Fairfax County

Manual for Data Collection

for

Performance Measurement

Performance Measurement Team
Department of Management and Budget
2007

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PREFACE

Achieving program goals is essential for continued support of any public program. Collecting the data to demonstrate program achievement is vital to performance measurement (PM) and is the focus of this manual. The tools and techniques described in this manual will assist County staff in establishing the critical link between program resources and program outcomes in order to use that data for service improvement. Continuous improvement means not being satisfied with "a good job," but always striving to do a better job and improve services. By measuring performance and benchmarking that performance, we can gain information to improve the quality, delivery, cost, and cycle time of our services.

Since data collection is a key tool of performance measurement, this manual is designed to supplement *Fairfax County Measures Up: A Manual for Performance Measurement*. It is primarily intended to assist in the process of collecting data for all types of performance measures: the *strategic* measures reported in the County budget, the *tactical* measures used to assess major business functions, and the *operational* measures used to monitor daily service delivery.

When addressing data collection, agencies should select data based on availability, accuracy, cost, and timeliness. Several considerations to make when addressing these criteria include:

➢ Availability: Are the data currently available? If not, can the data be collected easily?

➢ Accuracy: Do the data contain biases? Are the data verifiable and auditable?

➢ Timeliness: Are the data timely enough to evaluate performance? How frequently must the data be collected and reported?

➢ Cost: What is the cost of collecting the data? Are there sufficient resources available for data collection?

KEY TERMS

DATA: Plural of datum; facts, statistics, either historical or defined by calculation or experimentation.

INFORMATION: Knowledge communicated or received concerning a particular fact or circumstance; news.

METRIC: Relating to measuring; for performance measurement, it is often used interchangeably with the nouns "indicator" or "measure" and reflects the fact or statistic being conveyed about a particular service or activity.

MEASURE: (verb) To ascertain the extent, dimensions, quantity, etc. of something, especially by comparison with a standard or target. (noun) Fact or statistic reflecting a particular aspect of performance for a service or activity.

INDICATOR: Piece of information, fact, or statistic that provides insight into the performance of a program, e.g., input, output, efficiency, service quality, and outcome (Fairfax County model).

PROXY MEASURE: Surrogate or substitute indicator used when cost, complexity or timeliness prevent a result from being measured directly.

I.   WHY COLLECT DATA FOR PERFORMANCE MEASUREMENT

"We want to influence performance with elements of the process that we can control."   - Anonymous

Since the FY 1999 Budget process, Fairfax County has devoted considerable attention and effort to performance measurement. The purpose of performance measurement is to demonstrate the linkage between resources and program performance, and to use that information to improve services. The challenge to managers is *not just to capture and report performance data, but rather to use the information to manage for results*.

Data collection is a key tool in the overall performance measurement process. The data collected enable managers to make sound decisions more effectively. The following are some of the benefits of data collection:

- Helps identify or confirm a problem that exists
- Allows us to work with facts and empirical data
- Enables us to establish baseline measurement criteria
- Provides information with which to measure the success of implemented improvements

When thinking about data, it is important to remember the "3 R's" or the following characteristics required for good data:

- **R**eliable – it is credible; calculations are accurate and consistent over time
- **R**elevant – it pertains to the service it is intended to measure
- **R**epresentative – it is typical of the service being measured

Another way to think about data collection and performance measurement in general is to remember that measures should be **SMART**.

> **S**trategic
> **M**easurable
> **A**ccurate
> **R**eliable
> **T**ime-Based

These memory tools are intended to remind staff that data collection should be a careful, thoughtful process – not a casual and quick type of exercise. Planning up-front can avoid headaches at a later date. The benefit of sound data collection activities is that performance information can be used effectively and efficiently to make operational, tactical, and strategic program decisions.

II.   TYPES OF DATA

> "Few things are harder to put up with than a good example."
> - Mark Twain

Our everyday lives are full of data. Data can be facts, images, or sounds that may or may not be pertinent or useful for a particular task. Information is data whose form and content are appropriate for a particular use. The techniques covered in this manual will assist you in determining which data to collect, how to collect it, and how to translate that data into useful information.

The nature of the performance measure should determine the data collection method. For example, programs operating in a 'production' environment, where outputs and outcomes are easily observed, lend themselves to the use of quantitative data collection. Program managers seeking information about client-oriented programs will sometimes need to rely more on qualitative data. Most often we use a combination of both which are described in more detail below.

Fairfax County uses a performance measurement methodology that emphasizes quantified objectives, each linked to a full Family of Measures which consists of *output, efficiency, service quality and outcome*. The Family of Measures is important because it helps present a balanced picture of performance. For example, cost is not emphasized over quality or vice versa. Instead, various types are shown to illustrate the relationships and inherent trade-offs.

Quantitative Data

The Merriam-Webster Dictionary defines the term 'quantitative' as "of, relating to, or involving the measurement of quantity or amount." It is sometimes referred to as "hard data," and is most frequently used to describe the following types of performance measures: *inputs* (staff, budget dollars); *outputs* (clients served); and *efficiency* (cost per client). Quantitative data for the purpose of data collection is simply *how many* - how many clients, how many purchase orders, how many medical exams, etc. This type of data can often be collected on simple check sheets (manual) or through automated means such as spreadsheets, databases, or mainframe applications. It can be displayed in a variety of ways, e.g., histograms, line graphs, Pareto charts, and control charts which are discussed in more detail in Section V. Data Presentation.

Example 1:
Collecting Quantitative Data to Support the Performance Measurement Process

The Wastewater Management Program of the Department of Public Works and Environmental Services relies primarily on quantitative data to demonstrate program outcomes. The division's goal is to provide a reliable and cost-effective sanitary sewer system. The effectiveness of the program is measured by (1) the number of blockages causing sewer back-ups per year and (2) the average household sewer bill compared to other area providers.

As noted in Example 1 above, the quantitative data used by DPWES is obtained by counting actual occurrences. Either back-ups occurred or they didn't. Costs were either lower or higher than other area providers. There is little subjectivity associated with quantitative measures such as these.

Qualitative Data

Qualitative data is best described as "soft data." This information relates to customer perceptions or experiences and is most frequently reported in performance measures such as *service quality* or *outcome* indicators. Customer perceptions or experiences with aspects of service delivery such as courtesy, accessibility, communication, credibility, responsiveness and understanding are qualitative factors. Qualitative data may be gathered from a variety of sources such as observation, customer satisfaction surveys, or number and type of complaints.

