

# Measuring Customer Satisfaction and Perceptions

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U.S. Customs and  
Border Protection



# Customs and Border Protection (CBP) Office of Information Technology (OIT)

CBP (the former Customs Service, former Inspectors and former Border Patrol) is part of the Department of Homeland Security

OIT develops and maintains software and infrastructure that supports controlling the borders of the United States

- Enforcement software and tariff collection software for items and people entering the US
- Enforcement software for items leaving the US

Nation-wide telephone, radio and data networks

Maintains a national data center



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# OIT Measurement Initiative

OIT has an enterprise-wide process improvement program

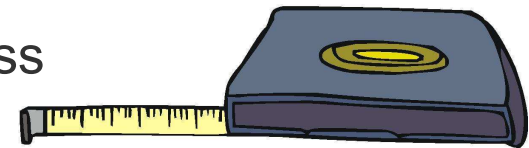
Goal is to work towards CMMI Level 4

Measurement one of 16 initiatives in the process improvement effort

Measurement Initiative

1. Implement a Common Measurement Process

- Based on PSM



2. Expand measures implemented during FY2003

3. Automate Data Collection, Analysis and Reporting

- Using Insight

4. Measure Progress and Impact of CMMI-based Process Improvement

**5. Strategic Measures**



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# Five Guiding Principles

The OIT Enterprise Measurement Initiative will follow five guiding principles during FY2004. These are:

- Broaden and strengthen a culture of measurement throughout OIT
- Collect, analyze, and report measures based on explicit information requirements
- Involve all management and working levels in the development of a common measurement process
- Rollout measurement in small steps to facilitate assimilation and expertise in measurement at all management levels: from the working level to the Assistant Commissioner.
- Enter data once, use it in multiple places



# Performance Baseline Measurement

Need expressed by senior-level management to **Baseline** the current organizational **Performance**

OMB's **Performance Reference Model** is used as a way to establish a "line of sight" from Inputs to Outcomes

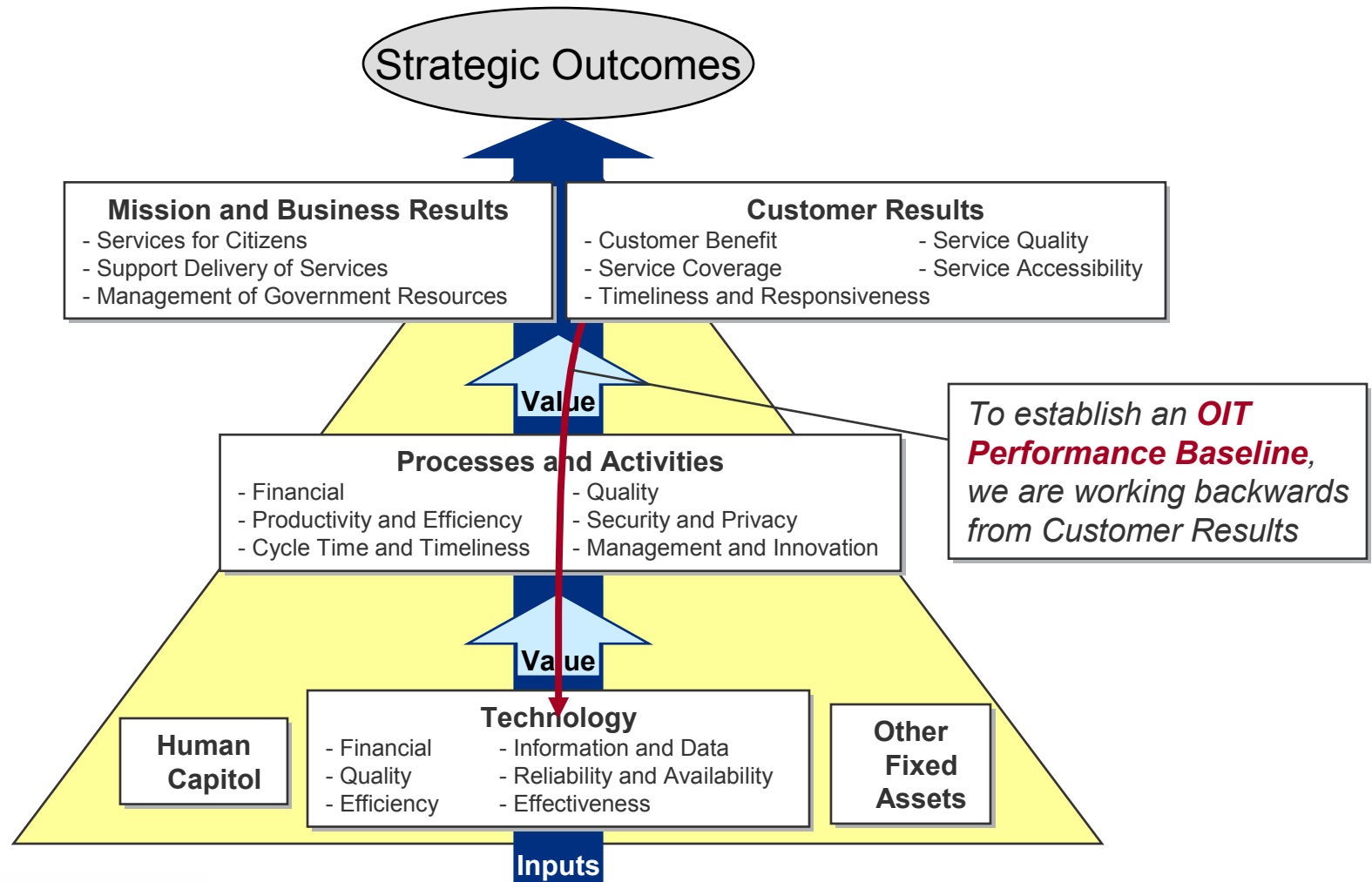
Start with measuring **Customer Satisfaction** to provide insight into:

- What are the OIT products and services for people on the front line?
- What are their **Pain Points** with these products or services?
- What is the **Impact** when they do not have access to an OIT product or service?

The results will provide the foundation for an **OIT Performance Baseline**



# OMB's Federal Enterprise Architecture: Performance Reference Model v1.0



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Source: Federal Enterprise Architecture Program Management Office, "Performance Reference Model," v 1.0, <http://www.feapmo.gov/feaprm2.asp>

# PSM Information Category

Information Category	Measurable Concept	Prospective measures
...	...	...
Technology Effectiveness	Technology Suitability	Requirements Change
	Technology Volatility	Baseline Changes
Customer Satisfaction	Customer Feedback	<b>Satisfaction Ratings</b>
		Award Fee
	Customer Support	Requests for Support
Support Time		



# Considerations for a Customer Satisfaction Survey -1

Most literature on customer satisfaction surveys addresses the **commercial customer**

- Someone who buys your product or service and has the decision authority on what to buy and how much to spend.
- The intent is to understand how to retain and increase the number of customers.

## Government End-User

- Agency has decision authority on where it receives its services.
- The intent is to understand how to better support the customers in carrying out their mission.

## Survey must have a purpose

- Process improvement impact
- Training effectiveness
- Investigating a perceived need
- Evaluating a product or service





