Survey Basics
The Four Challenges

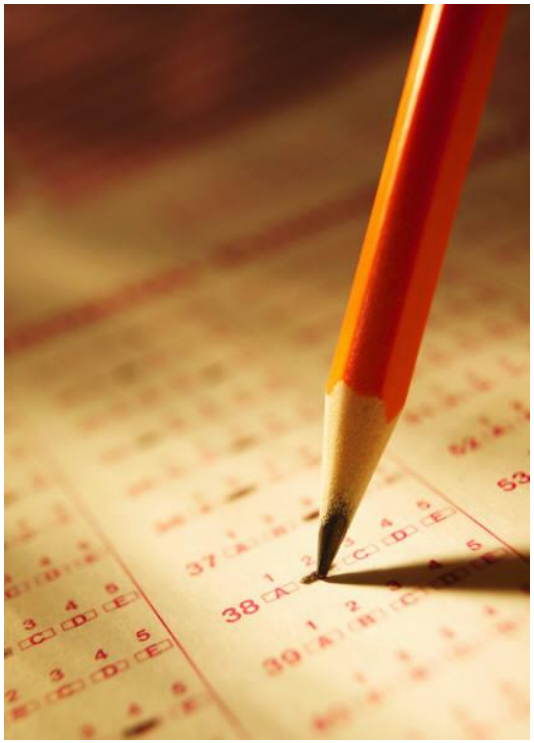
Patti Phillips Ph.D.
patti@roiinstitute.net

ASTD
WORKPLACE LEARNING & PERFORMANCE

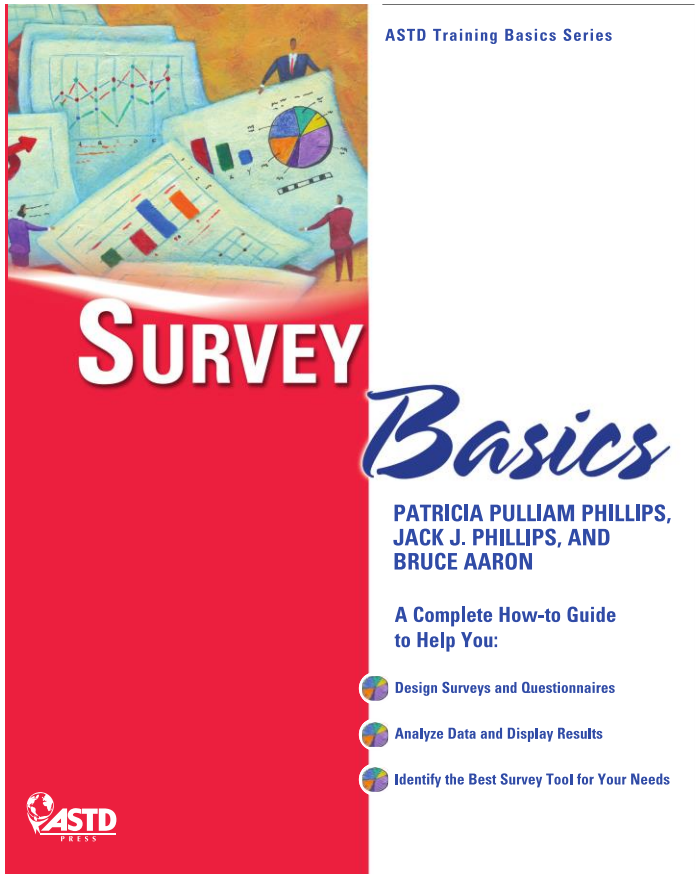
ROI INSTITUTE™

Objectives

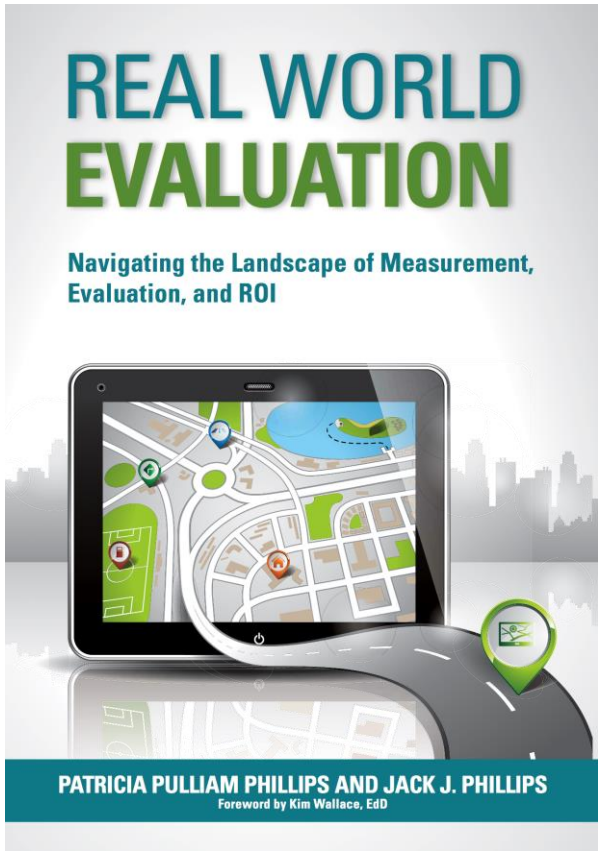
- Recognize the four challenges in survey design
- Calculate the sample size given the size of the population
- Calculate the appropriate number of responses required
- Improve the accuracy
- Consider key issues in developing survey questions