This type of data is generally categorized as ordinal data, or a rank ordering of the responses. Rating scales use classifications such as 'very important,' 'fairly important,' 'not very important,' or 'not at all important' to produce ordinal data. Feedback data on these types of measures can usually be displayed in bar charts and pie charts. Customer comments can also be grouped into categories and displayed as Pareto charts (See Section V. Data Presentation).

No one method of data gathering is clearly superior in all situations. Most process improvement efforts require both quantitative and qualitative data. Determining which data are necessary is a critical step before one can establish a baseline and understand results. Thoughtful, careful planning will prevent wasting precious time collecting data that never gets used.

While collecting quantitative data can be fairly straightforward, conducting surveys, questionnaires, interviews, and focus groups is much more difficult and requires a degree of expertise and knowledge in using these techniques. Proceed with caution if

you are embarking on this type of data collection. Sometimes it may be more practical and even economical to obtain these services from an outside consultant.

Proxy Measures

Occasionally, direct measurement of a specific outcome is not possible, either initially or at all. In such cases, a proxy measure is needed to track progress on those outcomes. A proxy measure is a surrogate or substitute indicator used when cost, complexity or timeliness prevent a result from being measured directly. For example, prevention programs are often difficult to measure due to their intrinsic nature. You are trying to avoid the occurrence of a particular situation, e.g., fires. The Fire and Rescue Department devotes considerable resources to preventing fires, whether it is through activities such as reviewing plans before structures are built, inspecting them once they are constructed to ensure compliance with Fire Prevention Code, and conducting public education activities such as encouraging residents to use smoke detectors and adopt other fire safety principles.

It would be extremely time-consuming and costly to attempt to collect data on the effectiveness of these activities, i.e., survey all citizens to determine their attitudes and the effect the various department activities have had on them. The Fire and Rescue Department can't realistically measure the fires that <u>didn't</u> occur; however, they can track their experience with fire and property loss, as well as fire deaths and injuries as indicators of the effectiveness of their actions.

Proxy measures may also be used if the County wants to measure service quality without surveying for customer satisfaction or if the beneficiary is an entity such as the environment. In such cases, a proxy measure may be the best and only way to capture performance measure data.

The examples on the next page illustrate types of situations where proxy measures are appropriate.

Example 2:
Collecting Customer Satisfaction Data Without Surveying

A County program exists where school-age children are provided access to computers and instruction in order to improve their technical and learning skills, as well as provide a resource for homework completion. To determine the level of service quality through customer satisfaction, program staff could survey each participant about his/her perception of the service. However, a quicker method would be to use repeat visits as a proxy measure. Returning to the computer center reflects participants' satisfaction with the services.   Program staff can use sign-in sheets to tally data on return participants. However, they would first need to determine a threshold, e.g., five or more visits, to appropriately reflect a satisfaction level. Simply returning once after the initial visit would not be sufficient.

Example 3:
Collecting Proxy Data to Measure Program Effectiveness

The Land Development Services division of the Department of Public Works and Environmental Services seeks to promote sound building design and construction. In order to demonstrate the effectiveness of the inspection service it provides, the division uses proxy measures such as "percent of buildings experiencing catastrophic failure as a result of building design."

Example 4:
Collecting Proxy Data to Measure Environmental Initiatives

County planning and land development processes emphasize tree preservation as a means to contribute to healthy air, clean water, habitat preservation for wildlife, and the enjoyment of the environment by County residents. Tree coverage is expressed as the percent of the County's land mass covered by the canopies of trees.   Annual estimates of tree coverage are based on statistical analyses and knowledge of recent development activities in the County, as well as periodic satellite analyses.   Despite intense development over the past 20 years, the County maintains a 41 percent tree cover (roughly 175 square miles). This percentage compares favorably to average tree cover levels reported by the U.S.D.A. Forest Service for other urbanized areas of Virginia (35.3 percent) and Maryland (40.1 percent).

Sources of Data

Data can come from many different sources. It is important not to limit yourself to the data that already exist in your file cabinets or on bookshelves. The following examples illustrate the diverse sources of data that can be used to track performance.

Measure	Source
Board packages prepared	BOS agenda records
Total cash payment transactions conducted	Bank records
Residents called each day for jury selection	Computer-generated roster
Lunches served	Contract administration records
Help desk calls processed	Telephone system records
Sign permits processed	Permit requests
Information requests responded to	"Hits" on webpages
Satisfaction with a program	Survey (mail, telephone, in-person) or repeat visits (sign-in sheets)
Condition of parks and playgrounds	Trained observer

There are advantages and disadvantages to the various types of data. You should consider these factors when selecting your data sources.

Type	Advantages	Disadvantages
Agency records	▪ Available ▪ Accessible ▪ Certainty about how data were collected ▪ Procedures can be amended to collect needed data in the future	▪ Value of data depends on how carefully it was recorded ▪ Existing records seldom contain all data needed ▪ Generally do not provide post-service information
Records from other agencies	▪ Offers a different perspective on participants' experiences ▪ May provide information on outcomes achieved after service	▪ Value of data depends on how carefully it was recorded ▪ Existing records may not contain all data needed ▪ Confidentiality issues may prevent using data ▪ Time frame may not match ▪ Identifying users may be difficult
Individuals	▪ Can provide first-hand view of experience or outcome during and after the program	▪ Information may be biased by memory, interpretation, perceived pressure fears, etc.
General public	▪ Can provide information when specific individuals cannot be identified ▪ Can provide information on programs that serve geographic areas or population segments rather than individuals	▪ Often, only a small portion of the at-large group experienced the program
Trained observers	▪ Good to provide information on behavioral skills and practice ▪ Alternative to or supplement for participants' self-reports	▪ Applies only to indicators based on physical observation ▪ Value of data depends on training and skill of observer, specificity of the rating scale ▪ Risk of inconsistent ratings if more than one observer used
Mechanical measurements	▪ Relatively objective, quantified, and standardized	▪ Findings are affected by the accuracy of testing devices as well as the training and skill of the administrator

Another way of looking at data collection is to consider cost, required training, completion time, and response rate with regard to the various methods. The following summarizes these factors.

	Data Collection Method			
Characteristic	**Review and Extract**	**Questionnaire**	**Interview**	**Ratings by Trained Observers**
Cost	Low	Moderate	Moderate to high, depending on how administered	Depends on availability of low-cost observers
Amount of training for data collectors	Some	None to some, depending on how the survey is handled	Moderate to high, depending on collectors' previous experience and survey complexity	Moderate to high, depending on complexity and subtlety of observations
Completion time	Short, depending on amount of data needed	Moderate to long depending on how the survey is handled	Long	Short to moderate
Response rate	High, if records contain needed data	Depends on administration method	Generally moderate to good	High

III.   COLLECTING DATA FOR PERFORMANCE MEASUREMENT

> Don't fall into the trap of, "if you can't measure what you want, want what you can measure."