# Considerations for a Customer Satisfaction Survey -2

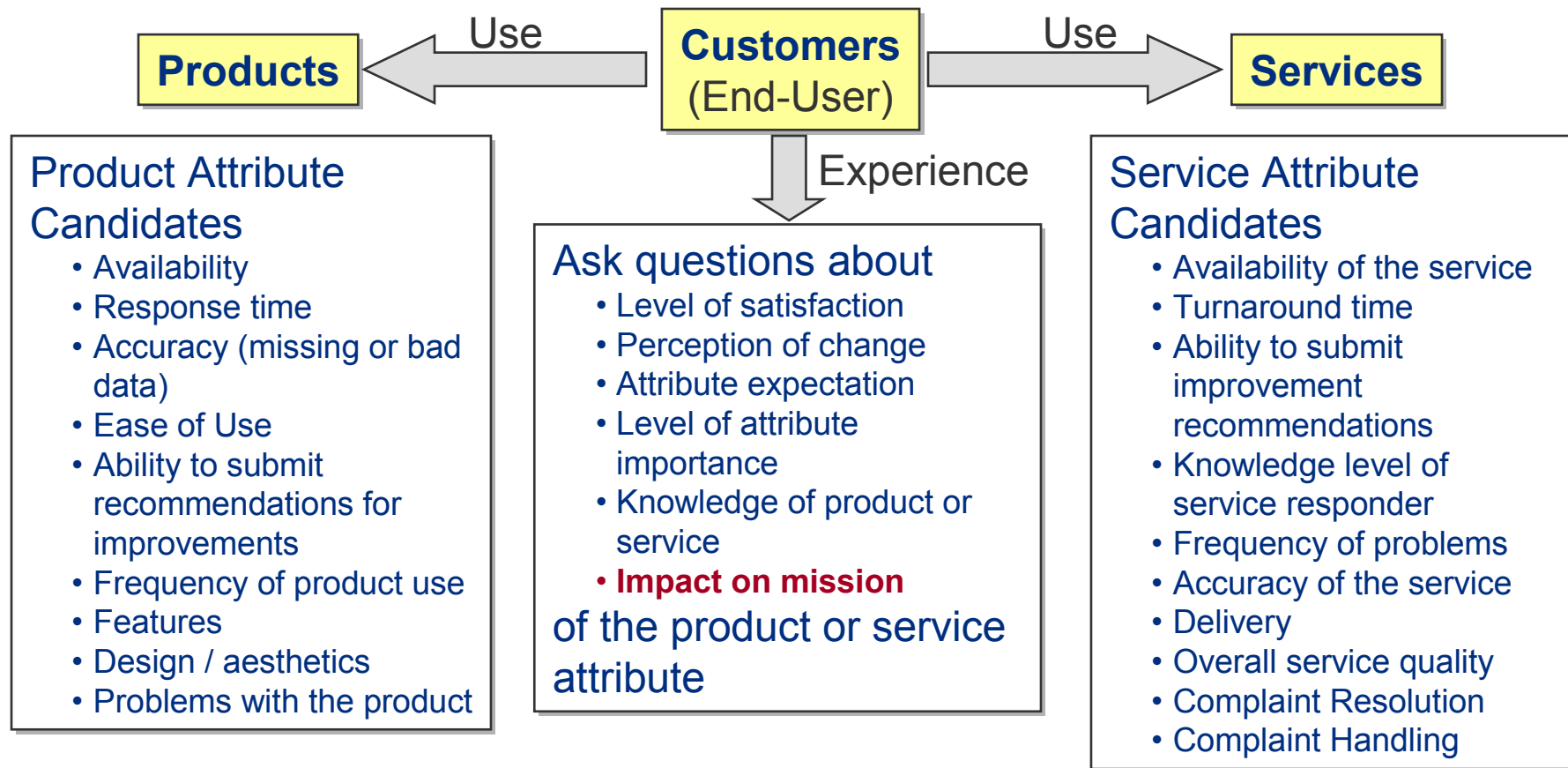
Make the survey as easy and clear as possible for the respondent

Keep the respondent's interest level and attention at a maximum

- Hot topics at the beginning of the survey
- Keep the questions short, simple and focused on one concept at a time
- Demographics at the end
- Limit and target questions so survey takes only 10 to 15 minutes
- Make the survey repeatable for annual updates



# Customer Satisfaction Survey Questions



# Types of Satisfaction Questions -1

Level of satisfaction with an attribute

- Scale can go from Highly Dissatisfied to Highly Satisfied

Perception of change in an attribute

- Scale can go from Much Worse to Much Better

Attribute expectation

- Ask for a specific expectation: “How long”, “How much”, “Acceptable amount”
- Provides basis for setting target values



# Types of Satisfaction Questions -2

Level of attribute importance

- Scale can go from “Not Important” to “Very Important”

Knowledge of product or service

- Ask how long they have been using the product or service

Impact on mission

- Ask what happens when they cannot get the product or service
- If a system is down for an hour, does that mean 5,000 people cross the border unchecked?



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# Demographics are Important!

## Examples of demographics

- Location
- Experience level
- Years employed
- Gender
- Job Position
- Job Description

Provide means for viewing data from different groups within the sample

Helps to understand “Non-Response” error

- Compare demographic with known population distribution



# Role of Demographics

For a population of 10,000+ CBP users, we need about 450 to 575 responses for statistically meaningful analysis and conclusions

Survey will be sent to all Customs and Border Protection front-line users

We will use demographic information to verify that responses were representative of larger population

- alternative would be random sampling with mandatory requirement to fill out survey
- this is difficult to enforce



# Steps in Creating an OIT Survey

1. Identify the **Customers**
2. Identify the **Products** and **Services**
3. Identify **Customer-Related Issues** with the products and services
  - Visited two field locations (airport and seaport)
  - Investigated internal sources (help desk calls, discussions within each OIT division)
4. **Create questions**
5. **Review questions** within the business organization
  - Five divisions covered (hardware infrastructure, software applications, laboratory testing, radios, field equipment)



