1 | 113.0 | 14.1 | 240.1 |
| SW63 | SCHANGES | 0 | 4500 | 0 | 55 | 89 | 189 | 407 | 140.5 | 120.4 | 20.0 | 260.9 |
| SW64 | SCHANGED | 0 | 2250 | 0 | 3 | 27 | 41 | 97 | 29.0 | 29.7 | -0.7 | 58.7 |
| SW65 | SCHANGET | 0 | 9000 | 143 | 437 | 1399 | 1917 | 2642 | 1353.1 | 849.6 | 503.5 | 2202.7 |
| SW66 | SWERRSN | 0 | 6000 | 35 | 91 | 314 | 388 | 524 | 277.5 | 152.3 | 125.2 | 429.9 |
| SW67 | SWERRSE | 0 | 4500 | 0 | 1 | 26 | 57 | 78 | 31.5 | 27.9 | 3.6 | 59.5 |
| SW68 | SWERRSS | 0 | 3000 | 0 | 17 | 27 | 54 | 77 | 33.9 | 23.0 | 10.9 | 56.9 |
| SW69 | SWERRSO | 0 | 1500 | 0 | 1 | 8 | 11 | 30 | 7.7 | 8.6 | -0.9 | 16.3 |
| SW70 | SWERRST | 0 | 6000 | 36 | 129 | 406 | 499 | 561 | 346.4 | 179.8 | 166.6 | 526.2 |
| SW71 | PCOMNTSN | 0 | 99 | 38 | 41 | 44 | 53 | 55 | 46.2 | 6.3 | 39.9 | 52.5 |
| SW72 | PCOMNTSE | 0 | 99 | 0 | 43 | 54 | 60 | 70 | 45.7 | 23.8 | 21.9 | 69.5 |
| SW73 | PCOMNTSS | 0 | 99 | 0 | 47 | 52 | 61 | 62 | 49.4 | 17.4 | 32.0 | 66.8 |
| SW74 | PCOMNTSD | 0 | 99 | 35 | 52 | 57 | 66 | 73 | 56.9 | 10.2 | 46.7 | 67.1 |
| SW75 | PCOMNTST | 0 | 99 | 43 | 45 | 50 | 55 | 56 | 49.6 | 4.8 | 44.8 | 54.5 |
| SW76 | ERRLOC | 0 | 2500 | 167 | 351 | 575 | 735 | 778 | 516.3 | 206.7 | 309.6 | 723.0 |
| SW77 | ERREXLOC | 0 | 5000 | 443 | 924 | 1411 | 1842 | 2080 | 1328.7 | 499.0 | 829.7 | 1827.7 |
| SW78 | ERRDECSN | 0 | 3750 | 181 | 574 | 804 | 1077 | 2942 | 961.5 | 739.5 | 222.0 | 1700.9 |
| SW79 | ERRCOMP | 0 | 167 | 24 | 46 | 57 | 77 | 104 | 61.5 | 24.8 | 36.7 | 86.4 |
| SW80 | ERRMOD | 0 | 250 | 39 | 92 | 114 | 136 | 226 | 117.4 | 56.2 | 61.2 | 173.6 |
| SW81 | DECLOC | 0 | 200 | 54 | 71 | 76 | 85 | 92 | 76.1 | 10.6 | 65.5 | 86.6 |
| SW82 | DECEXLOC | 0 | 400 | 144 | 171 | 189 | 221 | 278 | 199.1 | 38.7 | 160.4 | 237.8 |
| SW83 | DECCOMP | 0 | 200 | 66 | 71 | 86 | 110 | 145 | 94.3 | 27.2 | 67.0 | 121.5 |
| SW84 | DECMOD | 0 | 300 | 126 | 134 | 156 | 199 | 246 | 171.5 | 41.8 | 129.7 | 213.2 |
| SW85 | RATIOEXP | 0 | 999 | 807 | 886 | 901 | 923 | 943 | 897.5 | 39.4 | 858.2 | 936.9 |
| SW86 | EXLOCLOC | 0 | 500 | 294 | 373 | 395 | 402 | 437 | 386.1 | 37.3 | 348.8 | 423.4 |
| SW87 | EXLOCOMP | 0 | 667 | 360 | 407 | 441 | 527 | 662 | 470.9 | 85.1 | 385.8 | 556.0 |
| SW88 | EXLOCMOD | 0 | 250 | 48 | 74 | 80 | 105 | 112 | 84.9 | 19.2 | 65.7 | 104.1 |
| SW89 | COMPCHNG | 0 | 500 | 129 | 166 | 196 | 214 | 247 | 187.6 | 34.4 | 153.3 | 222.0 |
| SW90 | PERRCHNG | 0 | 99 | 36 | 41 | 50 | 58 | 63 | 50.3 | 9.0 | 41.3 | 59.2 |

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| NUMBER OF CLUSTERS | PRCD | | | | | | | | | | |
|-----------------------|-------|-------|-------|-------|-------|---|---|-------|-------|-------|---|
| | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| | 1 | 6 | 2 | 3 | 9 | 0 | 7 | 4 | 5 | 8 | 1 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | ***** | * | * | * | * | * | * |
| 9 | * | * | * | * | ***** | * | * | * | * | ***** | * |
| 8 | * | * | ***** | ***** | * | * | * | * | ***** | * | * |
| 7 | * | * | ***** | ***** | * | * | * | * | ***** | * | * |
| 6 | ***** | ***** | ***** | ***** | * | * | * | ***** | * | * | * |
| 5 | ***** | ***** | ***** | ***** | * | * | * | ***** | * | * | * |
| 4 | ***** | ***** | ***** | ***** | * | * | * | ***** | * | * | * |
| 3 | ***** | ***** | ***** | ***** | * | * | * | ***** | * | * | * |
| 2 | ***** | ***** | ***** | ***** | * | * | * | ***** | * | * | * |
| 1 | ***** | ***** | ***** | ***** | * | * | * | ***** | * | * | * |

Figure A.7.2-1. Code Breakdown: Cluster Map for 11 Projects

Table A.7.2-4. Code Breakdown: Summary Statistics for 20 Independent Systems
(1 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|---------|----------------|--------|------------------------|-------|--------|-------|--------|---------|---------|---------|---------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| SW01 | COMP SN | 0 | 7200 | 10 | 76 | 129 | 341 | 602 | 205.9 | 172.7 | 33.2 | 378.6 |
| SW02 | COMP SE | 0 | 1800 | 0 | 2 | 6 | 28 | 83 | 16.9 | 21.6 | -4.6 | 38.5 |
| SW03 | COMP SS | 0 | 3600 | 0 | 11 | 20 | 57 | 162 | 35.2 | 40.2 | -5.0 | 75.4 |
| SW04 | COMP SO | 0 | 5400 | 2 | 7 | 23 | 70 | 319 | 54.1 | 77.5 | -23.4 | 131.6 |
| SW05 | COMP ST | 0 | 7200 | 36 | 95 | 207 | 540 | 819 | 312.1 | 256.3 | 55.9 | 568.4 |
| SW06 | MOD SN | 0 | 4800 | 8 | 26 | 48 | 144 | 257 | 87.1 | 81.2 | 5.9 | 168.3 |
| SW07 | MOD SE | 0 | 1200 | 0 | 2 | 5 | 20 | 59 | 12.1 | 14.7 | -2.6 | 26.8 |
| SW08 | MOD SS | 0 | 2400 | 0 | 5 | 18 | 29 | 113 | 23.0 | 26.3 | -3.2 | 49.3 |
| SW09 | MOD SO | 0 | 3600 | 0 | 7 | 17 | 53 | 206 | 42.3 | 57.5 | -15.2 | 99.8 |
| SW10 | MOD ST | 0 | 4800 | 15 | 43 | 95 | 303 | 413 | 164.5 | 141.3 | 23.2 | 305.8 |
| SW11 | LOCLOLN | 0 | 60000 | 0 | 0 | 0 | 188 | 1428 | 156.5 | 346.7 | -190.1 | 503.2 |
| SW12 | LOCLOLE | 0 | 15000 | 0 | 0 | 0 | 0 | 708 | 35.4 | 158.3 | -122.9 | 193.7 |
| SW13 | LOCLOLS | 0 | 30000 | 0 | 0 | 0 | 506 | 1148 | 250.1 | 378.2 | -128.1 | 628.4 |
| SW14 | LOCLOLO | 0 | 45000 | 0 | 0 | 285 | 506 | 13623 | 1014.8 | 3003.8 | -1989.0 | 4018.6 |
| SW15 | LOCLOLT | 0 | 60000 | 0 | 0 | 587 | 1637 | 14147 | 1456.9 | 3107.3 | -1650.4 | 4564.2 |
| SW16 | LOCMDLN | 0 | 60000 | 0 | 767 | 3063 | 7184 | 18071 | 4442.6 | 4553.2 | -110.6 | 8995.9 |
| SW17 | LOCMDLE | 0 | 15000 | 0 | 0 | 0 | 118 | 2155 | 204.4 | 517.1 | -312.7 | 721.5 |
| SW18 | LOCMDLS | 0 | 30000 | 0 | 0 | 0 | 452 | 2148 | 286.8 | 572.4 | -285.6 | 859.3 |
| SW19 | LOCMDLO | 0 | 45000 | 0 | 0 | 0 | 0 | 3748 | 375.0 | 1151.8 | -776.8 | 1526.8 |
| SW20 | LOCMDLT | 0 | 60000 | 0 | 767 | 3063 | 8400 | 18582 | 5308.9 | 5361.4 | -52.5 | 10670.3 |
| SW21 | LOCMDLN | 0 | 240000 | 1430 | 4446 | 8916 | 31297 | 66654 | 18427.4 | 18823.5 | -396.1 | 37251.0 |
| SW22 | LOCMDLE | 0 | 60000 | 0 | 179 | 935 | 8007 | 12056 | 3474.3 | 4135.8 | -661.5 | 7610.1 |
| SW23 | LOCMDLS | 0 | 120000 | 0 | 699 | 2190 | 5282 | 17968 | 3670.3 | 4319.0 | -648.7 | 7989.3 |
| SW24 | LOCMDLO | 0 | 180000 | 11 | 337 | 1752 | 7037 | 44688 | 5347.5 | 9954.5 | -4607.0 | 15302.0 |
| SW25 | LOCMDLT | 0 | 240000 | 2052 | 8268 | 14486 | 55773 | 96481 | 30919.5 | 28030.6 | 2888.9 | 58950.2 |
| SW26 | LOCN | 0 | 240000 | 1430 | 5517 | 11738 | 38480 | 78955 | 23026.6 | 23086.3 | -59.7 | 46113.0 |
| SW27 | LOCE | 0 | 60000 | 0 | 179 | 1014 | 8379 | 13040 | 3714.1 | 4411.6 | -697.5 | 8125.7 |
| SW28 | LOCS | 0 | 120000 | 0 | 905 | 2190 | 6791 | 20257 | 4207.3 | 4891.0 | -683.7 | 9098.3 |
| SW29 | LOCD | 0 | 180000 | 11 | 337 | 1909 | 7883 | 49422 | 6737.3 | 11522.9 | -4785.6 | 18260.2 |
| SW30 | LOCT | 0 | 240000 | 2052 | 10000 | 16781 | 68248 | 115801 | 37685.3 | 34513.3 | 3172.1 | 72198.6 |
| SW31 | EXLOLN | 0 | 30000 | 0 | 0 | 0 | 94 | 623 | 62.2 | 142.6 | -80.4 | 204.8 |
| SW32 | EXLOLE | 0 | 7500 | 0 | 0 | 0 | 0 | 164 | 8.2 | 36.7 | -28.5 | 44.9 |
| SW33 | EXLOLS | 0 | 15000 | 0 | 0 | 0 | 234 | 519 | 108.5 | 164.6 | -56.1 | 273.2 |
| SW34 | EXLOLO | 0 | 22500 | 0 | 0 | 134 | 263 | 5578 | 438.1 | 1226.0 | -787.9 | 1664.1 |
| SW35 | EXLOLT | 0 | 30000 | 0 | 0 | 300 | 675 | 5876 | 617.0 | 1287.5 | -670.4 | 1904.5 |
| SW36 | EXMDLN | 0 | 30000 | 0 | 670 | 2723 | 6358 | 14024 | 3827.3 | 3821.9 | 5.5 | 7649.2 |
| SW37 | EXMDLE | 0 | 7500 | 0 | 0 | 0 | 95 | 1844 | 180.5 | 452.2 | -271.7 | 632.7 |
| SW38 | EXMDLS | 0 | 15000 | 0 | 0 | 0 | 243 | 1785 | 229.8 | 479.1 | -249.3 | 708.8 |
| SW39 | EXMDLO | 0 | 22500 | 0 | 0 | 0 | 0 | 3498 | 349.0 | 1073.0 | -724.0 | 1422.0 |
| SW40 | EXMDLT | 0 | 30000 | 0 | 670 | 2723 | 7631 | 15180 | 4586.6 | 4581.9 | 4.7 | 9168.5 |
| SW41 | EXMDLN | 0 | 120000 | 392 | 1557 | 2541 | 8552 | 20145 | 5361.0 | 5620.1 | -259.1 | 10981.2 |
| SW42 | EXMDLE | 0 | 30000 | 0 | 90 | 322 | 2401 | 4196 | 1138.5 | 1352.8 | -214.3 | 2491.4 |
| SW43 | EXMDLS | 0 | 60000 | 0 | 136 | 794 | 1901 | 5858 | 1189.4 | 1420.0 | -230.6 | 2609.5 |
| SW44 | EXMDLO | 0 | 90000 | 0 | 143 | 452 | 2520 | 13789 | 1797.2 | 3191.0 | -1393.8 | 4988.2 |
| SW45 | EXMDLT | 0 | 120000 | 584 | 2993 | 4619 | 16267 | 29817 | 9486.3 | 8682.8 | 803.4 | 18169.1 |
| SW46 | EXMDLN | 0 | 120000 | 392 | 2541 | 5247 | 15292 | 30959 | 9255.6 | 9312.1 | -56.5 | 18567.7 |