Factors to Consider

In order to ensure the collection of accurate, reliable and timely data, the organization should first develop a data collection strategy. Failure to pay attention to this step results in vulnerability to questionable data and constant rework of the data as you react to criticisms or requests for credible and complete information. In designing the study, it is essential to consider the linkage of the data desired to the program outcomes.

- *Define the data:* The data definitions must be developed, identifying the attributes to be included as well as those to be excluded from the reporting system. For example, a program may want to collect data on school-age children only and exclude those who are of pre-school age. A program may also want to coordinate its County data collection efforts with other reporting requirements (e.g., state or federal) to minimize duplication of work.

- *Document the process:* At a minimum, an outline should be developed which identifies how the data will be collected. For example, if the organization intends to obtain customer feedback at the point of service through comment cards, then there should be a record of where the cards are posted, the volume that are printed, and the number returned by customers.

- *Document data sources:* Whether the data are obtained from manual logs, check sheets, computer databases, surveys, or focus groups, it is critical to maintain a record of the source. This step is important because of staff turnover and/or reassignment of duties. The person collecting the data this year may not be the same as next year. In addition, it is dangerous to rely on memory for tasks not done daily, weekly or even monthly. Not documenting data sources makes the process vulnerable to inconsistency and inaccuracy in reporting data. In addition, data sources should be reviewed – at least annually – to ensure that a key data source has not been overlooked. For example, an economic development program may have an incomplete list of the businesses it serves. If missing data is a major problem, the program may need to modify its record-keeping process. Also, it is important to ensure that data sources, databases and recordkeeping are maintained in a manner that protects the privacy of client information, particularly in light of requirements such as the Health Insurance Portability and Accountability Act of 1996 (HIPAA). If you should have any questions related to HIPAA, please contact Sharon Arndt, HIPAA Compliance Manager at 703-324-3360 or HIPAAmanager@fairfaxcounty.gov.

- *Frequency of Data Collection:* The more frequently data are reviewed, the greater the opportunity to improve current processes and overall effectiveness. A key consideration is how often data will be collected and entered into a central system. Daily? Weekly? Monthly? Quarterly? This factor will help to remind data collectors of when information should be processed.

- *Data Manipulation:* The design should explain how data have been manipulated to create the reported results (i.e., cost per vaccine is the calculation of the total cost of vaccines divided by the total number of vaccinations administered annually). The term "manipulation" used here does not imply the data are being doctored to present a skewed picture. Rather, the term refers to the calculation or methodology used to determine a numerical relationship.

- *Explanatory Factors:* Any contextual or procedural information should be recorded as an explanatory factor. For example, outliers (extreme points well outside the range of the other data) are typically excluded to prevent a misrepresentation of the data collection effort. Where assumptions are made, there is always the possibility of misinterpretation of the data. Therefore, assumptions should also be included in the explanatory factors. Finally, any factors beyond the organization's control that influence program outcomes should also be identified and explained.

Appendix A is a sample form that can be used to document the types of information listed above.

Example 5:
Defining the Data

The Department of Purchasing and Supply Management reports the value of purchase orders processed as an output measure. The County and Schools Procurement System (CASPS) recognizes three types of purchase orders: small purchase orders (SO), purchase orders (PO), and blanket purchase orders (BP). In order to present reliable information, there must be agreement as to how the term 'purchase order' will be defined. This decision must be made before collecting the data.

As your system of data collection develops, the process may originally rely on manual record-keeping and later be replaced by automated systems. If you are using a manual system, it is best to start small and collect data on meaningful measures. In other words, don't try to measure everything. It is preferable to have a small collection of accurate data than a wide array of questionable guesstimates. Consider data collection and development to be an ongoing process. Continually look for ways to capture data more efficiently and effectively, including the use of automation. It also helps to be aware of what others are doing. You can learn from similar agencies as well as those

that are quite different. Not wearing blinders where data collection is involved will enable you to learn from others and improve on those efforts.

Data Collection Process

A process diagram for Performance Measurement Data Collection is shown as Appendix B; however, the following is a brief narrative of the steps to take:

1. **Brainstorm the type(s) of data to collect for your program.** Be sure to involve others who will be required to provide or otherwise assist in the effort, e.g., program managers, frontline staff, information technology support, etc. Different staff have different data needs. Top-level managers will be more interested in the *strategic* picture, the data most typically presented in the annual budget document.

   Program managers have a more *tactical* orientation. They are usually interested in the 3-6 month picture in order to have more opportunity for program adjustments than once a year data can offer. And finally, frontline staff will have the greatest interest in daily, weekly or monthly data, *operational* information, in order to note trends and make more immediate adjustments as required.

2. **Consider issues related to sample size and frequency of data collection**. Determine whether or not sampling is appropriate. Sometimes it is impractical from both a time and an expense perspective to collect data on every process or from all members of a population. Consequently, it is sometimes necessary to rely on sampling to infer characteristics of the whole by examining selected portions. Selecting the correct sample size can be calculated by using a mathematical formula or using tables provided for this purpose in statistics manuals.

3. **Design a data collection sheet that specifies:**
   - Who will collect the data
   - How often the data will be collected
   - How the data will be recorded
   - What medium will be used (manual or automated)
   - What types of calculations will be required. This is especially important when tracking efficiency data such as cost per client or productivity.

4. **Test the collection method and refine the steps.** Always do this step no matter how simple you think the data collection is. It will save you rework in the long run. A pilot test might include:
   - ➢ Only those outcome measures that are new or may require substantial modifications to existing data collection procedures
   - ➢ Selected activities
   - ➢ Selected locations or customers
   - ➢ Only part of the year/collection period

Pilot tests are useful because they can help identify problems with the sampling plan, ambiguity or bias in the questionnaires, and unclear definitions. In addition, if excessive amounts of time and money are required to implement the new procedures, the group should make recommendations regarding possible elimination of particularly difficult or costly outcome indicators, reduced sample sizes, shorter data collection instruments, etc.

5. **Work on summarization during data collection.** This will enable you to spot trends early and is better than waiting for the deadline to begin tallying data. Trying to analyze data, especially significant amounts, under the pressure of a deadline, often leads to careless mistakes. Summarizing data as you go along will also avoid unpleasant surprises at the end.