You can find this content in



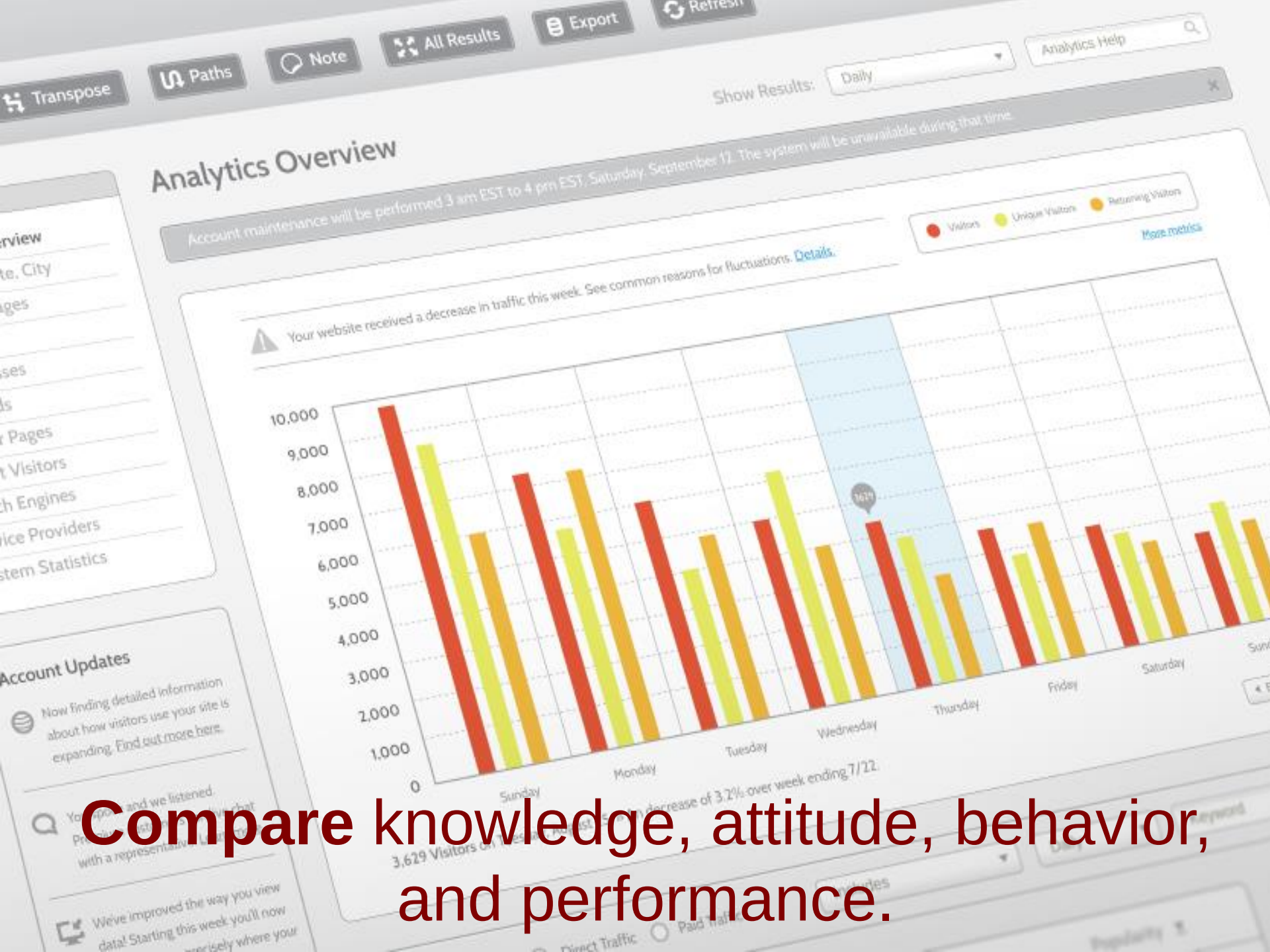
Order Today!



Available May 2014

What can you do with a survey?