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Table A.7.2-4. Code Breakdown: Summary Statistics for 20 Independent Systems
(1 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|-----------|----------------|--------|------------------------|-------|--------|-------|-------|---------|---------|---------|---------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| SW47 | EXLOCE | 0 | 30000 | 0 | 90 | 330 | 2552 | 4590 | 1327.3 | 1595.1 | -267.9 | 2922.4 |
| SW48 | EXLOCS | 0 | 60000 | 0 | 231 | 997 | 2222 | 7356 | 1527.8 | 1839.6 | -311.8 | 3367.3 |
| SW49 | EXLOCO | 0 | 90000 | 0 | 161 | 706 | 4404 | 17637 | 2584.5 | 4277.2 | -1692.7 | 6861.7 |
| SW50 | EXLOCT | 0 | 120000 | 584 | 4436 | 7283 | 25856 | 46271 | 14695.1 | 13689.9 | 1005.2 | 28385.0 |
| SW51 | DECISIONN | 0 | 48000 | 71 | 427 | 747 | 2353 | 7062 | 1609.8 | 1859.5 | -249.6 | 3469.3 |
| SW52 | DECISONE | 0 | 12000 | 0 | 15 | 63 | 781 | 1201 | 347.0 | 430.5 | -83.5 | 777.6 |
| SW53 | DECISIONS | 0 | 24000 | 0 | 49 | 234 | 459 | 1761 | 345.1 | 417.4 | -72.3 | 762.5 |
| SW54 | DECISIONO | 0 | 36000 | 0 | 35 | 169 | 715 | 4632 | 592.9 | 1073.4 | -480.5 | 1666.3 |
| SW55 | DECISONT | 0 | 48000 | 151 | 711 | 1320 | 5027 | 10153 | 2894.9 | 2901.6 | -6.7 | 5796.5 |
| SW56 | LCHANGEN | 0 | 12000 | 38 | 192 | 427 | 1242 | 2422 | 738.5 | 719.5 | 19.0 | 1458.0 |
| SW57 | LCHANGEE | 0 | 9000 | 0 | 7 | 26 | 163 | 379 | 82.4 | 103.8 | -21.4 | 186.2 |
| SW58 | LCHANGES | 0 | 6000 | 0 | 26 | 69 | 113 | 551 | 106.9 | 129.4 | -22.5 | 236.3 |
| SW59 | LCHANGEQ | 0 | 3000 | 2 | 10 | 25 | 134 | 292 | 66.6 | 81.2 | -14.6 | 147.8 |
| SW60 | LCHANGET | 0 | 12000 | 104 | 264 | 593 | 1712 | 3233 | 994.4 | 940.3 | 54.1 | 1934.7 |
| SW61 | SCHANGEN | 0 | 9000 | 28 | 130 | 324 | 998 | 2045 | 591.2 | 611.2 | -20.0 | 1202.4 |
| SW62 | SCHANGEE | 0 | 6750 | 0 | 5 | 20 | 143 | 298 | 69.8 | 87.6 | -17.9 | 157.4 |
| SW63 | SCHANGES | 0 | 4500 | 0 | 16 | 52 | 88 | 407 | 76.0 | 94.8 | -18.8 | 170.9 |
| SW64 | SCHANGEQ | 0 | 2250 | 0 | 1 | 4 | 25 | 97 | 15.8 | 25.0 | -9.2 | 40.8 |
| SW65 | SCHANGET | 0 | 9000 | 64 | 159 | 413 | 1313 | 2642 | 744.8 | 759.7 | -14.9 | 1504.4 |
| SW66 | SWERRSN | 0 | 6000 | 5 | 28 | 89 | 311 | 524 | 151.3 | 154.5 | -3.3 | 305.8 |
| SW67 | SWERRSE | 0 | 4500 | 0 | 1 | 5 | 37 | 58 | 17.3 | 21.5 | -4.2 | 38.7 |
| SW68 | SWERRSS | 0 | 3000 | 0 | 4 | 14 | 27 | 63 | 18.0 | 17.9 | 0.1 | 35.9 |
| SW69 | SWERRSO | 0 | 1500 | 0 | 0 | 1 | 8 | 30 | 4.1 | 7.1 | -3.0 | 11.3 |
| SW70 | SWERRST | 0 | 6000 | 12 | 39 | 111 | 402 | 561 | 188.3 | 180.5 | 7.8 | 368.8 |
| SW71 | PCDMNTSH | 0 | 99 | 22 | 38 | 44 | 52 | 58 | 43.9 | 8.6 | 35.4 | 52.5 |
| SW72 | PCDMNTSE | 0 | 99 | 0 | 25 | 45 | 60 | 70 | 39.4 | 23.7 | 15.7 | 63.2 |
| SW73 | PCDMNTSS | 0 | 99 | 0 | 39 | 49 | 61 | 64 | 43.5 | 21.1 | 22.4 | 64.6 |
| SW74 | PCDMNTSO | 0 | 99 | 18 | 50 | 56 | 68 | 76 | 55.8 | 14.3 | 41.5 | 70.1 |
| SW75 | PCDMNTST | 0 | 99 | 36 | 43 | 47 | 54 | 64 | 47.7 | 7.3 | 40.4 | 55.0 |
| SW76 | ERRLOC | 0 | 2500 | 167 | 355 | 517 | 728 | 903 | 521.1 | 214.9 | 306.2 | 736.0 |
| SW77 | ERRXLOC | 0 | 5000 | 443 | 938 | 1197 | 1806 | 3080 | 1408.0 | 693.2 | 714.9 | 2101.2 |
| SW78 | ERRDECSN | 0 | 3750 | 181 | 439 | 746 | 1069 | 2942 | 868.5 | 603.2 | 265.3 | 1471.7 |
| SW79 | ERRCOMP | 0 | 167 | 24 | 37 | 50 | 69 | 104 | 54.3 | 21.7 | 32.6 | 76.0 |
| SW80 | ERRMOD | 0 | 250 | 32 | 73 | 102 | 135 | 226 | 108.3 | 49.4 | 58.9 | 157.7 |
| SW81 | DECLOC | 0 | 200 | 54 | 67 | 74 | 84 | 98 | 75.0 | 12.7 | 62.4 | 87.7 |
| SW82 | DECEXLOC | 0 | 400 | 144 | 162 | 192 | 221 | 352 | 202.1 | 51.5 | 150.6 | 253.6 |
| SW83 | DECCOMP | 0 | 200 | 42 | 60 | 81 | 108 | 145 | 84.1 | 30.0 | 54.1 | 114.1 |
| SW84 | DECMDD | 0 | 300 | 101 | 120 | 143 | 191 | 254 | 157.6 | 47.8 | 109.8 | 205.5 |
| SW85 | RATIOEXP | 0 | 999 | 693 | 869 | 908 | 929 | 999 | 889.3 | 67.2 | 822.1 | 956.6 |
| SW86 | EXLOCLOC | 0 | 500 | 231 | 361 | 382 | 431 | 469 | 381.7 | 64.8 | 316.9 | 446.5 |
| SW87 | EXLOCOMP | 0 | 667 | 162 | 321 | 409 | 500 | 662 | 420.6 | 122.9 | 297.7 | 543.6 |
| SW88 | EXLOCMOD | 0 | 250 | 32 | 60 | 79 | 105 | 126 | 80.3 | 26.6 | 53.7 | 106.9 |
| SW89 | COMPCING | 0 | 500 | 118 | 166 | 196 | 215 | 247 | 191.4 | 31.7 | 159.7 | 223.1 |
| SW90 | PERRCHNG | 0 | 99 | 33 | 39 | 49 | 51 | 63 | 46.5 | 8.8 | 37.7 | 55.3 |