6. **Generate and collect only the data to be analyzed.** Do not waste time collecting data that you do not plan to use.

Methods of Data Collection

Data can be collected through a variety of methods. There are several methods which may be more appropriate depending on whether you are collecting quantitative or qualitative data. These methods are described on the following pages.

Collecting Quantitative Data

- **Unobtrusive Measures**

  Unobtrusive measures are methods for collection of data that do not require the cooperation of the subjects and, in fact, may be "invisible" to them. This technique is considered nonreactive because the researcher gathers data without interfering in the ongoing flow of events.

Example 6:
Unobtrusive Measures

During the 1960s, the floor tile around the chick-hatching exhibit at the Chicago Museum of Science and Industry had to be replaced every 6 weeks. The tile in other parts of the museum did not require replacement for years. The selective erosion of the tiles, indexed by the replacement rate, provided a measure of the relative popularity of the exhibit.

Example 7:
Unobtrusive Measures

The Fairfax County Public Library has a "books on tape" program. Staff members monitor the frequency with which the audiotapes are checked out. This check-out rate provides a measure of the popularity of the Library system's "books on tape" program.

- **Questionnaires and Surveys**

    Questionnaires and surveys typically entail several questions that have structured response categories and may include some that are open-ended. The survey may be administered through the mail, telephone, on-line, or by personal interview. Surveying is the preferred method of data collection for a researcher who wants to obtain a small amount of information from a large number of subjects. Surveys can be particularly useful in collecting politically or ethically sensitive quantitative data. They may be used for programs for public welfare or economic development. Large surveys often focus on sensitive or controversial topics within the public domain. However, as is noted in the *Manual for Surveying for Customer Satisfaction*, surveying where a large population is involved can be expensive, difficult and time-consuming. It must be conducted using strict random probability procedures so that information can be extrapolated from the sample population to provide an accurate picture of the entire population.

Example 8:
On-Line Surveys

There are many software survey tools available for use by County agencies. The Department of Management and Budget has used on-line surveys in the context of two different processes over the past year: work on the Budget Process Redesign and feedback from internal budget processes. Below is an example of how an on-line survey works and which screens users would see and access:

Survey Preview   BACK

Below is what your respondents will see when they take the survey. To exit Preview mode, click the "Back" button.

Q & A Survey

We would appreciate your feedback regarding how the Q and A process has worked, as well as suggestions for future improvement. Please take a few minutes to respond to this brief survey. Thank you.

START SURVEY!

Survey Preview

BACK

Below is what your respondents will see when they take the survey. To exit Preview mode, click the "Back" button.

Q & A Survey

We would appreciate your feedback regarding how the Q and A process has worked, as well as suggestions for future improvement. Please take a few minutes to respond to this brief survey. Thank you.

1   Were the instructions provided during the Q and A process understandable and useful?

YES   NO

Additional Comment

2   Was it difficult to create a Q and A response from the provided template?

YES   NO

Additional Comment

Many on-line surveys also provide links to their servers to view the results of the surveys. The survey "owner" can send this link out to all interested parties to access.

Survey Results

Q & A Survey

We would appreciate your feedback regarding how the Q and A process has worked, as well as suggestions for future improvement. Please take a few minutes to respond to this brief survey. Thank you.

1.	Were the instructions provided during the Q and A process understandable and useful?	Number of Responses	Response Ratio
Yes		11	100%
No		0	0%
	Total	11	100%

2.	Was it difficult to create a Q and A response from the provided template?	Number of Responses	Response Ratio
Yes		0	0%
No		11	100%
	Total	11	100%

- **Reactive**

  The customer initiates reactive methods of data collection. Comment cards, 800 numbers and complaints are among the reactive types of responses that an organization can receive. Organizations can use this information to improve performance by identifying trends from comment cards and complaints and developing strategies for improvement.

Example 9:
Collecting Observational Data

The Department of Transportation collects ridership data on the FAIRFAX CONNECTOR bus program through periodic spot-checks by riding the buses and recording each boarding and de-boarding as it occurs. This data provides a rich profile of the bus service to be used by the department planning staff. However, to be done correctly, staff must be properly trained on observation techniques.

Example 10:
Collecting Observational Data

The Department of Tax Administration conducts tests periodically to ensure the timely processing of tax information. Staff submit tax payments via the mail, as well as via drop-in boxes at the Government Center, and monitor the length of time it takes to receive confirmation of payments. In addition, staff posing as residents call the department and request information. They check to determine if the phone is answered properly, that correct information is given, etc. Telephone calls are also randomly monitored to ensure quality customer service. On occasion, County staff serve as "secret shoppers" and go through the tax lines at the Government Center. The department uses these various data collection techniques to ensure that internal processes are effective and that residents are receiving a high quality of service.

Collecting Qualitative Data

- **Participation**

  Participant observation involves first-hand involvement with the study group. Immersion in the setting allows the researcher to hear, see and begin to experience reality as the participants do. Before commencing, the researcher should plan the extent of the participation, what the nature of the participation is expected to be, how much will be revealed to the study group and the intensity of the participation.

- **Observation**

  Behavior, the meanings attached to those behaviors, or relationships are often the focus of observational research. With this technique, the researcher is simply an unobtrusive observer seeking patterns of activity or events. It is important, however, to train the observer on data that are subjective in nature and to establish common definitions (i.e., what constitutes "good," "marginal" or "poor" conditions).

- **Interviews**

  Qualitative interviews are much more like conversations than formal events with predetermined response categories. The participant frames and structures the responses; the researcher may only respond with general questions to understand context or perspective. The strengths of the interview process are the ability to get large amounts of data, the ability to gather a wide variety of information, the ability to obtain immediate follow-up and clarification. The limitations and weaknesses of interviewing include the ability to obtain cooperation from the interview subjects, the ability to properly convey the interview topics, the ability to obtain truthful

responses, the time commitment required, and the increased difficulty of recording and classifying non-standard responses.

- **Document Review**

  A review of documents is an unobtrusive method of collecting contextual information about events or behaviors. This process is both unobtrusive and nonreactive; it can be conducted without disturbing the program setting in any way.

- **Proactive**

  Proactive data collection is used to collect data on specific aspects of service delivery. Client interviews, focus groups, and after-service follow-up contacts are methods to gain qualitative information from clients on their impressions of the service provided.