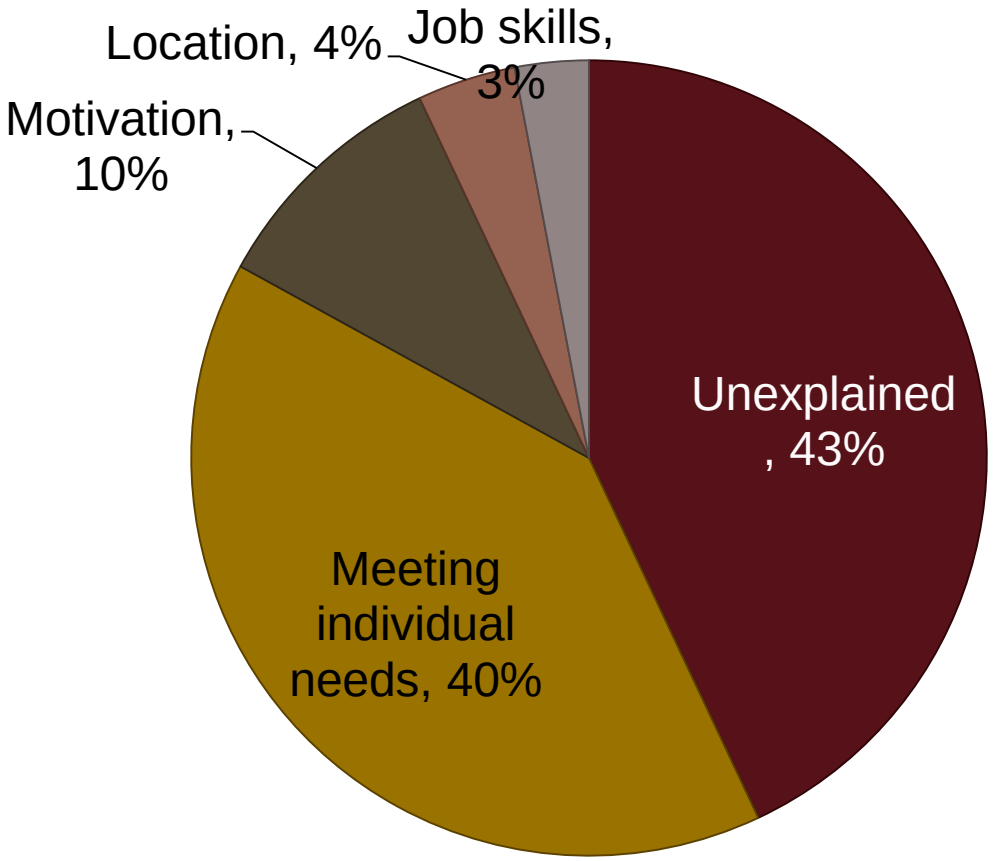
Describe knowledge, attitude, behavior, and performance.



Compare knowledge, attitude, behavior, and performance.

Predict knowledge, attitude, behavior, and performance.

Explain knowledge, attitude, behavior, and performance.



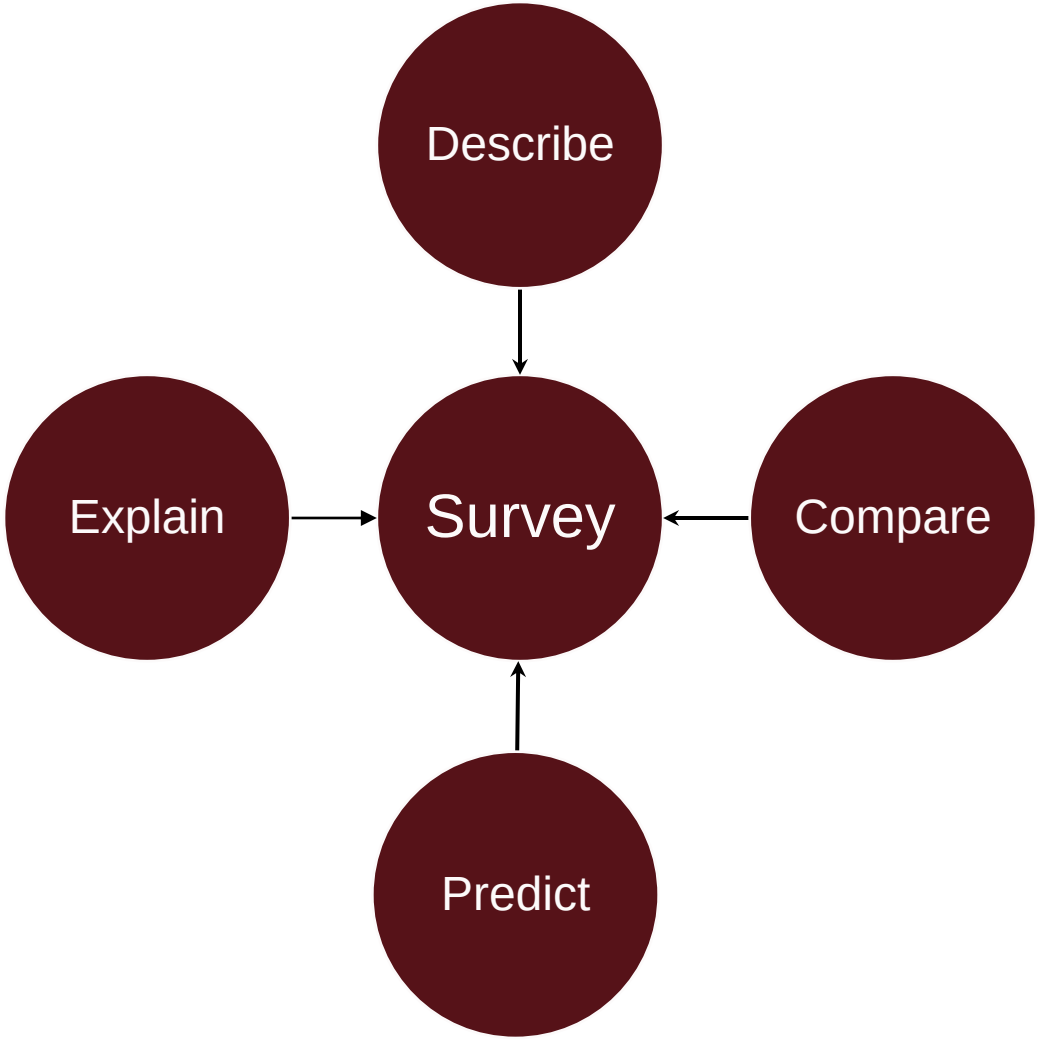
A survey is a system for collecting information from or about people to describe, compare, predict or explain their knowledge, attitudes, and behavior.