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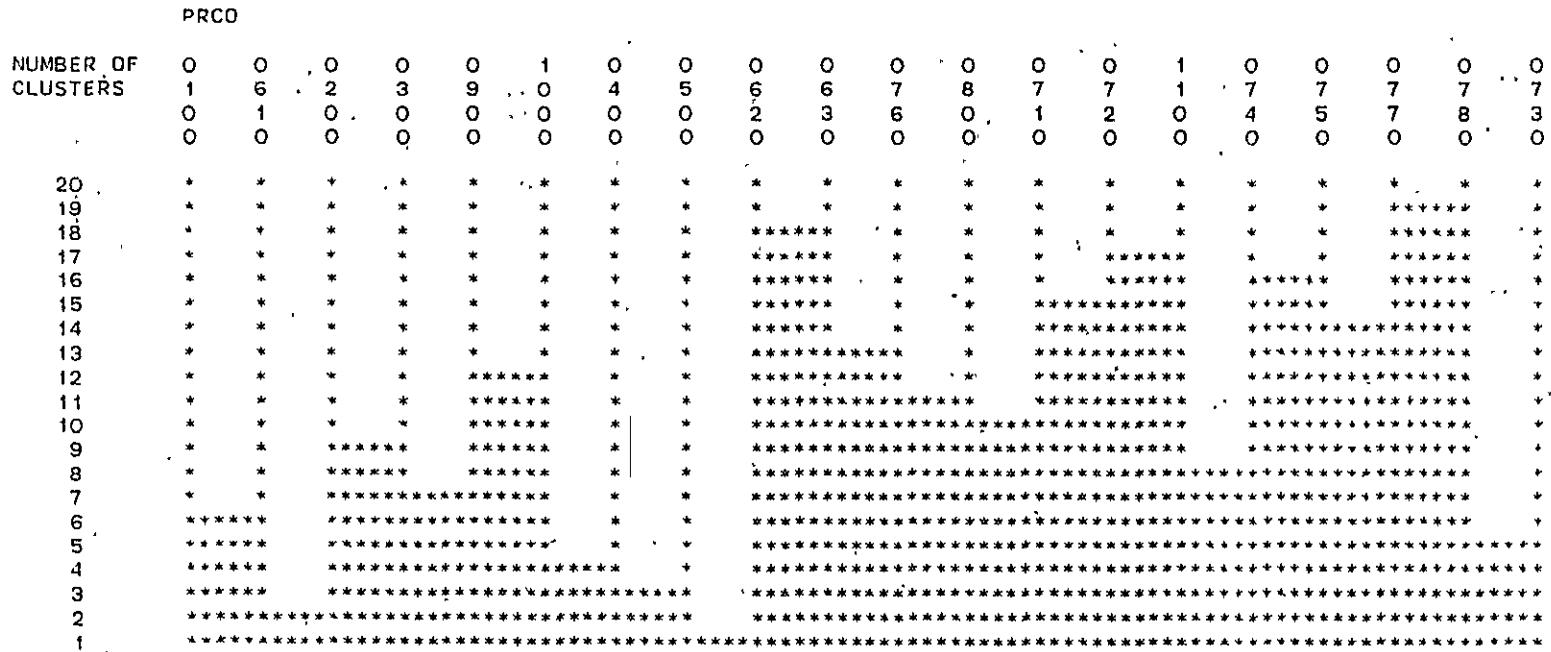


Figure A.7.2-2. Code Breakdown: Cluster Map for 20 Independent Systems

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Table A.7.2-5. Code Breakdown: Summary Statistics for 9 Large Systems (1 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|---------|----------------|--------|------------------------|-------|--------|-------|--------|---------|---------|---------|---------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| SW01 | COMP SN | 0 | 7200 | 128 | 244 | 346 | 473 | 602 | 355.6 | 148.0 | 207.6 | 503.5 |
| SW02 | COMP SE | 0 | 1800 | 0 | 16 | 29 | 43 | 83 | 32.3 | 24.1 | 8.2 | 56.4 |
| SW03 | COMP SS | 0 | 3600 | 19 | 26 | 65 | 88 | 162 | 63.4 | 45.7 | 17.7 | 109.1 |
| SW04 | COMP SD | 0 | 5400 | 10 | 43 | 74 | 147 | 319 | 105.1 | 93.7 | 11.4 | 198.8 |
| SW05 | COMP ST | 0 | 7200 | 295 | 415 | 511 | 716 | 819 | 556.4 | 169.6 | 386.8 | 726.1 |
| SW06 | MOD SN | 0 | 4800 | 25 | 83 | 153 | 236 | 257 | 150.4 | 82.7 | 67.7 | 233.1 |
| SW07 | MOD SE | 0 | 1200 | 0 | 12 | 20 | 28 | 59 | 22.2 | 16.6 | 5.6 | 38.9 |
| SW08 | MOD SS | 0 | 2400 | 19 | 23 | 30 | 49 | 113 | 41.8 | 29.1 | 12.6 | 70.9 |
| SW09 | MOD SO | 0 | 3600 | 10 | 28 | 58 | 136 | 206 | 81.6 | 67.7 | 13.9 | 149.2 |
| SW10 | MOD ST | 0 | 4800 | 116 | 200 | 303 | 401 | 413 | 296.0 | 105.2 | 190.8 | 401.2 |
| SW11 | LOCL0LN | 0 | 60000 | 0 | 0 | 191 | 521 | 1428 | 322.4 | 474.8 | -152.4 | 797.3 |
| SW12 | LOCL0LE | 0 | 15000 | 0 | 0 | 0 | 0 | 708 | 78.7 | 236.0 | -157.3 | 314.7 |
| SW13 | LOCL0LS | 0 | 30000 | 0 | 0 | 506 | 933 | 1148 | 478.7 | 449.2 | 29.5 | 927.9 |
| SW14 | LOCL0LO | 0 | 45000 | 0 | 288 | 471 | 1454 | 13623 | 2106.4 | 4351.6 | -2245.2 | 6458.1 |
| SW15 | LOCL0LT | 0 | 60000 | 471 | 1195 | 1675 | 2493 | 14147 | 2986.2 | 4239.8 | -1253.6 | 7226.0 |
| SW16 | LOCM0LN | 0 | 60000 | 3516 | 5727 | 7279 | 9605 | 18071 | 8235.6 | 4215.2 | 4020.4 | 12450.7 |
| SW17 | LOCM0LE | 0 | 15000 | 0 | 0 | 0 | 750 | 2155 | 436.8 | 722.4 | -285.6 | 1159.1 |
| SW18 | LOCM0LS | 0 | 30000 | 0 | 0 | 228 | 1149 | 2148 | 577.8 | 756.5 | -178.7 | 1334.3 |
| SW19 | LOCM0LO | 0 | 45000 | 0 | 0 | 0 | 1873 | 3748 | 832.6 | 1650.1 | -817.5 | 2482.6 |
| SW20 | LOCM0LT | 0 | 60000 | 5189 | 7486 | 8421 | 12965 | 18582 | 10082.7 | 4411.5 | 5671.1 | 14494.2 |
| SW21 | LOCH0LN | 0 | 240000 | 5853 | 18691 | 31771 | 45609 | 66654 | 33160.7 | 18908.1 | 14552.5 | 52368.8 |
| SW22 | LOCH0LE | 0 | 60000 | 0 | 2957 | 8072 | 9293 | 12056 | 6778.3 | 4024.5 | 2753.9 | 10802.8 |
| SW23 | LOCH0LS | 0 | 120000 | 3000 | 3797 | 5287 | 8033 | 17968 | 7002.1 | 4550.5 | 2451.6 | 11552.6 |
| SW24 | LOCH0LO | 0 | 180000 | 624 | 3017 | 7469 | 11375 | 44688 | 10553.7 | 13326.9 | -2773.2 | 23880.5 |
| SW25 | LOCH0LT | 0 | 240000 | 28081 | 45398 | 56074 | 67923 | 96481 | 57794.8 | 19104.3 | 38690.4 | 76899.1 |
| SW26 | LOCN | 0 | 240000 | 11042 | 23677 | 38669 | 58405 | 78955 | 42018.7 | 22357.2 | 19661.5 | 64375.8 |
| SW27 | LOCE | 0 | 60000 | 0 | 4034 | 8568 | 9754 | 13040 | 7293.8 | 4231.8 | 3061.9 | 11525.6 |
| SW28 | LOCS | 0 | 120000 | 3506 | 4463 | 6950 | 9370 | 20257 | 8058.6 | 5054.5 | 3004.1 | 13113.1 |
| SW29 | LOCO | 0 | 180000 | 893 | 4233 | 7919 | 17172 | 49422 | 13492.7 | 14810.0 | -1317.3 | 28302.7 |
| SW30 | LOCT | 0 | 240000 | 33741 | 54999 | 68554 | 83028 | 115801 | 70863.7 | 23230.8 | 47632.9 | 94094.5 |
| SW31 | EXL0LN | 0 | 30000 | 0 | 0 | 94 | 153 | 623 | 124.4 | 198.3 | -73.9 | 322.8 |
| SW32 | EXL0LE | 0 | 7500 | 0 | 0 | 0 | 0 | 164 | 18.2 | 54.7 | -36.4 | 72.9 |
| SW33 | EXL0LS | 0 | 15000 | 0 | 0 | 168 | 366 | 519 | 197.0 | 198.4 | -1.4 | 395.4 |
| SW34 | EXL0LO | 0 | 22500 | 120 | 134 | 269 | 643 | 5578 | 904.0 | 1764.7 | -860.7 | 2668.7 |
| SW35 | EXL0LT | 0 | 30000 | 244 | 542 | 707 | 999 | 5876 | 1243.7 | 1758.3 | -514.7 | 3002.0 |
| SW36 | EXM0LN | 0 | 30000 | 3285 | 4830 | 6704 | 9084 | 14024 | 7133.2 | 3288.3 | 3844.9 | 10421.5 |
| SW37 | EXM0LE | 0 | 7500 | 0 | 0 | 0 | 705 | 1844 | 387.1 | 629.8 | -242.7 | 1016.9 |
| SW38 | EXM0LS | 0 | 15000 | 0 | 0 | 117 | 987 | 1785 | 462.2 | 642.7 | -180.5 | 1104.9 |
| SW39 | EXM0LO | 0 | 22500 | 0 | 0 | 0 | 1740 | 3498 | 775.2 | 1537.2 | -761.9 | 2312.4 |
| SW40 | EXM0LT | 0 | 30000 | 4652 | 6871 | 7691 | 11176 | 15180 | 8757.8 | 3558.4 | 5199.4 | 12316.2 |
| SW41 | EXH0LN | 0 | 120000 | 1677 | 4514 | 8746 | 14356 | 20145 | 9596.6 | 6045.3 | 3551.3 | 15641.8 |
| SW42 | EXH0LE | 0 | 30000 | 0 | 876 | 2422 | 3091 | 4196 | 2157.7 | 1401.8 | 755.8 | 3559.5 |
| SW43 | EXH0LS | 0 | 60000 | 846 | 1079 | 1945 | 2716 | 5858 | 2249.7 | 1521.5 | 728.1 | 3771.2 |
| SW44 | EXH0LO | 0 | 90000 | 138 | 656 | 2868 | 4617 | 13789 | 3538.9 | 4199.5 | -660.6 | 7738.4 |
| SW45 | EXH0LT | 0 | 120000 | 7241 | 13212 | 16308 | 21951 | 29817 | 17542.8 | 6608.7 | 10934.0 | 24151.5 |
| SW46 | EXLOCN | 0 | 120000 | 5915 | 8915 | 15959 | 24785 | 30959 | 16854.2 | 9130.9 | 7723.3 | 25985.1 |