Example 11:
Focus Groups

The Facilities Management Division (FMD) conducted "office chair try-outs" to determine the most comfortable office chair for the price. The division facilitated a focus group, comprised of office workers throughout the County. Each participant was given a rating sheet and instructed to try out approximately 16 different types of office chairs. The rating sheet included questions about comfort, ergonomics, and cost. FMD collected the rating sheets and analyzed the feedback to determine the County's office chair selection when agencies purchase new or replacement seating. This process is anticipated to save the County time and money, while ensuring the purchase of a quality product.

- **Other**

  Surveys and benchmarking have characteristics of both reactive and proactive data collection. Annual surveys tend to capture problems or feelings, but will not identify significant trends. An annual survey is more useful where services do not change significantly from year to year. A "just in time" survey, however, can be used strategically to capture data on trends or problem areas by targeting the audience and tailoring the survey instrument.

Appendix C presents a chart on Matching Data Collection Purposes with Collection Techniques.

IV.   DATA INTEGRITY

> "Trust, but verify."
>   - Ronald Reagan

Periodic Review

Your organization should conduct a periodic review (at least annually) of the data collection process to ensure accuracy, completeness, timing and validity of performance measurement data tracked. In particular, staff who are responsible for data collection should be fully trained to be able to collect accurate, complete and reliable data. Changes in the program environment, program goals, or technology are also all events that should trigger a review of the data collection process. However, staff and especially managers should remain vigilant where data integrity is concerned and not wait until an annual submission is due to uncover problems. Assume ownership for your data!

Consistency

It is important to have consistency of data from year to year. Some performance measures such as customer satisfaction percentages, help desk response time, or transaction processing accuracy are relatively durable and comparable over longer time periods. These measures track trends in areas where products and services do not change significantly. If a significant difference is noted, steps should be taken to ensure that the data have been collected in the same manner from one year to the next to ensure consistency. Sometimes even a small difference in the procedure will result in a considerable variance in the data. However, where data have been consistently collected from year to year, and there is still a significant variation, this should lead to closer examination and analysis of the root cause, which should then be presented as explanatory data.

Accuracy

It is critical that computations involving raw data be calculated accurately or there will be little credibility attached to using the data. In most cases, a calculation is generally only a matter of computing percent change. However, if someone does not perform these types of calculations regularly, an incorrect procedure may be performed. It is always advisable to have someone else check all calculations. This person should have good quantitative skills. Even if the person preparing the data has outstanding quantitative skills, it is always easy to perform a calculation in error or to copy data incorrectly. For these reasons, having an objective party review the data for accuracy is essential.

V.   DATA PRESENTATION

Presentation of the data should be concise, easy to understand, and tailored to the needs of the audience. External stakeholders require summary presentations of the data. An operational manager needs more details and supporting contextual information. A senior manager requires data presentations and displays that focus on bottom-line performance results, allowing him or her to quickly digest information, focus on problem areas, and be more efficient in making program decisions.

- **Text** – Generally, the simplest way to present data. The data are listed in interpretable order. However, text does not lend itself to visualization of trends.

- **Tabular** – Tables prepared to present information should be clear, simple, and easy to read (not a storehouse of data). Tables can record figures or percentages, and are a good tool for presentation of a range of information in a compact and interpretable form. Percentage tables should claim no more precision than your data warrant; therefore, you should retain only significant digits. In practice, this means you should round percentages off to either whole numbers or one decimal place. The following is an example of data presented in tabular format.

Invoice Payment Rate (in percentages)	
Payment Schedule	**Percent**
One to three days	32
Four to six days	43
Seven to nine days	21
Ten or more days	4
Total	100
(N)	(6,450)

Note: In the above, (N) represents the total number of invoices from which these percentages were computed.

▪ **Graphical** – A graphical presentation of the data. The main types are:

- *Bar graph or histogram* – a bar graph presents figures as bars whose height is proportional to what is being measured; a typical histogram presents data by illustrating frequency over time. Its visual representation allows the reader to readily grasp trends.

Gym/Field Applications Processed

FY 2002	FY 2003	FY 2004	FY 2005	FY 2006
345	441	541	542	550
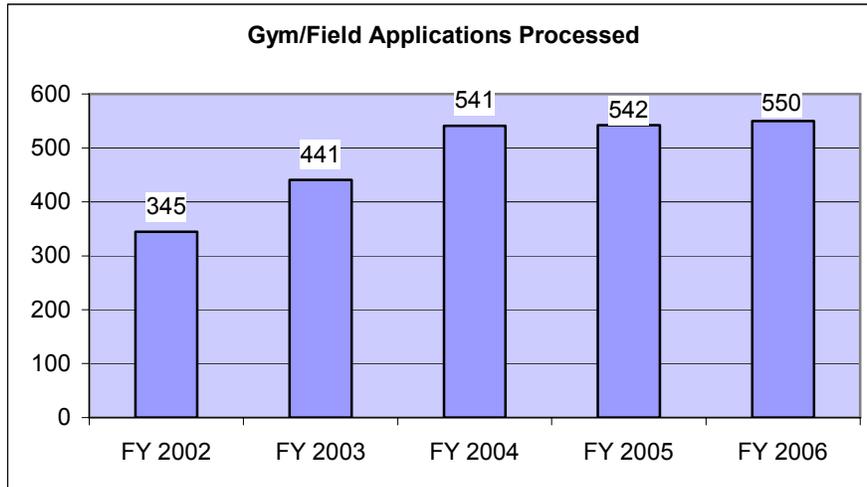
- *Line graph* – a graph that presents data as a line whose points are defined by the two variables that form the vertical and horizontal axis. Again, this presentation lends itself to easy visualization of trends.

Average Hourly Court Security Costs

FY 2002	FY 2003	FY 2004	FY 2005	FY 2006
$76	$87	$96	$200	$220
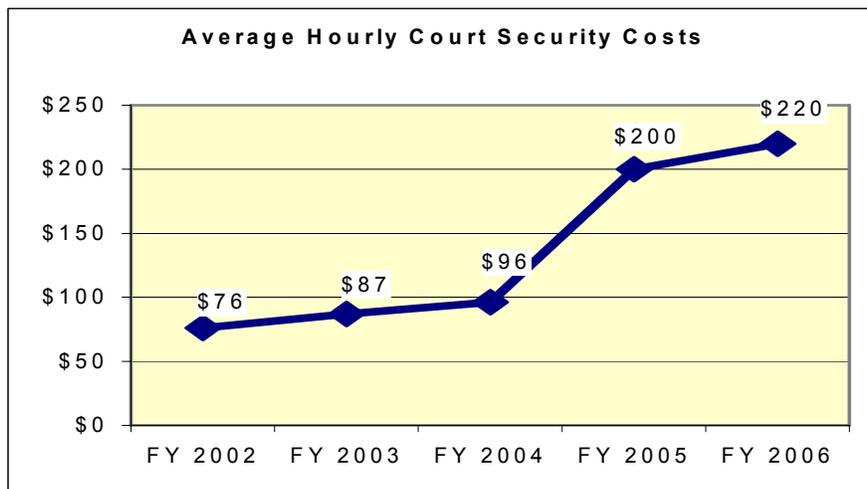
- *Pie chart* – a graph where the total is illustrated as a circle or 'pie,' and figures are shown as segments of the circle.