--Arlene Fink (2003) The Survey Handbook

Characteristic	1960s	1970s to 1980s	1990s to Present
Human Interaction	High →		Low
Trust that the survey is legitimate	High →		Low
Time involvement with each respondent	High →		Low
Attention given to each respondent	High →		Low
Respondent control over access	Low →		High
Respondent control over whether to	Low →		High

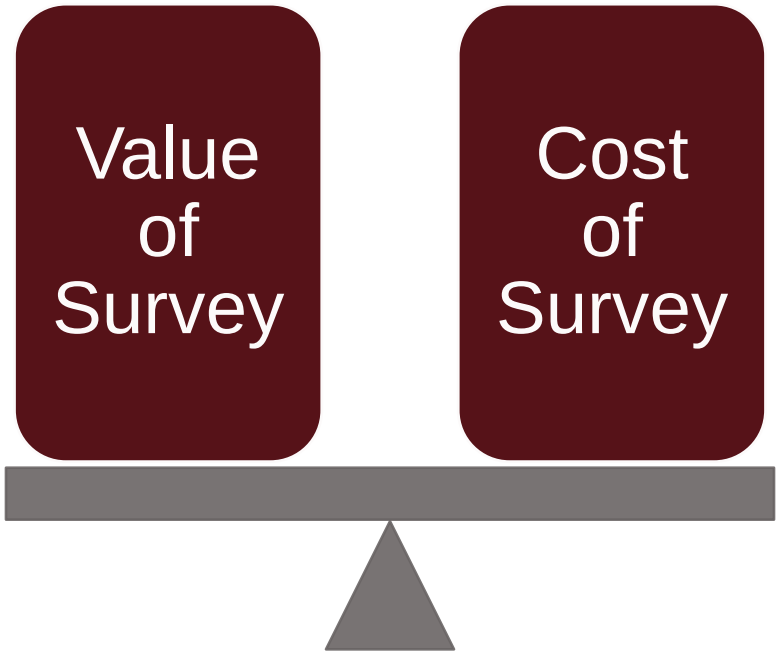
A surveys purpose

- Self-administered
- Interviews
- Records
- Observations



The value of a survey depends on:

- Cost of making an error
- Degree of uncertainty
- Amount of uncertainty the survey may reduce