# Measurement Scales

- **Nominal:** categorizing points on the scale, no ordering implied
  - Examples: demographic data (gender, location), Yes/No responses
- **Ordinal:** points on the scale are ordered
  - Example: quality of service is “worse”, “no change”, “better”
- **Interval:** equal space or intervals between points on the scale
  - Examples: responses indicating a numerical quantity - “How long can you wait for system to repond?”
  - Likert scale where end points are labeled and intervals are implied
    - Allen & Tanniru\* argued that people cognitively create an interval scale
- **Ratio:** equal intervals plus a meaningful zero point
  - Example: number of problem reports

Source: “Analysis of Customer Satisfaction Data” by Derek Allen and Tanniru R. Rao, American Society for Quality (ASQ) Press, 2000





# Measurement Scales

Type of analysis is determined by measurement scales

- Nominal and ordinal
  - Frequency tabulations (bar charts)
- Interval and ratio
  - Frequency tabulations
  - Correlation, linear regression

Source: “Analysis of Customer Satisfaction Data” by Derek Allen and Tanniru R. Rao,  
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# Example Survey Question 1a – Ordinal Scale

We would like to ask you about your satisfaction with the Automated Targeting System application. Please tell us how satisfied you are by using the scale shown below. How satisfied are you with the application in terms of...

	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
Availability	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
Response Time	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
Data Accuracy	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
Ease of Use	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
Ability to submit improvements	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>



# Example Survey Question 1b – Interval Scale

We would like to ask you about your satisfaction with the Automated Targeting System application. Please tell us how satisfied you are by using a seven-point scale where **1** means you are **completely and totally dissatisfied** and **7** means you are **completely and totally satisfied**. Using the seven points on this scale, how satisfied are you with the application in terms of...

	Completely Dissatisfied			Completely Satisfied			
Availability	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
Response Time	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
Data Accuracy	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
Ease of Use	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
Ability to submit improvements	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>



# Example Survey Question -2

When you don't have the use of this application, what impact does this have on your mission?

1. Can still get what I need
2. Wait until application is available
3. Work-around available using other applications
4. Work has to be transferred to another location
5. Use manual methods to get work done

If the mission is compromised, please describe this impact (e.g., cargo is not screened as quickly or as thoroughly)



# Example Survey Question -3

Overall, considering all of these characteristics, how satisfied are you with the Advance Targeting System application. Again, please use the seven-point scale where **1** means you are ***totally and completely dissatisfied*** and **7** means you are ***totally and completely satisfied***.

Completely  
Dissatisfied

Completely  
Satisfied

1  2  3  4  5  6  7

Please provide us additional comments on this application:



# Example Survey Analysis -1

Suppose we administered a product satisfaction survey and we get 9 responses back.

- What can we learn from the responses?