Revenues By Quarter

$458,767

$187,659

$454,484

$786,757

☐ First Quarter Revenues   ■ Second Quarter Revenues
☐ Third Quarter Revenues   ☐ Fourth Quarter Revenues
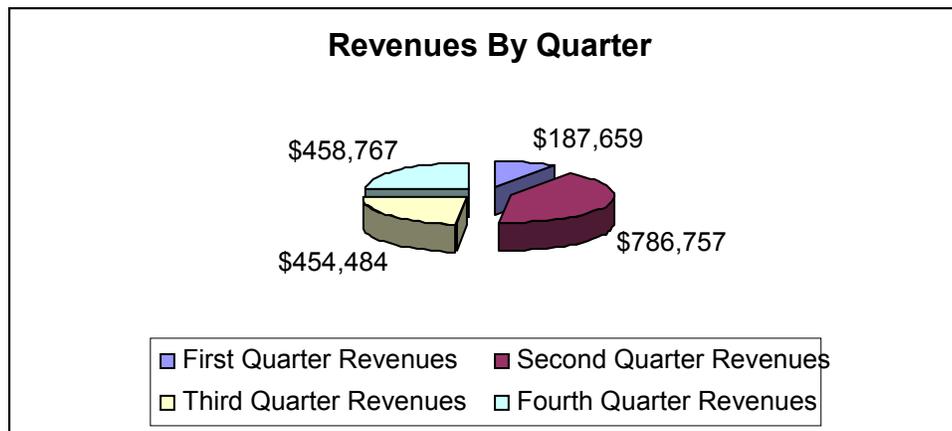
- *Pareto chart* – A chart that displays, in the order of relative importance, the sources that contribute to a problem or condition in order to prioritize problem solving actions, monitor success, or identify the basic sources that contribute to the problem. It is a form of a vertical bar chart in which the bars are arranged in descending order. Each bar represents a source, problem or cause. The technique is based on the Pareto Principle, which states that only a few sources account for most of the problems. The Pareto chart indicates which "vital few" sources should be addressed first. By using a Pareto chart such as the following, various aspects of an operation can be examined and resources concentrated in the areas with the greatest potential for improvement. The Pareto chart should rank or display problems or causes of problems in descending order from left to right which, in turn, will help you decide which problems to work on first. However paraphrased; pareto is a simple management tool with wide business application. It can provide valuable information, which allows us to focus on the vital few, rather than the trivial many.

  As an example of the basic rule: 80% of customer complaints are caused by 20% of our products or services so this is where we should concentrate improvement efforts. The 80/20 theory was first developed in 1906, by Italian economist and sociologist, Vilfredo Pareto, who observed an unequal distribution of wealth and power in a relatively small proportion of the total population. Joseph M. Juran is credited with adapting Pareto's economic observations to business applications and in 1950; he published *The Quality Control Handbook*, which first recognized the applicability of the Pareto principle in the context of inventory management. As a credit to Pareto's work, Juran named his finding 'The Pareto Principle.' A good web site which explains how to create pareto charts is found at http://www.saferpak.com/pareto_articles/howto_pareto.pdf and http://www.qaproject.org/methods/resparetochart.html.

Pareto Chart Example:
Causes of Tardiness
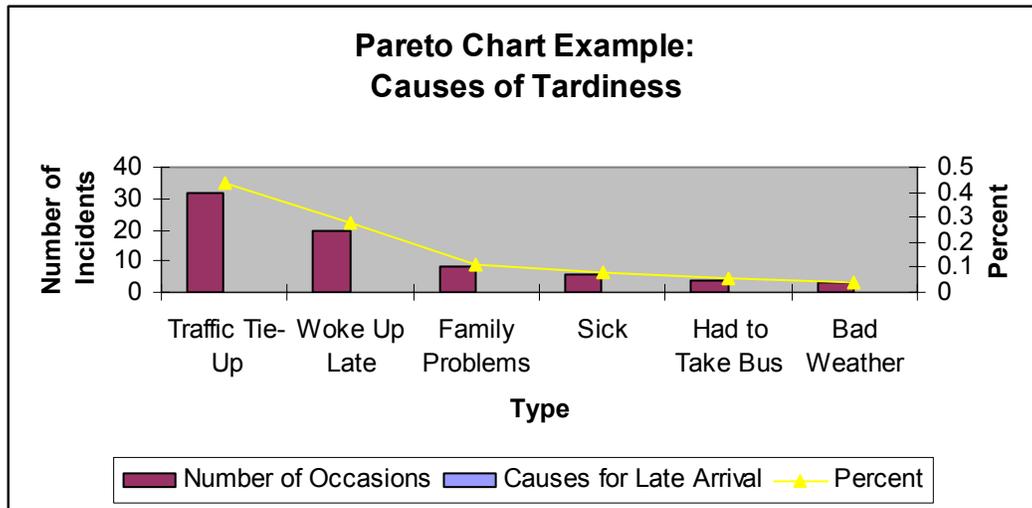
AUDIT PERFORMANCE

Problem Areas

Late transactions	_____50
Incorrect journal entries	_____30
Wrong fund	_____10
Coded incorrectly	___5
Wrong accounting period	___5

- *Run chart* – A chart that plots variable data in time order to help display trends. Data are plotted on a graph in the order in which they become available. The points can be connected for easy interpretation. The time period covered and the unit of measure must be clearly identified. Problems, trends and cycles then become readily apparent. Run charts give a picture of a variation in some process over time and help detect special (external) causes of that variation. They make trends or other non-random variation in the process easier to see and understand. With the understanding of patterns and trends of the past, groups can then use run charts to help predict future performance. If data analysis focuses on statistics that give only the big picture (such as average, range and variation), trends over time can often be lost. Changes could be hidden from view and problems left unresolved. Run charts graphically display shifts, trends, cycles, or other non-random patterns over time. They can be used to identify problems (by showing a trend away from the desired results) and to monitor progress when solutions are carried out.