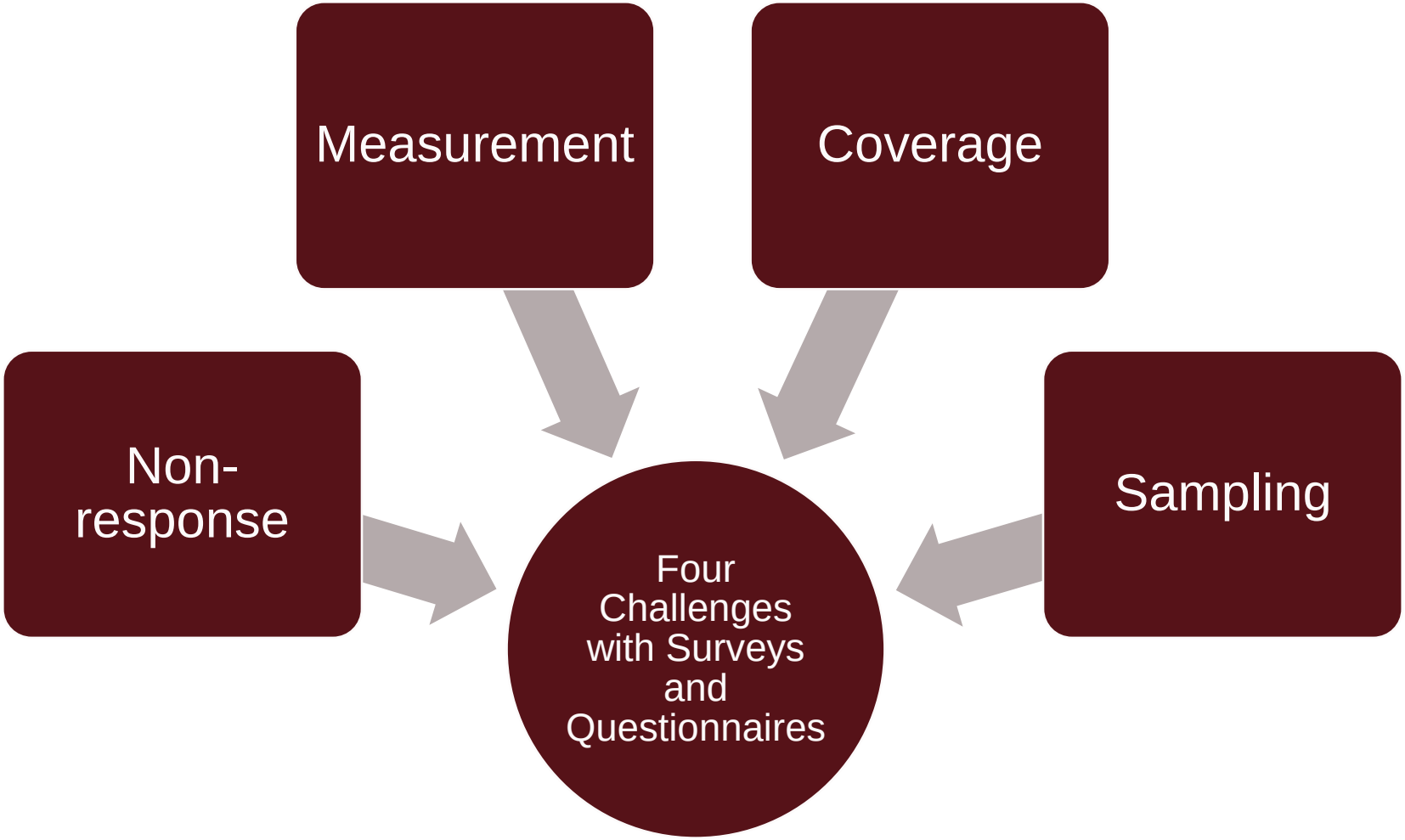


What's wrong with this survey?

1. A designer of health rehabilitation devices wanted to understand potential demand for its products among the general public and how having health insurance might affect the ability to purchase those devices. They commissioned a survey of more than 10,000 people who were members of a volunteer Internet panel.
2. A Ph.D. student working on her dissertation spent months designing a survey of high school students to compare differences across schools. The student could only afford to mail out 100 surveys with no reminders, for each randomly selected school in her sample. Because of these limitations, it was likely that only 25 to 30 students from each school would respond.

What's wrong with this survey?

3. A vice president of a major university administered a 40-minute web survey to all faculty, staff, and students at the university. The survey used a standard questionnaire that was used at other universities and that contained a long series of questions about bias and harassment repeated for many different minority groups throughout the country. In addition, the survey required an answer for each question.
4. To encourage careful thinking about each question in a customer satisfaction survey conducted by a public agency, response scales were varied across questions. On one page, a scale began with very satisfied and ended with very dissatisfied, but a later scale on the same page began with not at all satisfied and ended with completely satisfied. Later respondents were asked to



Source: Dillman, D. A., Smyth, J. D., and Christian, L. M. (2009). *Internet, Mail, and Mixed-Model Surveys: The Tailored Design Method* 3rd edition. Hoboken, NJ: John Wiley.