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Table A.7.2-5. Code Breakdown: Summary Statistics for 9 Large Systems (2 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|-----------|----------------|--------|------------------------|-------|--------|-------|-------|---------|---------|---------|---------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| SW47 | EXLOCE | 0 | 30000 | 0 | 1282 | 2559 | 3987 | 4590 | 2563.0 | 1630.4 | 932.6 | 4193.4 |
| SW48 | EXLOCS | 0 | 60000 | 1179 | 1362 | 2242 | 3809 | 7356 | 2908.9 | 1982.3 | 926.5 | 4891.2 |
| SW49 | EXLOCD | 0 | 90000 | 273 | 915 | 4820 | 7073 | 17637 | 5218.1 | 5371.6 | -153.5 | 10589.8 |
| SW50 | EXLOCT | 0 | 120000 | 12137 | 21349 | 26320 | 33643 | 46271 | 27544.2 | 9983.8 | 17560.4 | 37528.0 |
| SW51 | DECISONN | 0 | 48000 | 446 | 1597 | 2386 | 4383 | 7062 | 2944.4 | 2100.9 | 843.5 | 5045.4 |
| SW52 | DECISONE | 0 | 12000 | 0 | 264 | 807 | 1049 | 1201 | 687.3 | 434.4 | 252.9 | 1121.8 |
| SW53 | DECISONS | 0 | 24000 | 335 | 346 | 475 | 811 | 1761 | 653.3 | 456.2 | 197.1 | 1109.5 |
| SW54 | DECISONO | 0 | 36000 | 47 | 226 | 793 | 1505 | 4632 | 1187.6 | 1409.2 | -221.7 | 2596.8 |
| SW55 | DECISONT | 0 | 48000 | 1875 | 3596 | 5110 | 7159 | 10153 | 5472.7 | 2486.2 | 2986.5 | 7958.9 |
| SW56 | LCHANGEN | 0 | 12000 | 363 | 757 | 1266 | 1921 | 2422 | 1337.9 | 682.8 | 655.1 | 2020.7 |
| SW57 | LCHANGEE | 0 | 9000 | 0 | 74 | 163 | 211 | 379 | 160.3 | 110.2 | 50.1 | 270.6 |
| SW58 | LCHANGES | 0 | 6000 | 70 | 87 | 114 | 246 | 551 | 193.4 | 152.5 | 41.0 | 345.9 |
| SW59 | LCHANGEO | 0 | 3000 | 14 | 58 | 146 | 178 | 292 | 130.6 | 84.4 | 46.1 | 215.0 |
| SW60 | LCHANGET | 0 | 12000 | 805 | 1057 | 1746 | 2409 | 3233 | 1822.2 | 811.0 | 1011.2 | 2633.2 |
| SW61 | SCHANGEN | 0 | 9000 | 290 | 562 | 1027 | 1600 | 2045 | 1094.8 | 592.5 | 502.3 | 1687.3 |
| SW62 | SCHANGEE | 0 | 6750 | 0 | 58 | 145 | 186 | 298 | 137.6 | 90.4 | 47.1 | 228.0 |
| SW63 | SCHANGES | 0 | 4500 | 51 | 58 | 89 | 178 | 407 | 138.7 | 112.8 | 25.9 | 251.5 |
| SW64 | SCHANGEO | 0 | 2250 | 3 | 7 | 27 | 47 | 97 | 32.8 | 29.8 | 3.0 | 62.6 |
| SW65 | SCHANGET | 0 | 9000 | 437 | 768 | 1399 | 1884 | 2642 | 1385.9 | 712.5 | 673.4 | 2098.4 |
| SW66 | SWERRSN | 0 | 6000 | 86 | 164 | 314 | 352 | 524 | 285.9 | 136.2 | 149.7 | 422.0 |
| SW67 | SWERRSE | 0 | 4500 | 0 | 15 | 41 | 55 | 58 | 34.3 | 21.3 | 13.0 | 55.6 |
| SW68 | SWERRSS | 0 | 3000 | 16 | 21 | 27 | 48 | 63 | 33.0 | 16.2 | 16.8 | 49.2 |
| SW69 | SWERRSD | 0 | 1500 | 1 | 2 | 8 | 11 | 30 | 8.8 | 8.8 | -0.0 | 17.6 |
| SW70 | SWERRST | 0 | 6000 | 129 | 239 | 405 | 419 | 561 | 356.7 | 134.1 | 222.6 | 490.8 |
| SW71 | PCOMNTSN | 0 | 99 | 37 | 40 | 49 | 53 | 55 | 46.8 | 7.0 | 39.8 | 53.8 |
| SW72 | PCOMNTSE | 0 | 99 | 0 | 45 | 58 | 60 | 62 | 48.9 | 19.5 | 29.4 | 68.4 |
| SW73 | PCOMNTSS | 0 | 99 | 46 | 51 | 59 | 62 | 62 | 56.0 | 6.2 | 49.8 | 62.2 |
| SW74 | PCOMNTSO | 0 | 99 | 35 | 51 | 55 | 63 | 68 | 55.1 | 9.9 | 45.2 | 65.0 |
| SW75 | PCOMNTST | 0 | 99 | 42 | 48 | 54 | 55 | 56 | 51.4 | 4.7 | 46.7 | 56.2 |
| SW76 | ERRLOC | 0 | 2500 | 167 | 401 | 516 | 742 | 778 | 530.8 | 202.9 | 327.9 | 733.7 |
| SW77 | ERRELOC | 0 | 5000 | 443 | 993 | 1434 | 1908 | 2080 | 1388.1 | 533.2 | 854.9 | 1921.3 |
| SW78 | ERRDECSN | 0 | 3750 | 181 | 482 | 676 | 1041 | 1445 | 767.7 | 385.2 | 382.5 | 1152.9 |
| SW79 | ERRCOMP | 0 | 167 | 24 | 52 | 59 | 88 | 104 | 66.3 | 24.8 | 41.5 | 91.1 |
| SW80 | ERRMOD | 0 | 250 | 43 | 95 | 130 | 173 | 226 | 130.6 | 55.6 | 75.0 | 186.1 |
| SW81 | DECLOC | 0 | 200 | 54 | 62 | 76 | 87 | 92 | 74.4 | 13.6 | 60.9 | 88.0 |
| SW82 | DECELOC | 0 | 400 | 144 | 166 | 189 | 220 | 245 | 192.6 | 32.3 | 160.2 | 224.9 |
| SW83 | DECCOMP | 0 | 200 | 64 | 71 | 88 | 121 | 145 | 96.2 | 28.2 | 68.0 | 124.4 |
| SW84 | DECMOD | 0 | 300 | 124 | 151 | 185 | 218 | 246 | 182.9 | 40.7 | 142.2 | 223.6 |
| SW85 | RATIOEXP | 0 | 999 | 839 | 899 | 917 | 921 | 932 | 905.0 | 27.3 | 877.7 | 932.3 |
| SW86 | EXLOCLOC | 0 | 500 | 360 | 368 | 377 | 401 | 430 | 385.0 | 22.2 | 362.8 | 407.2 |
| SW87 | EXLOCCOMP | 0 | 667 | 392 | 426 | 487 | 534 | 662 | 492.0 | 81.0 | 411.0 | 573.0 |
| SW88 | EXLOCMOD | 0 | 250 | 69 | 72 | 98 | 107 | 112 | 92.1 | 17.4 | 74.7 | 109.5 |
| SW89 | COMPCHNG | 0 | 500 | 118 | 157 | 172 | 212 | 247 | 182.6 | 39.1 | 143.5 | 221.6 |
| SW90 | PERRCHNG | 0 | 99 | 36 | 40 | 50 | 58 | 63 | 49.3 | 9.2 | 40.1 | 58.6 |

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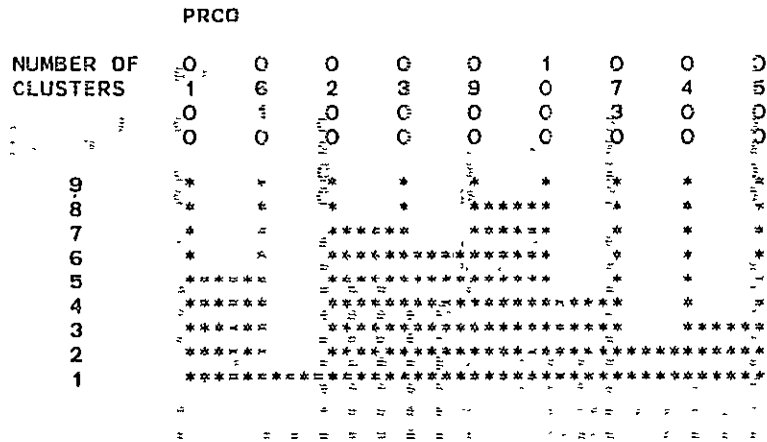