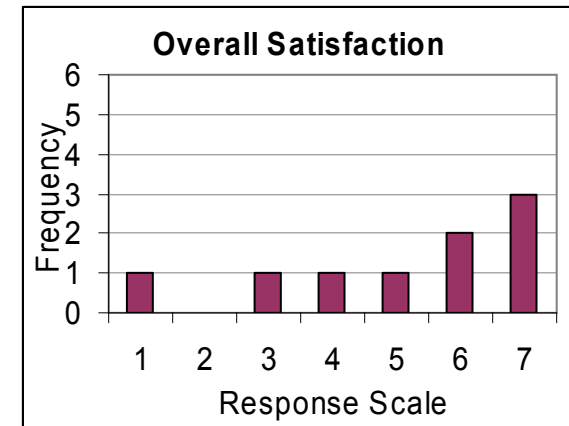
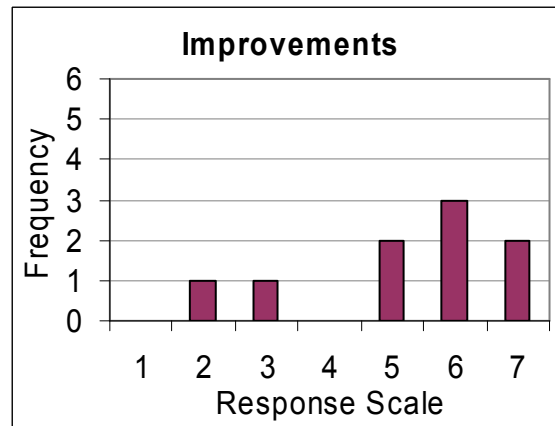
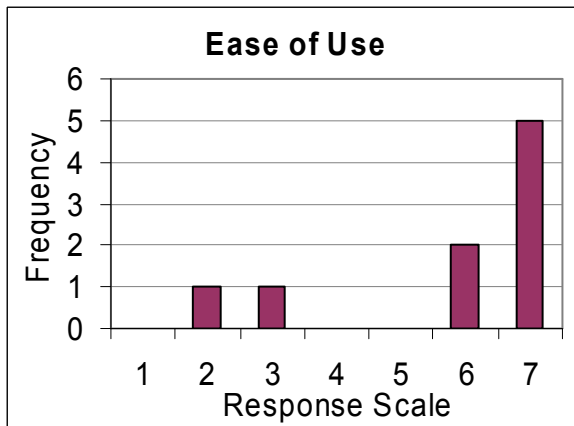
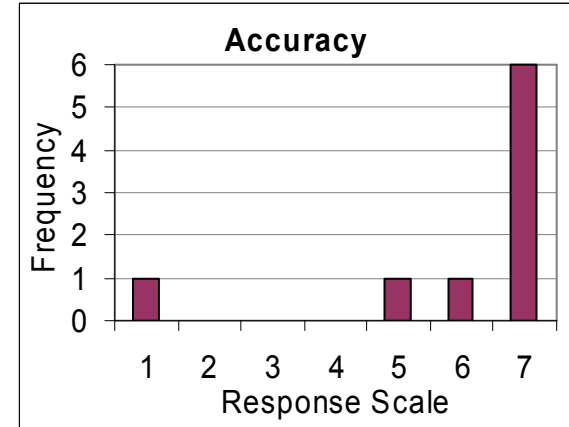
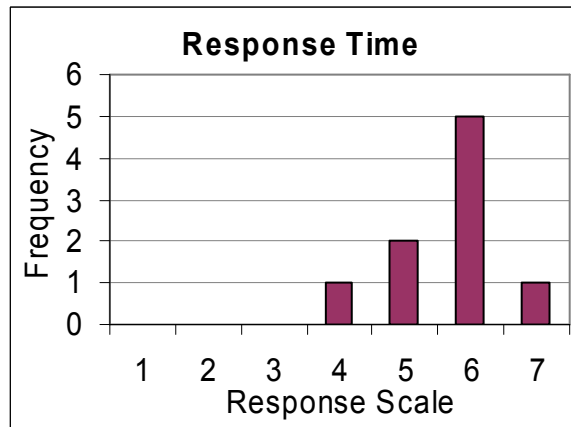
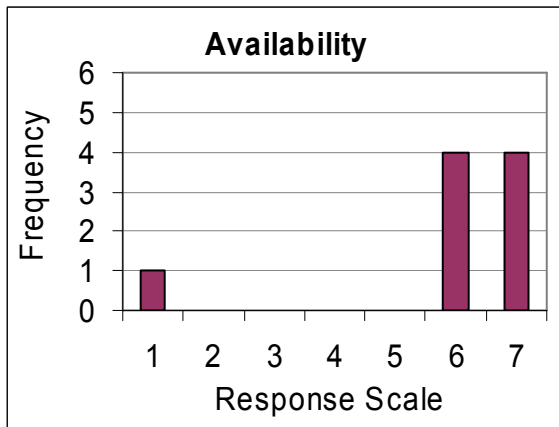
Survey Response ID	Availability	Response Time	Accuracy	Ease of Use	Improvements	Overall Satisfaction
1	7	6	7	7	7	6
2	6	6	7	6	6	6
3	6	5	6	6	3	4
4	7	6	7	7	6	7
5	1	5	7	7	5	1
6	6	4	1	2	2	5
7	7	7	7	7	7	7
8	6	6	5	7	5	7
9	7	6	7	3	6	3

For a population of 10,000+ CBP users, we need about 450 to 575 responses for statistically meaningful analysis and conclusions