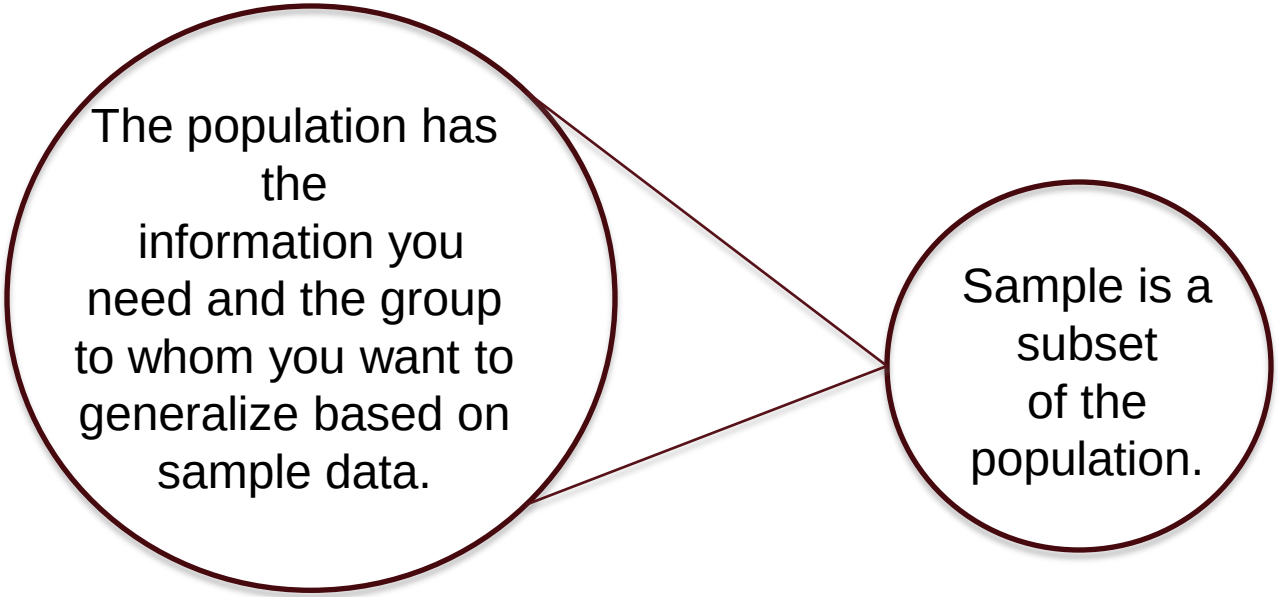
Managing Coverage Error

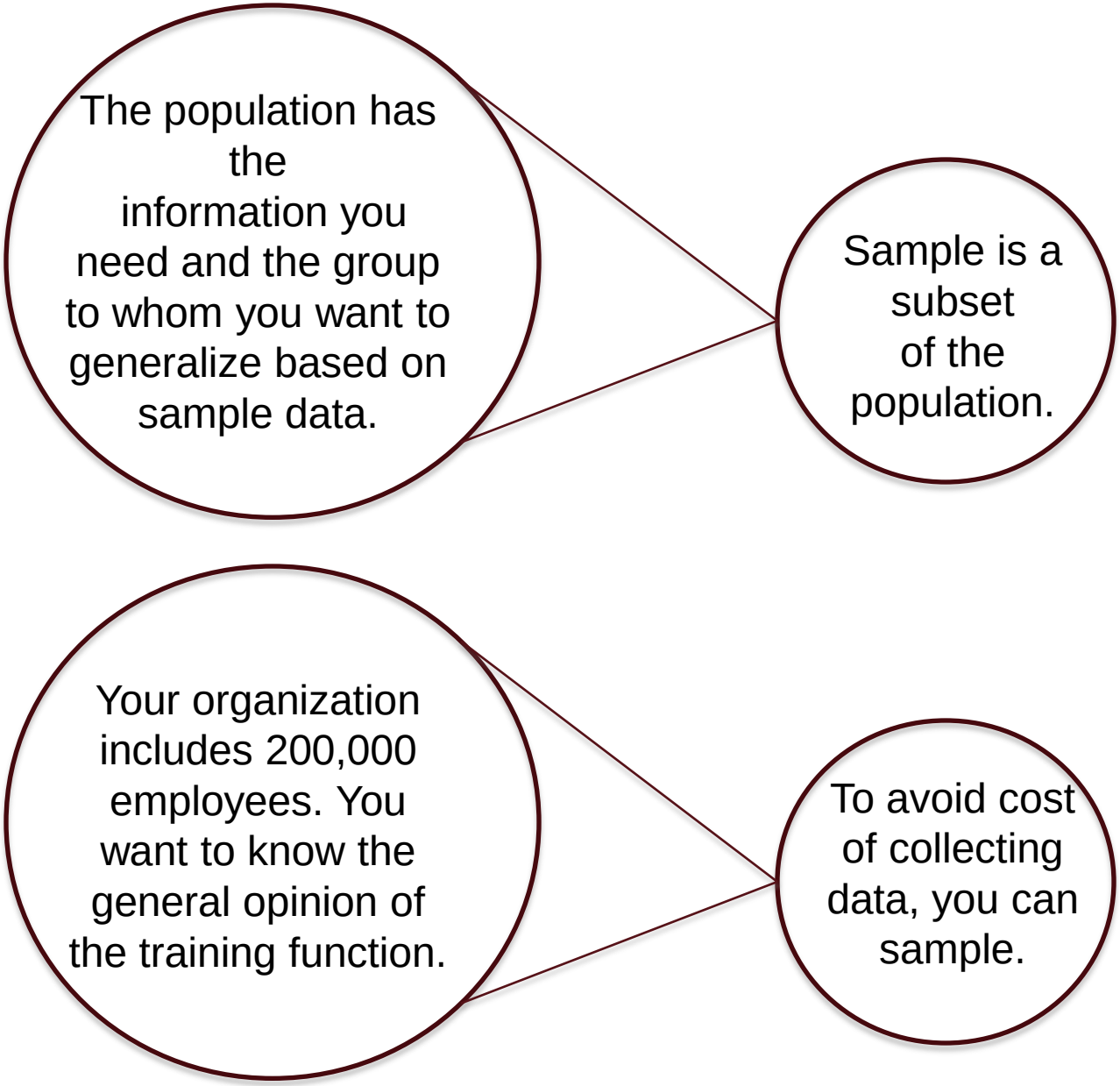

Checklist for Complete Coverage
❑Get clear on purpose of survey
❑Identify target audience
❑Consider audience
○ Location
○ Access to technology
○ Roles
❑ Use multiple channels of delivery

Managing Sampling Error

Sampling is a process that allows us to collect data about a population without investing in data collection for the entire population.

Sampling is an efficiency tool.


The population has the information you need and the group to whom you want to generalize based on sample data.
Sample is a subset of the population.


The population has the information you need and the group to whom you want to generalize based on sample data.
Sample is a subset of the population.
Your organization includes 200,000 employees. You want to know the general opinion of the training function.
To avoid cost of collecting data, you can sample.

Sampling is useful if you want to be efficient in your data collection and make inference to a larger group.

However, sometimes it is more appropriate to conduct a census of the entire population.