A run is the consecutive points running either above or below the center line (mean or median). The points in a run chart mark the single events (how much occurred at a certain point in time). A run is broken once it crosses the center line. Values on the center line are ignored: they do not break the run, nor are they counted as points in the run. The basic steps in creating a run chart follow.

> **Step 1.** Where possible, collect at least 25 data points (number, time, cost), recording when each measurement was taken. Arrange the data in chronological order.

> **Step 2.** Determine the scale for the vertical axis as 1.5 times the range. Label the axis with the scale and unit of measure.

> **Step 3.** Draw the horizontal axis and mark the measure of time (minute, hour, day, shift, week, month, year, etc.) and label the axis.

> **Step 4.** Plot the points and connect them with a straight line between each point. Draw the center line (the average of all the data points).

The following provide some guidance in interpreting a run chart:

- Eight consecutive points above (or below) the center line (mean or median) suggest a shift in the process

- Six successive increasing (or decreasing) points suggest a trend

- Fourteen successive points alternating up and down suggest a cyclical process
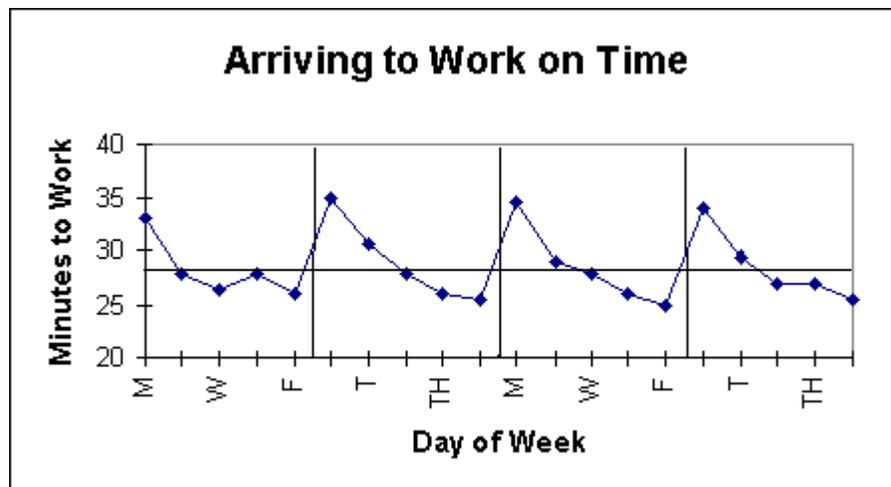
- *Control chart* – A chart that plots variable data in time order which is characterized by statistically calculated upper and low control limits which establish the boundaries of a stable process. The control chart is a picture of how well a process is performing, i.e., how often events fall outside the control limits. This chart can be used to detect gradual changes before the process goes out of control. The control chart is the fundamental tool of statistical process control, as it indicates the range of variability that is built into a system (known as common cause variation). Thus, it helps determine whether or not a process is operating consistently or if a special cause has occurred to change the process mean or variance. The bounds of the control chart are marked by upper and lower control limits that are calculated by applying statistical formulas to data from the process. Data points that fall outside these bounds represent variations due to special causes, which can typically be found and eliminated. On the other hand, improvements in common cause variation require fundamental changes in the process. Be careful not to use too many notations on a run chart. Keep it as simple as possible and include only the information necessary to interpret the chart. Do not draw conclusions that are not justified by the data. Certain trends and interpretations may require more statistical testing to determine if they are significant. Whenever possible, use a run chart to show the variation in the process. Do not assume that the variation is so clear and obvious that a run chart is unnecessary. A run chart must not lie or mislead! To ensure that this does not happen, follow these guidelines:

  - Scales must be in regular intervals

  - Charts that are to be compared must also use the same scale and symbols

  - Charts should be easy to read

Control Chart of Average Wait Time before and after a Redesign

Average Waiting Time in Minutes (Daily Sample of Five)   Redesign Implemented

- 80
- Upper Control Limit = 78 Minutes
- 70
- 60
- Average = 42 Minutes
- 50
- 40
- Upper Control Limit = 26 Minutes
- 30
- Average = 15 Minutes
- 20
- Lower Control Limit = 6 Minutes
- 10
- Lower Control Limit = 4 Minutes
- 0

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

VI. SUMMARY – COLLECTING AND CONNECTING

Be aware of some common types of data bias that can occur when collecting data. The usefulness of data is directly proportional to the objectivity with which it has been collected. Sometimes we unknowingly introduce bias into the data collection process, which can contribute to inaccuracy and unreliability of data. The five most common types of data bias are:

<u>Exclusion bias</u> – This occurs when one or several portions of a process are not studied or surveyed. Consequently, the data do not represent or reflect the entire process. By having excluded certain data, you may be acting on incomplete information.

<u>Sampling bias</u> – This is similar to exclusion bias and occurs when one or several subpopulations are disproportionately represented in a sample. As a consequence, the data may grossly distort the true situation.

<u>Interaction bias</u> – When workers are aware that they are being observed, they may perform differently than normal. Interaction bias can also occur when data collection techniques physically interfere with the natural process.

<u>Perception bias</u> – The data collector may have pre-conceived ideas or anticipated outcomes that may color the way he sees and records the data. This affects the objectivity of the data.

<u>Operational bias</u> – When the instructions for collecting the data are either flawed or not followed, operational bias is introduced and data are less reliable. Poorly trained or careless data collectors also contribute to this weakness.

Key Points
The following are the key points for SMART data collection:

➢ **S**trategic **-** collect only needed data, using a checksheet as a guide.

➢ **M**easurable **-** get the right data for the program being measured.

➢ **A**ccurate **-** measure things as accurately as possible given reasonable time and cost constraints.

➢ **R**eliable **-** record data correctly.

➢ **T**ime-Based **-** keep it simple.

> "If performance measurement is simply viewed as a data-collection and reporting exercise, it will serve little purpose to a community. It is only through the analysis of data that performance measurement really can become a tool for continuous service improvement. And it is through good, thoughtful questions that this analysis begins."
> - *ICMA Comparative Performance Measurement: FY 2000 Data Report*

What to do with all this collected data? Although this topic will be discussed in greater detail in the "Managing for Results" workshop, it is essential to reiterate the importance of collecting meaningful data that illustrate how well an agency is meeting its performance objectives. In addition to comparing current operations against past performance, agencies can identify where they appear to be doing well compared with other jurisdictions in the program, as well as areas for improvement.