Figure A.7:2-3. Code Breakdown: Cluster Map for 9 Large Systems

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Table A.7.2-6. Code Breakdown: Summary Statistics for 11 Small Systems (1 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|---------|----------------|--------|------------------------|-------|--------|-------|-------|---------|---------|--------|---------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| SW01 | COMP SN | 0 | 7200 | 10 | 42 | 81 | 124 | 182 | 83.5 | 49.8 | 33.7 | 133.3 |
| SW02 | COMP SE | 0 | 1800 | 0 | 0 | 3 | 5 | 20 | 4.4 | 5.7 | -1.3 | 10.0 |
| SW03 | COMP SS | 0 | 3600 | 0 | 0 | 15 | 17 | 27 | 12.1 | 9.7 | 2.4 | 21.8 |
| SW04 | COMP SO | 0 | 5400 | 2 | 3 | 7 | 20 | 39 | 12.4 | 11.5 | 0.8 | 23.9 |
| SW05 | COMP ST | 0 | 7200 | 36 | 55 | 111 | 187 | 224 | 112.3 | 64.3 | 48.0 | 176.6 |
| SW06 | MOD SN | 0 | 4800 | 8 | 13 | 34 | 46 | 83 | 35.3 | 22.3 | 13.0 | 57.5 |
| SW07 | MOD SE | 0 | 1200 | 0 | 0 | 3 | 5 | 17 | 3.8 | 4.8 | -1.0 | 8.6 |
| SW08 | MOD SS | 0 | 2400 | 0 | 0 | 6 | 17 | 19 | 7.7 | 7.8 | -0.0 | 15.5 |
| SW09 | MOD SO | 0 | 3600 | 0 | 3 | 7 | 13 | 33 | 10.2 | 9.5 | 0.7 | 19.7 |
| SW10 | MOD ST | 0 | 4800 | 15 | 38 | 52 | 88 | 96 | 56.9 | 28.0 | 28.9 | 84.9 |
| SW11 | LOCLOLN | 0 | 60000 | 0 | 0 | 0 | 0 | 179 | 20.8 | 54.6 | -33.7 | 75.4 |
| SW12 | LOCLOLE | 0 | 15000 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| SW13 | LOCLOLS | 0 | 30000 | 0 | 0 | 0 | 0 | 508 | 63.2 | 157.8 | -94.7 | 221.0 |
| SW14 | LOCLOLO | 0 | 45000 | 0 | 0 | 0 | 301 | 506 | 121.6 | 209.7 | -88.0 | 331.3 |
| SW15 | LOCLOLT | 0 | 60000 | 0 | 0 | 0 | 488 | 1063 | 205.6 | 370.5 | -164.9 | 576.2 |
| SW16 | LOCMOLN | 0 | 60000 | 0 | 0 | 1395 | 2539 | 3263 | 1339.4 | 1278.9 | 60.4 | 2618.3 |
| SW17 | LOCMOLE | 0 | 15000 | 0 | 0 | 0 | 0 | 157 | 14.3 | 47.3 | -33.1 | 61.6 |
| SW18 | LOCMOLS | 0 | 30000 | 0 | 0 | 0 | 0 | 537 | 48.8 | 161.9 | -113.1 | 210.7 |
| SW19 | LOCMOLO | 0 | 45000 | 0 | 0 | 0 | 0 | 7 | 0.6 | 2.1 | -1.5 | 2.7 |
| SW20 | LOCMOLT | 0 | 60000 | 0 | 0 | 1395 | 2568 | 3263 | 1403.1 | 1324.5 | 78.6 | 2727.6 |
| SW21 | LOCHOLN | 0 | 240000 | 1430 | 1579 | 6750 | 9161 | 14826 | 6127.5 | 4170.1 | 1957.5 | 10297.6 |
| SW22 | LOCHOLE | 0 | 60000 | 0 | 0 | 359 | 849 | 4529 | 771.0 | 1295.8 | -524.8 | 2066.8 |
| SW23 | LOCHOLS | 0 | 120000 | 0 | 0 | 892 | 1947 | 2331 | 944.3 | 843.3 | 101.0 | 1787.5 |
| SW24 | LOCHOLD | 0 | 180000 | 11 | 281 | 365 | 1256 | 3822 | 1087.9 | 1356.2 | -268.3 | 2444.1 |
| SW25 | LOCHOLT | 0 | 240000 | 2052 | 5204 | 8453 | 12127 | 15232 | 8930.7 | 4355.5 | 4575.3 | 13286.2 |
| SW26 | LOCN | 0 | 240000 | 1430 | 2942 | 9289 | 11239 | 14826 | 7487.7 | 4749.2 | 2738.5 | 12237.0 |
| SW27 | LOCE | 0 | 60000 | 0 | 0 | 359 | 1006 | 4529 | 785.3 | 1297.6 | -512.3 | 2082.8 |
| SW28 | LOCS | 0 | 120000 | 0 | 0 | 944 | 1947 | 2331 | 1056.3 | 861.8 | 194.5 | 1918.1 |
| SW29 | LOCO | 0 | 180000 | 11 | 283 | 365 | 1564 | 4118 | 1210.2 | 1460.4 | -250.2 | 2670.5 |
| SW30 | LOCT | 0 | 240000 | 2052 | 5204 | 10456 | 15258 | 17688 | 10539.5 | 5492.6 | 5046.9 | 16032.0 |
| SW31 | EXLOLN | 0 | 30000 | 0 | 0 | 0 | 0 | 94 | 11.3 | 28.9 | -17.6 | 40.1 |
| SW32 | EXLOLE | 0 | 7500 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| SW33 | EXLOLS | 0 | 15000 | 0 | 0 | 0 | 0 | 259 | 36.2 | 84.9 | -48.7 | 121.0 |
| SW34 | EXLOLO | 0 | 22500 | 0 | 0 | 0 | 136 | 234 | 56.9 | 95.5 | -38.6 | 152.4 |
| SW35 | EXLOLT | 0 | 30000 | 0 | 0 | 0 | 275 | 523 | 104.4 | 183.0 | -78.7 | 287.4 |
| SW36 | EXMOLN | 0 | 30000 | 0 | 0 | 1051 | 2281 | 2862 | 1122.5 | 1104.1 | 18.4 | 2226.7 |
| SW37 | EXMOLE | 0 | 7500 | 0 | 0 | 0 | 0 | 126 | 11.5 | 38.0 | -26.5 | 49.4 |
| SW38 | EXMOLS | 0 | 15000 | 0 | 0 | 0 | 0 | 435 | 39.5 | 131.2 | -91.6 | 170.7 |
| SW39 | EXMOLO | 0 | 22500 | 0 | 0 | 0 | 0 | 3 | 0.3 | 0.9 | -0.6 | 1.2 |
| SW40 | EXMOLT | 0 | 30000 | 0 | 0 | 1051 | 2281 | 2862 | 1173.8 | 1135.0 | 38.9 | 2308.8 |
| SW41 | EXHOLN | 0 | 120000 | 392 | 600 | 2280 | 2545 | 4341 | 1895.6 | 1192.2 | 703.4 | 3087.9 |
| SW42 | EXHOLE | 0 | 30000 | 0 | 0 | 192 | 389 | 1599 | 304.7 | 453.4 | -148.7 | 758.2 |
| SW43 | EXHOLS | 0 | 60000 | 0 | 0 | 182 | 598 | 1137 | 322.0 | 374.0 | -52.0 | 696.0 |
| SW44 | EXHOLO | 0 | 90000 | 0 | 43 | 168 | 384 | 1432 | 372.2 | 523.9 | -151.7 | 896.0 |
| SW45 | EXHOLT | 0 | 120000 | 584 | 1526 | 3370 | 4456 | 4719 | 2894.5 | 1446.2 | 1448.3 | 4340.8 |
| SW46 | EXLOCN | 0 | 120000 | 392 | 1322 | 3983 | 4633 | 5322 | 3038.5 | 1891.8 | 1146.8 | 4930.3 |

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Table A.7.2-6. Code Breakdown: Summary Statistics for 11 Small Systems (2 of 2)

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|--------|------------------------|-------|--------|-------|------|---------|---------|--------|--------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| SW47 | EXLOCE | 0 | 30000 | 0 | 0 | 192 | 405 | 1599 | 316.2 | 457.4 | -141.2 | 773.5 |
| SW48 | EXLOCS | 0 | 60000 | 0 | 0 | 377 | 742 | 1137 | 397.7 | 405.5 | -7.8 | 803.2 |
| SW49 | EXLOCO | 0 | 90000 | 0 | 69 | 168 | 618 | 1662 | 429.7 | 571.2 | -141.5 | 1000.9 |
| SW50 | EXLOCT | 0 | 120000 | 584 | 1526 | 4482 | 6800 | 7726 | 4182.2 | 2486.3 | 1695.9 | 6668.5 |
| SW51 | DECISONN | 0 | 48000 | 71 | 139 | 622 | 723 | 1219 | 517.9 | 351.8 | 166.1 | 869.7 |
| SW52 | DECISONE | 0 | 12000 | 0 | 0 | 49 | 64 | 375 | 68.6 | 108.1 | -39.4 | 176.7 |
| SW53 | DECISONS | 0 | 24000 | 0 | 0 | 75 | 175 | 254 | 92.9 | 95.0 | -2.1 | 187.9 |
| SW54 | DECISONO | 0 | 36000 | 0 | 10 | 42 | 138 | 430 | 106.4 | 147.7 | -41.3 | 254.0 |
| SW55 | DECISONT | 0 | 48000 | 151 | 432 | 733 | 1244 | 1371 | 785.8 | 421.6 | 364.2 | 1207.4 |
| SW56 | LCHANGEN | 0 | 12000 | 38 | 143 | 209 | 419 | 519 | 248.1 | 150.5 | 97.5 | 398.6 |
| SW57 | LCHANGE | 0 | 9000 | 0 | 0 | 11 | 19 | 99 | 18.6 | 28.4 | -9.8 | 47.0 |
| SW58 | LCHANGES | 0 | 6000 | 0 | 0 | 45 | 63 | 89 | 36.1 | 30.7 | 5.4 | 66.8 |
| SW59 | LCHANGED | 0 | 3000 | 2 | 7 | 10 | 22 | 41 | 14.3 | 11.6 | 2.7 | 25.9 |
| SW60 | LCHANGET | 0 | 12000 | 104 | 146 | 289 | 529 | 637 | 317.1 | 179.7 | 137.3 | 496.8 |
| SW61 | SCHANGEN | 0 | 9000 | 28 | 89 | 138 | 325 | 382 | 179.2 | 118.6 | 60.6 | 297.8 |
| SW62 | SCHANGEE | 0 | 6750 | 0 | 0 | 6 | 14 | 79 | 14.3 | 23.0 | -8.7 | 37.2 |
| SW63 | SCHANGES | 0 | 4500 | 0 | 0 | 30 | 46 | 62 | 24.8 | 22.2 | 2.6 | 47.0 |
| SW64 | SCHANGED | 0 | 2250 | 0 | 0 | 1 | 3 | 7 | 1.9 | 2.3 | -0.4 | 4.2 |
| SW65 | SCHANGET | 0 | 9000 | 64 | 103 | 199 | 387 | 458 | 220.2 | 133.4 | 86.8 | 353.5 |
| SW66 | SWERRSN | 0 | 6000 | 5 | 23 | 35 | 58 | 94 | 41.1 | 29.5 | 11.6 | 70.6 |
| SW67 | SWERRSE | 0 | 4500 | 0 | 0 | 1 | 2 | 20 | 3.3 | 5.9 | -2.6 | 9.2 |
| SW68 | SWERRSS | 0 | 3000 | 0 | 0 | 5 | 11 | 17 | 5.7 | 5.6 | 0.2 | 11.3 |
| SW69 | SWERRSO | 0 | 1500 | 0 | 0 | 0 | 1 | 1 | 0.4 | 0.5 | -0.1 | 0.9 |
| SW70 | SWERRST | 0 | 6000 | 12 | 25 | 47 | 65 | 112 | 50.5 | 33.8 | 16.8 | 84.3 |
| SW71 | PCOMNTSN | 0 | 99 | 22 | 37 | 43 | 47 | 58 | 41.6 | 9.4 | 32.3 | 51.0 |
| SW72 | PCOMNTSE | 0 | 99 | 0 | 0 | 36 | 49 | 70 | 31.7 | 24.9 | 6.8 | 56.6 |
| SW73 | PCOMNTSS | 0 | 99 | 0 | 0 | 41 | 49 | 64 | 33.3 | 23.7 | 9.6 | 56.9 |
| SW74 | PCOMNTSO | 0 | 99 | 18 | 42 | 61 | 71 | 76 | 56.4 | 17.6 | 38.7 | 74.0 |
| SW75 | PCOMNTST | 0 | 99 | 36 | 39 | 45 | 47 | 64 | 44.6 | 7.8 | 36.8 | 52.4 |
| SW76 | ERRLOC | 0 | 2500 | 226 | 268 | 518 | 706 | 903 | 513.2 | 233.7 | 279.5 | 746.9 |
| SW77 | ERREXLOC | 0 | 5000 | 633 | 803 | 1143 | 1638 | 3080 | 1424.4 | 827.6 | 596.8 | 2251.9 |
| SW78 | ERRDECSN | 0 | 3750 | 278 | 398 | 795 | 1126 | 2942 | 951.0 | 745.7 | 205.3 | 1696.7 |
| SW79 | ERRCOMP | 0 | 167 | 30 | 32 | 45 | 50 | 72 | 44.5 | 12.7 | 31.7 | 57.2 |
| SW80 | ERRMOD | 0 | 250 | 32 | 66 | 98 | 114 | 152 | 90.1 | 36.8 | 53.3 | 126.9 |
| SW81 | DECLOC | 0 | 200 | 55 | 67 | 74 | 82 | 98 | 75.5 | 12.5 | 63.0 | 88.0 |
| SW82 | DECEXLOC | 0 | 400 | 144 | 161 | 202 | 259 | 352 | 209.9 | 63.6 | 146.3 | 273.6 |
| SW83 | DECCOMP | 0 | 200 | 42 | 50 | 67 | 108 | 124 | 74.2 | 28.9 | 45.3 | 103.1 |
| SW84 | DECMOD | 0 | 300 | 101 | 105 | 130 | 141 | 254 | 137.0 | 44.5 | 92.5 | 181.5 |
| SW85 | RATIOEXP | 0 | 999 | 693 | 807 | 884 | 943 | 999 | 876.5 | 87.1 | 789.4 | 963.7 |
| SW86 | EXLOCLOC | 0 | 500 | 231 | 293 | 423 | 462 | 469 | 379.0 | 86.9 | 292.1 | 465.9 |
| SW87 | EXLOCOMP | 0 | 667 | 162 | 304 | 364 | 407 | 613 | 362.3 | 123.0 | 239.3 | 485.3 |
| SW88 | EXLOCMOD | 0 | 250 | 32 | 48 | 70 | 87 | 126 | 70.6 | 29.6 | 41.0 | 100.2 |
| SW89 | COMPCHNG | 0 | 500 | 163 | 176 | 196 | 215 | 234 | 198.6 | 23.6 | 175.0 | 222.3 |
| SW90 | PERRCHNG | 0 | 99 | 33 | 38 | 41 | 50 | 60 | 44.2 | 8.2 | 36.0 | 52.4 |