Sampling Selection Methods

- Census

- Simple Random Sample
- Stratified Random sample
- Systematic Random Sample
- Simple Cluster Sample
- Multistage Sample
- Area Sampling
- Convenience Sample

Random Number Table

51772	74640	42331	29044	46621	62898	93582	04186	19640	87056
24033	23491	83587	06568	21960	21387	76105	10863	97453	90581
45939	60173	52078	25424	11645	55870	56974	37428	93507	94271
30586	02133	75797	45406	31041	86707	12973	17169	88116	42187
03585	79353	81938	82322	96799	85659	36081	50884	14070	74950

Or use www.graphpad.com

Random Number Generator GraphPad

1. Go to http://www.graphpad.com
2. Select “GraphPad QuickCalcs”
3. Select “Random Numbers”
4. Select “Continue”
5. Select “Randomly Select a Subset of Subjects”
6. Select “Continue”
7. Input the number of subjects you would like to randomly select from your population (input the number of people in your population). You can repeat for as many groups as you need.
8. The output will give you a list of random numbers selected from your population. The numbers will then be matched to the corresponding name in your sampling frame.

Sample size depends on a number of factors.

1. The size of the population.
2. The homogeneity of the population.
3. The margin of error you are willing to accept (confidence interval).
4. The desired confidence level that the results represent the population.

Formula for Calculating Sample Size

Formula 1:

$$N_s = \frac{(N_p)(p)(1-p)}{(N_p-1)(B/C)^2 + (p)(1-p)}$$

N_s = completed sample size
N_p = size of the population
p = proportion expected to choose one of two responses if dichotomous scale
B = margin or error (.03 = +/-3%)
C = z-score (95% confidence is a z-score of 1.96)

Example

Assume:

- $N_p = 800$
- $p = .5$
- $B = .03$ (+/-3%)
- $C = 1.96$

Solve for N_s: ____

Solution

$$N_s = \frac{(800)(.5)(1-.5)}{(800-1)(.03/1.96)^2 + (.5)(1-.5)}$$

$$N_s = \frac{200}{(799)(.000234) + .25}$$

$$N_s = \frac{200}{.436966}$$

$$N_s = 458$$

A Simple Formula

Formula 2:

$$Ns = \frac{1}{\text{error}^2}$$

With an acceptable margin of error of .05, your sample size would be 400.

Sample Size Calculator

- Margin of error
- Confidence level
- Population
- Response distribution (proportion responses – they suggest leaving it at 50%)

Raosoft http://www.raosoft.com/samplesize.html

Pop.	Sam.	Pop.	Sam.	Pop.	Sam.	Pop.	Sam.	Pop.	Sam.	Pop.	Sam.
10	9	90	73	230	144	480	213	1400	301	6000	361
15	14	95	76	240	147	500	217	1500	305	7000	364
20	19	100	79	250	151	550	226	1600	309	8000	366
25	23	110	85	260	155	600	234	1700	313	9000	368
30	27	120	91	270	158	650	241	1800	316	10000	369
35	32	130	97	280	162	700	248	1900	319	15000	374
40	36	140	102	290	165	750	254	2000	322	20000	376
45	40	150	108	300	168	800	259	2200	327	30000	379
50	44	160	113	320	174	850	264	2400	331	40000	380
55	48	170	118	340	180	900	269	2600	334	50000	381
60	52	180	122	360	186	950	273	2800	337	60000	381
65	55	190	127	380	191	1000	277	3000	340	70000	382
70	59	200	131	400	196	1100	284	2600	346	120000	382
75	62	210	136	420	200	1200	291	4000	350	160000	383
80	66	220	140	440	205	1300	296	4500	354	1000000	383
85	69			460	209			5000	356		

Managing Response Error

If you are not conducting a census, how many surveys should you administer given your target sample?

The formula is:

$$x = \frac{N_s}{R}$$

X = number of surveys to administer
R = estimated response rate
N_s = number of surveys in your sample

Try it

Assume:

- $N_s = 369$
- $R = .20$

Solve for x $$x = \frac{N_s}{R}$$

x = number of surveys to administer
R = estimated response rate
N_s = number of surveys in your sample

Solution

Assume:

- $N_s = 369$
- $R = .20$

Solve for x

$$x = \frac{369}{.20} = 1845$$

Strategy to Increase Response Rate

Before the survey is administered

- Present to respondents at kick-off meeting
- Explain why it's important, how long it will take, when it is due
- Send pre-notice email/letter
- Design for easy response
- Commit to confidentiality
- Offer incentives

During administration of the survey

- Send at least two reminders, one using a different delivery mode
- Show progress
- Encourage competition between groups