When engaging in comparative performance measurement, agencies should be sure to compare performance with a subset of agencies on the basis of similar criteria such as population, weather conditions, or method of service delivery. If the agency's performance is well below that of the comparison group, it can use the higher levels of performance in those other agencies as targets for future improvement. Agencies should seek explanations from higher-performing agencies as to the practices and procedures contributing to such high performance. Agencies should ask questions such as:

- Why does Agency X or County Y have a higher level of performance on that indicator than my agency?
- How do they do that?
- Is it the equipment they use?
- Is it how they train agency or county employees?
- What is their process?

VII. REFERENCES

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Sample Form for Data Collection Documentation

Agency Name: _____

Name of Person Completing Form: _____

Date: _____

Complete one form for each data type to be collected.

I.   DATA DEFINITION:
        Brief description of data to be collected, including attributes to include/exclude.

II.   COLLECTION PROCESS:
        How the data will be collected, e.g., point of service comment card (note where
        posted, volume printed/distributed/received, etc.)

III.   DATA SOURCES:
        Document if manual log (how recorded), database, spreadsheet, mainframe
        application, etc.

IV.   FREQUENCY OF DATA COLLECTION:
        How often data will be collected, e.g., daily, weekly, monthly, etc.

V.   DATA MANIPULATION:
        Identify the components that go into, as well as the calculations made, to arrive
        at the final measures. For example, to derive an efficiency measure – cost per
        client – Identify all your inputs used to provide the service (preferably by
        subobject: regular salaries, overtime, fringe benefits, operating expenses, capital
        equipment, etc.) and divide this cost by the number of units of service provided
        (number of clients) to derive a cost per client. A standard format is provided in
        the Basic Manual, *Fairfax County Measures Up*.

        Recording this information well the first time makes subsequent processes much
        easier.

VI.   EXPLANATORY DATA:
        Note any significant factors that influence the data, e.g., assumptions made, etc.

Process for Data Collection for Performance Measures

```
                          ┌─────────────────────────────────┐
          ┌──────────────▶│      Define the objectives      │
          │               └─────────────────────────────────┘
          │                                │
          │                                ▼
          │               ┌─────────────────────────────────┐
          │               │  Design the data collection process │
          │               └─────────────────────────────────┘
          │                                │
          │                                ▼
          │               ┌─────────────────────────────────┐
          │               │     Test the collection method     │
          │               └─────────────────────────────────┘
          │                                │
          │                                ▼
          │               ┌─────────────────────────────────┐
          │               │           Gather data           │
          │               └─────────────────────────────────┘
          │                                │
          │                                ▼
          │               ┌─────────────────────────────────┐
          │               │         Analyze the data        │
          │               └─────────────────────────────────┘
          │                                │
          │                                ▼
          │               ┌─────────────────────────────────┐
          │               │          Use the data           │
          └───────────────│                                 │
                          │  -  refine projections for performance measures │
                          │  -  improve service delivery    │
                          │  -  support request for additional resources │
                          │  -  update strategic plans      │
                          └─────────────────────────────────┘
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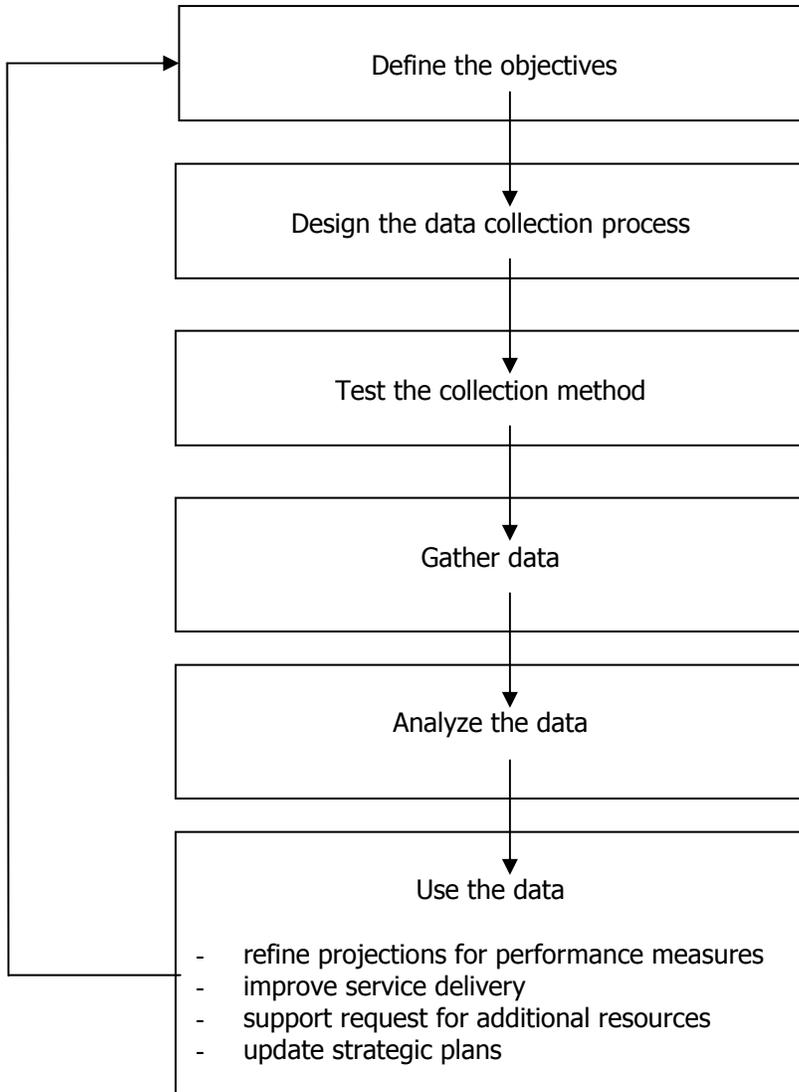
Matching Data Collection Purpose with Collection Technique

Data Collection Purpose	Research Question	Research Strategy	Examples of Data Collection Techniques
EXPLORATORY To identify/discover important variables	What are the variables that are affecting the program outcomes?	Case study Field study	Participant observation Interview
EXPLANATORY To identify causal relationships affecting the outcome	What is the linkage between program resources and outcomes?	Program history Case study Field study	Participant observation Interview Survey Database
DESCRIPTIVE To document the outcome	What are the factors, processes occurring in this situation?	Case study Field study	Kiosk Interview Field observation Survey Comment card
PREDICTIVE To forecast the outcomes resulting from the program	Who will be affected? In what ways?	Pilot program	Survey (large sample)