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| NUMBER OF CLUSTERS | PRCO | | | | | | | | | | |
|-----------------------|-------|---|---|---|---|---|-------|-------|-------|-------|-------|
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | 6 | 6 | 7 | 8 | 7 | 7 | 1 | 7 | 7 | 7 | 7 |
| | 2 | 3 | 6 | 0 | 1 | 2 | 0 | 4 | 5 | 7 | 8 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | ***** |
| 9 | ***** | * | * | * | * | * | * | * | * | * | ***** |
| 8 | ***** | * | * | * | * | * | ***** | * | * | * | ***** |
| 7 | ***** | * | * | * | * | * | ***** | ***** | * | * | ***** |
| 6 | ***** | * | * | * | * | * | ***** | ***** | ***** | * | ***** |
| 5 | ***** | * | * | * | * | * | ***** | ***** | ***** | ***** | ***** |
| 4 | ***** | * | * | * | * | * | ***** | ***** | ***** | ***** | ***** |
| 3 | ***** | * | * | * | * | * | ***** | ***** | ***** | ***** | ***** |
| 2 | ***** | * | * | * | * | * | ***** | ***** | ***** | ***** | ***** |
| 1 | ***** | * | * | * | * | * | ***** | ***** | ***** | ***** | ***** |

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Figure A.7.2-4. Code Breakdown: Cluster Map for 11 Small Systems

A.7.3 ESTIMATED STATISTICS

| | | | |
|--------------|------------|--------------|-------------|
| - <u>X</u> - | Objective | - - - | Subjective |
| - <u>X</u> - | Absolute | - - - | Relative |
| - <u>X</u> - | Explicit | - - - | Derived |
| - <u>X</u> - | Static | - - - | Dynamic |
| - - - | Predictive | - <u>X</u> - | Explanatory |

This category measures the development process and the development product. All these measures are objective, absolute, explicit, static, and explanatory at the end of the project. The only subjectivity in these measures is in the sense of how to count things. Estimates (dynamic) of the measures must be made for prediction. None of the measures is static until the end of the project.

The remainder of this subsection contains tables and figures that describe the Estimated Statistics measures with brief phrases, raw numbers, simple statistics, and graphics.

These tables and figures include

- Descriptions of the measures with code numbers, mnemonic names, acceptable values, and brief phrases (Table A.7.3-1)
- Values of the measures for 25 systems (Table A.7.3-2)
- Summary statistics for 11 projects (Table A.7.3-3)
- Cluster map for 11 projects (Figure A.7.3-1)
- Summary statistics for 20 independent systems (Table A.7.3-4)
- Cluster map for 20 independent systems (Figure A.7.3-2)
- Summary statistics for 9 large systems (Table A.7.3-5)
- Cluster map for 9 large systems (Figure A.7.3-3)

- Summary statistics for 11 small systems
(Table A.7.3-6)
- Cluster map for 11 small systems (Figure A.7.3-4)

Table A.7.3-1. Estimated Statistics: Description of Measures

| Code | Measure | Range | | Description |
|------|----------|---------|--------|---|
| | | Low | High | |
| ES01 | TOTCOMP | 0000 | 7200 | Number of Components Number of Modules |
| ES02 | TOTMOD | 0000 | 4800 | Total |
| ES03 | NEWMOD | 0000 | 4800 | New |
| ES04 | MODMOD | 0000 | 2400 | Modified |
| ES05 | COMPRUNS | 000000 | 024000 | Number of Computer Runs |
| ES06 | CHANGES | 000000 | 012000 | Number of Source Code Changes |
| ES07 | DOCPAGES | 000000 | 013200 | Number of Pages of Documentation Number of Lines of Code |
| ES08 | TOTLINES | 000000 | 240000 | Total |
| ES09 | NEWLINES | 000000 | 240000 | New |
| ES10 | MODLINES | 000000 | 120000 | Modified Number of Executable Statements |
| ES11 | TOTEXST | 000000 | 120000 | Total |
| ES12 | NEWEXST | 000000 | 120000 | New |
| ES13 | MODEXST | 000000 | 060000 | Modified Work Hours in Tenths |
| ES14 | PGRHRS | 0000000 | 720000 | Programmers |
| ES15 | MGRHRS | 0000000 | 240000 | Managers |
| ES16 | OTRHRS | 0000000 | 240000 | Other Services Computer Hours in Tenths |
| ES17 | C95HRS | 0000000 | 032000 | IBM S/360-95 |
| ES18 | C75HRS | 0000000 | 032000 | IBM S/360-75 |
| ES19 | OCPUHRS | 0000000 | 032000 | Other |

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Table A.7.3-2. Estimated Statistics: Values of the Measures for 25 Systems

| PRCD | ES01 | ES02 | ES03 | ES04 | ES05 | ES06 | ES07 | ES08 | ES09 | ES10 |
|------|------|------|------|------|-------|------|------|--------|--------|-------|
| 0100 | 587 | 510 | 346 | 122 | 11976 | 3228 | 2473 | 111868 | 84729 | 20041 |
| 0200 | 355 | 283 | 200 | 21 | 6871 | 1649 | 1104 | 55237 | 43955 | 3506 |
| 0300 | 292 | 201 | 172 | 19 | 4604 | 1255 | 1613 | 50911 | 45345 | 4673 |
| 0400 | 638 | 535 | 337 | 31 | 7500 | 2107 | 1793 | 75393 | 49316 | 4252 |
| 0500 | 423 | 374 | 92 | 30 | 3033 | 858 | 1120 | 75420 | 20075 | 6727 |
| 0600 | 689 | 689 | 546 | 81 | 10283 | 3459 | 3017 | 110306 | 98388 | 7502 |
| 0700 | 851 | 604 | 409 | 84 | 7379 | 2761 | 2695 | 89513 | 61950 | 14297 |
| 0800 | 113 | 102 | 93 | 0 | 1589 | 255 | 763 | 15258 | 14873 | 0 |
| 0900 | 432 | 373 | 182 | 70 | 15017 | 2077 | 2107 | 67325 | 45004 | 9705 |
| 1000 | 444 | 391 | 216 | 65 | 14561 | 1575 | 2360 | 66266 | 44644 | 8606 |
| 1100 | 161 | 134 | 74 | 22 | 2467 | 541 | 760 | 17271 | 10822 | 2331 |
| 9000 | 1073 | 898 | 472 | 157 | 32045 | 4193 | 5227 | 150862 | 100470 | 20642 |
| 0610 | 639 | 519 | 418 | 59 | 7527 | 2710 | 2458 | 85369 | 76883 | 5652 |
| 0620 | 74 | 55 | 45 | 8 | 1476 | 219 | 255 | 10172 | 9627 | 527 |
| 0630 | 143 | 115 | 83 | 14 | 1283 | 530 | 366 | 14765 | 11878 | 1323 |
| 0631 | 101 | 74 | 44 | 14 | 548 | 275 | 300 | 9126 | 5354 | 1323 |
| 0632 | 42 | 41 | 39 | 0 | 735 | 255 | 66 | 5639 | 5540 | 0 |
| 0710 | 180 | 136 | 105 | 16 | 1395 | 660 | 527 | 14863 | 12227 | 1571 |
| 0720 | 113 | 100 | 71 | 7 | 1151 | 314 | 511 | 14282 | 9568 | 892 |
| 0730 | 245 | 148 | 72 | 29 | 2354 | 795 | 873 | 32822 | 18680 | 7838 |
| 0740 | 39 | 38 | 13 | 15 | 332 | 103 | 136 | 5497 | 2451 | 1947 |
| 0750 | 44 | 41 | 38 | 0 | 465 | 158 | 169 | 4525 | 4160 | 0 |
| 0760 | 114 | 63 | 39 | 17 | 856 | 300 | 284 | 9727 | 7350 | 2049 |
| 0770 | 35 | 23 | 23 | 0 | 221 | 135 | 61 | 2052 | 2052 | 0 |
| 0780 | 74 | 48 | 41 | 0 | 546 | 289 | 163 | 5204 | 4921 | 0 |