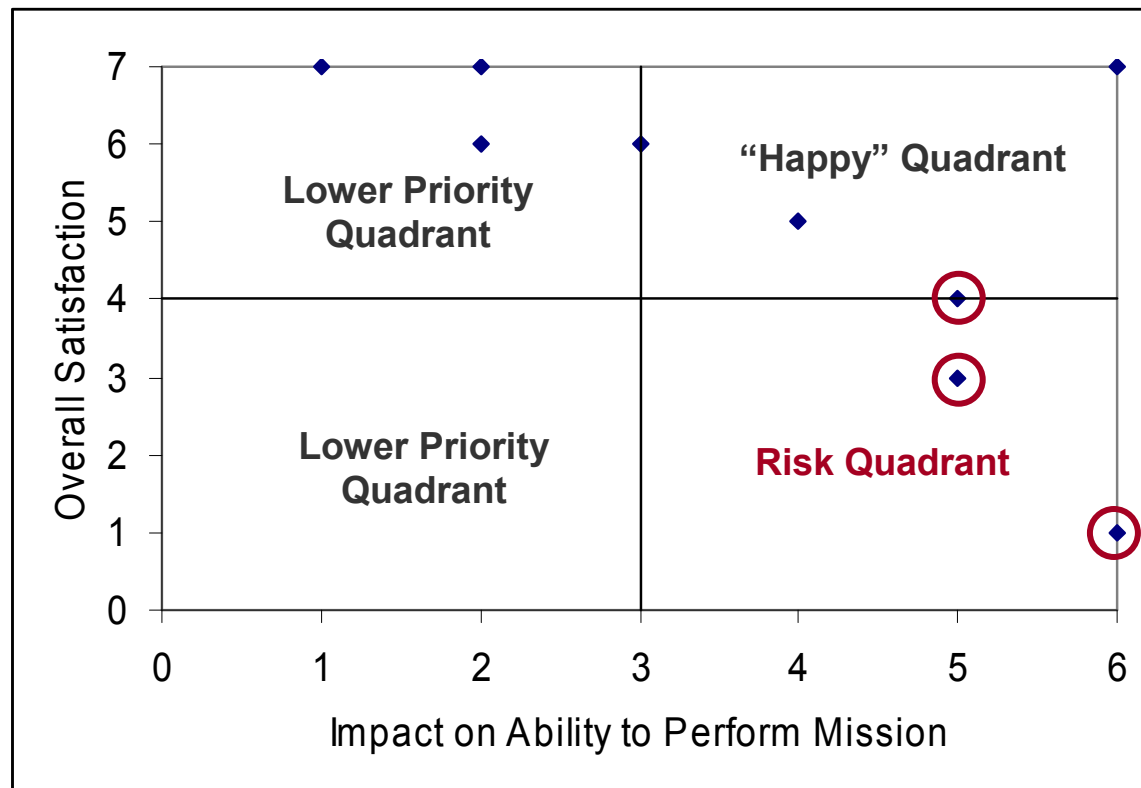
# Analysis Example -2

Frequency analysis: treating the responses as an ordinal scale



# Analysis Example -3

Vulnerability analysis: treating the responses as an ordinal scale, you can look for **risks** to accomplishing the mission.





# Analysis Example -4

Correlation analysis: treating the responses as an interval scale

Product Attributes	Availability	Response Time	Accuracy	Ease of Use	Improvements	Overall Satisfaction
Availability	1					
Response Time	0.43	1				
Accuracy	-0.03	0.72	1			
Ease of Use	-0.18	0.55	0.65	1		
Improvements	0.24	0.90	0.80	0.55	1	
Overall Satisfaction	0.73	0.51	-0.06	0.29	0.31	1

## Analysis Questions

- For this product, how can availability be increased?
- What internal data exists to collaborate the availability product attribute (from a call center, problem reports, etc.)?
- Are there other products or infrastructure services that impact this product's availability (e.g. other databases, network availability, etc.)?



# Analysis Example Conclusion

Type of measurement scale determines the possible analysis

Decide which analysis techniques will be used on the data

Construct questions using appropriate scales to support the analysis

The analysis must correlate attributes against the overall results to help define follow-up actions



# Conclusions

Customer satisfaction surveys can be an important measurement instrument

We are using surveys to identify relevant organizational performance measures based on survey results

- What product and service characteristics are important in accomplishing CBP mission (availability, data accuracy, response time...)?
- Understanding the impact resulting from problems with a product or service will focus OIT on the appropriate priorities

Ask questions that point to specific improvement actions (not just a “feel good” survey)



# Further Reading

“Listening to the Voice of the Customer” by Jon Anton and Debra Perkins, Alexander Communication Group, 1997

“Customer Satisfaction Tools, Techniques, and Formulas for Success” by Craig Cochran, Paton Press, 2003

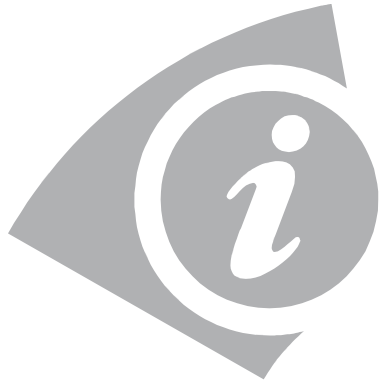
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