| PRCD | ES11 | ES12 | ES13 | ES14 | ES15 | ES16 | ES17 | ES18 | ES19 |
|------|-------|------|-------|--------|--------|-------|-------|------|------|
| 0100 | 30959 | 2851 | 12461 | 128522 | 29078 | 43160 | 3113 | 1537 | 0 |
| 0200 | 15959 | 2422 | 4557 | 129299 | 23316 | 13780 | 1638 | 1563 | 0 |
| 0300 | 18165 | 0 | 1594 | 89115 | 36765 | 11090 | 2220 | 1595 | 0 |
| 0400 | 18956 | 142 | 11350 | 109565 | 35510 | 12310 | 2090 | 1930 | 0 |
| 0500 | 5915 | 2559 | 20654 | 41706 | 16209 | 10790 | 930 | 763 | 3 |
| 0600 | 38726 | 5353 | 4186 | 162646 | 38873 | 38190 | 4202 | 2654 | 1050 |
| 0700 | 21917 | 5014 | 9205 | 123143 | 28078 | 19265 | 1270 | 1825 | 0 |
| 0800 | 4341 | 72 | 69 | 31638 | 13022 | 11942 | 628 | 4 | 0 |
| 0900 | 11500 | 4520 | 10300 | 149476 | 45273 | 28462 | 6704 | 3169 | 0 |
| 1000 | 13292 | 3453 | 7720 | 134639 | 45328 | 32669 | 5381 | 2719 | 0 |
| 1100 | 5322 | 0 | 2404 | 34532 | 11800 | 6950 | 796 | 1009 | 0 |
| 9000 | 30114 | 7973 | 20424 | 318647 | 102401 | 68081 | 12881 | 6897 | 0 |
| 0610 | 30613 | 4590 | 2954 | 116586 | 27119 | 27444 | 3120 | 1852 | 0 |
| 0620 | 3983 | 248 | 190 | 16675 | 4986 | 5436 | 643 | 149 | 0 |
| 0630 | 4130 | 515 | 1042 | 29385 | 6768 | 5310 | 439 | 663 | 1050 |
| 0631 | 2154 | 515 | 1026 | 19205 | 6002 | 5276 | 227 | 566 | 0 |
| 0632 | 1976 | 0 | 16 | 10180 | 766 | 34 | 212 | 97 | 1050 |
| 0710 | 5172 | 192 | 1475 | 23035 | 6392 | 3381 | 263 | 323 | 0 |
| 0720 | 4633 | 405 | 1762 | 14023 | 1536 | 2349 | 139 | 344 | 0 |
| 0730 | 6329 | 2530 | 3278 | 35202 | 9091 | 5079 | 259 | 730 | 0 |
| 0740 | 418 | 255 | 553 | 7780 | 2269 | 2010 | 140 | 0 | 0 |
| 0750 | 2060 | 0 | 107 | 9775 | 3446 | 2417 | 123 | 73 | 0 |
| 0760 | 1651 | 1599 | 1296 | 10115 | 1290 | 1284 | 44 | 315 | 0 |
| 0770 | 392 | 192 | 0 | 5182 | 2290 | 1118 | 93 | 0 | 0 |
| 0780 | 1322 | 0 | 204 | 11166 | 1765 | 1627 | 215 | 14 | 0 |

Table A.7.3-3. Estimated Statistics: Summary Statistics for 11 Projects

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|--------|------------------------|-------|--------|--------|--------|----------|---------|---------|----------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| ES01 | TOTCOMP | 0 | 7200 | 113 | 292 | 432 | 638 | 851 | 453.2 | 224.5 | 228.7 | 677.7 |
| ES02 | TOTMOD | 0 | 4800 | 102 | 201 | 374 | 535 | 689 | 381.5 | 191.3 | 190.1 | 572.8 |
| ES03 | NEWMOD | 0 | 4800 | 74 | 93 | 200 | 346 | 546 | 242.5 | 149.7 | 92.8 | 392.1 |
| ES04 | MODMOD | 0 | 2400 | 0 | 21 | 31 | 81 | 122 | 49.5 | 37.1 | 12.4 | 86.7 |
| ES05 | COMPRUNS | 0 | 24000 | 1589 | 3033 | 7379 | 11976 | 15017 | 7752.7 | 4716.6 | 3036.1 | 12469.3 |
| ES06 | CHANGES | 0 | 12000 | 255 | 858 | 1649 | 2761 | 3459 | 1796.8 | 1054.3 | 742.5 | 2851.1 |
| ES07 | DOCPAGES | 0 | 13200 | 760 | 1104 | 1793 | 2473 | 3017 | 1800.5 | 792.6 | 1007.9 | 2593.0 |
| ES08 | TOTLINES | 0 | 240000 | 15258 | 50911 | 67325 | 89513 | 111868 | 66797.1 | 31755.9 | 35041.2 | 98552.9 |
| ES09 | NEWLINES | 0 | 240000 | 10822 | 20075 | 45004 | 61950 | 98388 | 47191.0 | 27166.5 | 20024.5 | 74357.5 |
| ES10 | MODLINES | 0 | 120000 | 0 | 3506 | 6727 | 9705 | 20041 | 7421.8 | 5723.2 | 1698.6 | 13145.0 |
| ES11 | TOTEXST | 0 | 120000 | 4341 | 5915 | 15959 | 21917 | 38726 | 16822.9 | 10772.5 | 6050.4 | 27595.4 |
| ES12 | NEWEXST | 0 | 120000 | 0 | 72 | 2559 | 4520 | 5353 | 2398.7 | 2083.8 | 314.9 | 4482.6 |
| ES13 | MODEXST | 0 | 60000 | 69 | 2404 | 7720 | 11350 | 20654 | 7681.8 | 5988.4 | 1693.4 | 13670.2 |
| ES14 | PGRHRS | 0 | 720000 | 20800 | 41706 | 123143 | 134639 | 162646 | 101868.1 | 49290.5 | 52577.6 | 151158.6 |
| ES15 | MGRHRS | 0 | 240000 | 1380 | 16209 | 29078 | 38873 | 45328 | 28439.3 | 13939.3 | 14500.0 | 42378.6 |
| ES16 | OTRHRS | 0 | 240000 | 0 | 11090 | 13780 | 32669 | 43160 | 20150.7 | 13515.3 | 6635.4 | 33666.0 |
| ES17 | C95HRS | 0 | 32000 | 628 | 930 | 2090 | 4202 | 6704 | 2633.8 | 2010.6 | 623.2 | 4644.4 |
| ES18 | C75HRS | 0 | 32000 | 4 | 1009 | 1595 | 2654 | 3169 | 1706.2 | 919.9 | 786.2 | 2626.1 |
| ES19 | OCPUHRS | 0 | 32000 | 0 | 0 | 0 | 0 | 1050 | 95.7 | 316.5 | -220.8 | 412.2 |

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| NUMBER OF CLUSTERS | PRCD | | | | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 1 | 6 | 2 | 9 | 0 | 4 | 7 | 3 | 5 | 8 | 1 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | ***** | * | * | * | * | * | * | * |
| 9 | * | * | * | ***** | * | * | * | * | * | ***** | * |
| 8 | * | * | * | ***** | ***** | * | * | * | * | ***** | * |
| 7 | * | * | * | ***** | ***** | * | * | * | * | ***** | * |
| 6 | ***** | ***** | ***** | ***** | ***** | * | * | * | * | ***** | * |
| 5 | ***** | ***** | ***** | ***** | ***** | * | * | * | * | ***** | * |
| 4 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |
| 3 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |
| 2 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |
| 1 | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | * |

Figure A.7.3-1. Estimated Statistics: Cluster Map for 11 Projects

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Table A.7.3-4. Estimated Statistics: Summary Statistics for 20 Independent Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|--------|------------------------|-------|--------|--------|--------|---------|---------|---------|----------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| ES01 | TOTCOMP | 0 | 7200 | 35 | 84 | 171 | 430 | 639 | 257.3 | 205.6 | 51.6 | 462.9 |
| ES02 | TOTMOD | 0 | 4800 | 23 | 57 | 135 | 374 | 535 | 209.4 | 177.1 | 32.4 | 386.5 |
| ES03 | NEWMOD | 0 | 4800 | 13 | 42 | 88 | 196 | 418 | 133.0 | 117.4 | 15.6 | 250.4 |
| ES04 | MODMOD | 0 | 2400 | 0 | 7 | 18 | 31 | 122 | 27.3 | 30.5 | -3.3 | 57.8 |
| ES05 | COMPRUNS | 0 | 24000 | 221 | 930 | 1972 | 7343 | 15017 | 4261.2 | 4762.6 | -501.4 | 9023.8 |
| ES06 | CHANGES | 0 | 12000 | 103 | 264 | 601 | 1631 | 3228 | 987.9 | 934.4 | 53.5 | 1922.3 |
| ES07 | DCCPAGES | 0 | 13200 | 61 | 262 | 762 | 1748 | 2473 | 994.8 | 842.4 | 152.4 | 1837.2 |
| ES08 | TOTLINES | 0 | 240000 | 2052 | 9838 | 16265 | 67060 | 111868 | 36711.3 | 33496.6 | 3214.8 | 70207.9 |
| ES09 | NEWLINES | 0 | 240000 | 2052 | 7905 | 13550 | 44914 | 84729 | 25928.0 | 24872.7 | 1055.3 | 50800.7 |
| ES10 | MODLINES | 0 | 120000 | 0 | 618 | 2190 | 6458 | 20041 | 4082.0 | 4846.0 | -764.0 | 8928.0 |
| ES11 | TOTEXST | 0 | 120000 | 392 | 2541 | 5247 | 15292 | 30959 | 9255.6 | 9312.1 | -56.5 | 18567.7 |
| ES12 | NEWEXST | 0 | 120000 | 0 | 90 | 330 | 2552 | 4590 | 1327.3 | 1595.1 | -267.9 | 2922.4 |
| ES13 | MODEXST | 0 | 60000 | 0 | 291 | 1678 | 6929 | 20654 | 4112.3 | 5424.0 | -1311.8 | 9536.3 |
| ES14 | PGRHRS | 0 | 720000 | 5182 | 11880 | 30512 | 114831 | 149476 | 55684.2 | 52275.3 | 3408.9 | 107959.5 |
| ES15 | MGRHRS | 0 | 240000 | 1290 | 2274 | 7930 | 28588 | 45328 | 15641.6 | 15570.0 | 71.7 | 31211.6 |
| ES16 | OTRHRS | 0 | 240000 | 0 | 2095 | 5373 | 13413 | 43160 | 11082.9 | 12303.3 | -1220.4 | 23386.2 |
| ES17 | C95HRS | 0 | 32000 | 44 | 159 | 636 | 2188 | 6704 | 1448.9 | 1864.7 | -415.8 | 3313.6 |
| ES18 | C75HRS | 0 | 32000 | 0 | 92 | 697 | 1587 | 3169 | 937.6 | 953.7 | -16.1 | 1891.3 |
| ES19 | OCPUHRS | 0 | 32000 | 0 | 0 | 0 | 0 | 1050 | 52.6 | 234.8 | -182.1 | 287.4 |

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Figure A.7.3-2. Estimated Statistics: Cluster Map for 20 Independent Systems

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Table A.7.3-5. Estimated Statistics: Summary Statistics for 9 Large Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|--------|------------------------|-------|--------|--------|--------|----------|---------|---------|----------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| ES01 | TOTCOMP | 0 | 7200 | 245 | 324 | 432 | 613 | 639 | 450.6 | 144.5 | 306.1 | 595.0 |
| ES02 | TOTMOD | 0 | 4800 | 148 | 242 | 374 | 515 | 535 | 370.4 | 139.2 | 231.3 | 509.6 |
| ES03 | NEWMOD | 0 | 4800 | 72 | 132 | 200 | 342 | 418 | 226.1 | 117.7 | 108.4 | 343.8 |
| ES04 | MODMOD | 0 | 2400 | 19 | 25 | 31 | 68 | 122 | 49.6 | 33.3 | 16.2 | 82.9 |
| ES05 | COMPRUNS | 0 | 24000 | 2354 | 3819 | 7500 | 13269 | 15017 | 8160.3 | 4712.9 | 3447.4 | 12873.2 |
| ES06 | CHANGES | 0 | 12000 | 795 | 1057 | 1649 | 2409 | 3228 | 1806.0 | 814.4 | 991.6 | 2620.4 |
| ES07 | DOCPAGES | 0 | 13200 | 873 | 1112 | 1793 | 2409 | 2473 | 1766.8 | 625.0 | 1141.8 | 2391.8 |
| ES08 | TOTLINES | 0 | 240000 | 32822 | 53074 | 67325 | 80395 | 111868 | 68956.8 | 22426.1 | 46530.7 | 91382.9 |
| ES09 | NEWLINES | 0 | 240000 | 18680 | 32015 | 45004 | 63100 | 84729 | 47625.7 | 21985.3 | 25640.3 | 69611.0 |
| ES10 | MODLINES | 0 | 120000 | 3506 | 4463 | 6727 | 9156 | 20041 | 7888.9 | 5007.8 | 2881.1 | 12896.6 |
| ES11 | TOTEXST | 0 | 120000 | 5915 | 8915 | 15959 | 24785 | 30959 | 16854.2 | 9130.9 | 7723.3 | 25985.1 |
| ES12 | NEWEXST | 0 | 120000 | 0 | 1282 | 2559 | 3987 | 4590 | 2563.0 | 1630.4 | 932.6 | 4193.4 |
| ES13 | MODEXST | 0 | 60000 | 1594 | 3116 | 7720 | 11381 | 20654 | 8127.0 | 6005.6 | 2121.4 | 14132.6 |
| ES14 | PGRHRS | 0 | 720000 | 35202 | 65411 | 116586 | 131969 | 149476 | 103790.0 | 40731.5 | 63058.5 | 144521.5 |
| ES15 | MGRHRS | 0 | 240000 | 9091 | 19763 | 29078 | 41019 | 45328 | 29743.2 | 12374.1 | 17369.1 | 42117.3 |
| ES16 | OTRHRS | 0 | 240000 | 5079 | 10940 | 13780 | 30566 | 43160 | 20531.6 | 12777.1 | 7754.4 | 33308.7 |
| ES17 | C95HRS | 0 | 32000 | 259 | 1284 | 2220 | 4251 | 6704 | 2828.3 | 2068.8 | 759.5 | 4897.2 |
| ES18 | C75HRS | 0 | 32000 | 730 | 1150 | 1595 | 2325 | 3169 | 1762.0 | 799.4 | 962.6 | 2561.4 |
| ES19 | OCPUHRS | 0 | 32000 | 0 | 0 | 0 | 0 | 3 | 0.3 | 1.0 | -0.7 | 1.3 |

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| NUMBER OF CLUSTERS | PRCD | | | | | | | | | |
|--------------------|-------|---|-------|---|---|-------|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| | 1 | 6 | 2 | 4 | 3 | 9 | 0 | 5 | 7 | |
| | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | ***** | * | * | * | * |
| 7 | * | * | ***** | * | * | ***** | * | * | * | * |
| 6 | ***** | * | ***** | * | * | ***** | * | * | * | * |
| 5 | ***** | * | ***** | * | * | ***** | * | * | * | * |
| 4 | ***** | * | ***** | * | * | ***** | * | * | * | * |
| 3 | ***** | * | ***** | * | * | ***** | * | * | * | * |
| 2 | ***** | * | ***** | * | * | ***** | * | * | * | * |
| 1 | ***** | * | ***** | * | * | ***** | * | * | * | * |

Figure A.7.3-3. Estimated Statistics: Cluster Map for 9 Large Systems

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Table A.7.3-6. Estimated Statistics: Summary Statistics
for 11 Small Systems

| CODE | NAME | -ALLOWED-RANGE | | -----ACTUAL-RANGE----- | | | | | AVERAGE | STD DEV | AVG-SD | AVG+SD |
|------|----------|----------------|--------|------------------------|-------|--------|-------|-------|---------|---------|--------|---------|
| | | LOW | HIGH | LOW | 1ST Q | MEDIAN | 3RD Q | HIGH | | | | |
| ES01 | TOTCOMP | 0 | 7200 | 35 | 44 | 113 | 143 | 180 | 99.1 | 49.9 | 49.2 | 149.0 |
| ES02 | TOTMOD | 0 | 4800 | 23 | 41 | 63 | 115 | 136 | 77.7 | 40.7 | 37.0 | 118.4 |
| ES03 | NEWMOD | 0 | 4800 | 13 | 38 | 45 | 83 | 105 | 56.8 | 29.9 | 26.9 | 86.7 |
| ES04 | MODMOD | 0 | 2400 | 0 | 0 | 8 | 16 | 22 | 9.0 | 8.2 | 0.8 | 17.2 |
| ES05 | COMPRUNS | 0 | 24000 | 221 | 465 | 1151 | 1476 | 2467 | 1071.0 | 670.5 | 400.5 | 1741.5 |
| ES06 | CHANGES | 0 | 12000 | 103 | 158 | 289 | 530 | 660 | 318.5 | 182.2 | 136.4 | 500.7 |
| ES07 | DOCPAGES | 0 | 13200 | 61 | 163 | 284 | 527 | 763 | 363.2 | 245.9 | 117.3 | 609.1 |
| ES08 | TOTLINES | 0 | 240000 | 2052 | 5204 | 10172 | 14863 | 17271 | 10328.7 | 5296.6 | 5032.1 | 15625.4 |
| ES09 | NEWLINES | 0 | 240000 | 2052 | 4160 | 9568 | 11878 | 14873 | 8175.4 | 4286.0 | 3889.4 | 12461.3 |
| ES10 | MODLINES | 0 | 120000 | 0 | 0 | 892 | 1947 | 2331 | 967.3 | 917.8 | 49.5 | 1885.0 |
| ES11 | TOTEXST | 0 | 120000 | 392 | 1322 | 3983 | 4633 | 5322 | 3038.5 | 1891.8 | 1146.8 | 4930.3 |
| ES12 | NEWEXST | 0 | 120000 | 0 | 0 | 192 | 405 | 1599 | 316.2 | 457.4 | -141.2 | 773.5 |
| ES13 | MODEXST | 0 | 60000 | 0 | 107 | 553 | 1475 | 2404 | 827.5 | 818.1 | 9.3 | 1645.6 |
| ES14 | PGRHRS | 0 | 720000 | 5182 | 9775 | 14023 | 23035 | 31638 | 16324.9 | 8836.2 | 7488.7 | 25161.1 |
| ES15 | MGRHRS | 0 | 240000 | 1290 | 1536 | 2290 | 6392 | 13022 | 4104.0 | 3565.6 | 538.4 | 7669.6 |
| ES16 | OTRHRS | 0 | 240000 | 0 | 1284 | 2349 | 5310 | 11942 | 3352.2 | 3303.4 | 48.8 | 6655.6 |
| ES17 | C95HRS | 0 | 32000 | 44 | 123 | 215 | 628 | 796 | 320.3 | 261.9 | 58.4 | 582.2 |
| ES18 | C75HRS | 0 | 32000 | 0 | 4 | 149 | 344 | 1009 | 263.1 | 323.4 | -60.3 | 586.5 |
| ES19 | DCPUHRS | 0 | 32000 | 0 | 0 | 0 | 0 | 1050 | 95.5 | 316.6 | -221.1 | 412.0 |

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| | PRCO | | | | | | | | | | |
|--------------------|------|---|---|---|---|---|---|---|---|---|---|
| NUMBER OF CLUSTERS | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 6 | 7 | 1 | 6 | 7 | 8 | 7 | 7 | 7 | 7 | 7 |
| | 2 | 2 | 0 | 3 | 1 | 0 | 4 | 5 | 8 | 6 | 7 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | * | * | * | * | * | * | * | * | * | * | * |
| 10 | * | * | * | * | * | * | * | * | * | * | * |
| 9 | * | * | * | * | * | * | * | * | * | * | * |
| 8 | * | * | * | * | * | * | * | * | * | * | * |
| 7 | * | * | * | * | * | * | * | * | * | * | * |
| 6 | * | * | * | * | * | * | * | * | * | * | * |
| 5 | * | * | * | * | * | * | * | * | * | * | * |
| 4 | * | * | * | * | * | * | * | * | * | * | * |
| 3 | * | * | * | * | * | * | * | * | * | * | * |
| 2 | * | * | * | * | * | * | * | * | * | * | * |
| 1 | * | * | * | * | * | * | * | * | * | * | * |

Figure A.7.3-4. Estimated Statistics: Cluster Map for 11 Small Systems

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†† This article also appears in SEL-82-004, Collected Software Engineering Papers: Volume 1, July 1982.

DOCUMENTS

| <u>DOCUMENT #</u> | <u>TITLE</u> | <u>NO. OF COPIES</u> | <u>NTIS</u> |
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| SEL-78-102 | FORTRAN STATIC SOURCE CODE ANALYZER PROGRAM (SAP) USER'S GUIDE (REVISION 1) | 3 | YES |
| SEL-80-003 | MULTIMISSION MODULAR SPACECRAFT GROUND SUPPORT SOFTWARE SYSTEM (MMS/GSSS) STATE-OF-THE-ART COMPATIBILITY STUDY | 3 | YES |
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| SEL-82-001 | EVALUATION OF MANAGEMENT MEASURE OF SOFTWARE DEVELOPMENT VOLUME 1: ANALYSIS SUMMARY (SEPTEMBER 1982) | 3 | YES |
| SEL-82-001 | EVALUATION OF MANAGEMENT MEASURES OF SOFTWARE DEVELOPMENT VOLUME 2: DATA DESCRIPTION (SEPTEMBER 1982) | 3 | YES |
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