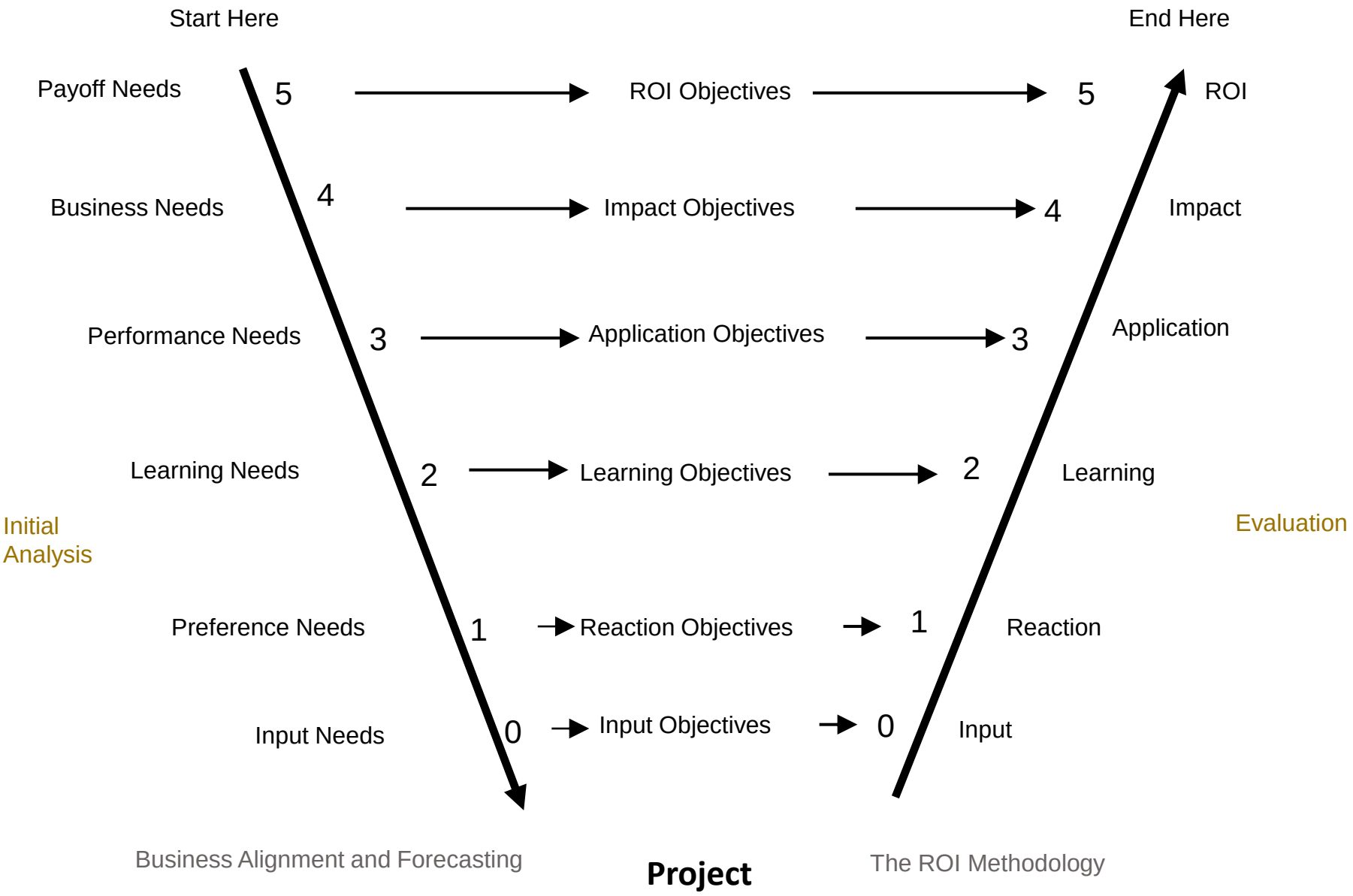
After the responses have been returned

- Send a summary of results
- Follow-up with actions taken as a result of survey

Managing Measurement Error

How do you know you are asking the right questions?

Business Alignment



How should you ask the question?

Questions should be written so that respondents

- Can answer the question.
- Understand the meaning of the question.
- Know the answer.
- Are able to answer in the terms required.
- Willing to answer the question.

Barreling vs Specificity

- When making assignments, my supervisor gives clear, achievable goals that are within my control.

Barreling vs Specificity

- When making assignments, my supervisor gives clear, achievable goals that are within my control.
- When making assignments, my supervisor gives me achievable goals.

Loose Bundling vs Anchoring

- I am interested in my students.

Loose Bundling vs Anchoring

- I am interested in my students.
- I regularly share information about my students' progress with their parents.

Jargon vs Clarity

- I would speak more freely if my co-workers didn't have such long left-hand columns.

Jargon vs Clarity

- I would speak more freely if my co-workers didn't have such long left-hand columns.
- I would speak more freely if my co-workers were more open about what they are thinking.

Loaded vs Fact

- The sales of automatic weapons should be banned in order to save human lives.

Loaded vs Fact

- The sales of automatic weapons should be banned in order to save human lives.
- The sales of automatic weapons should be banned.

Lack of Knowledge vs Knowledge

- The instructor is an expert of this field.

Lack of Knowledge vs Knowledge

- The instructor is an expert of this field.
- The instructor effectively answered all of my questions on this topic.

Complexity vs Simplicity

- What is the frequency of the overall interpersonal, informal, and formal communication between the focal group and the targeted semi-autonomous, functionally specialized groups?

Complexity vs Simplicity

- What is the frequency of the overall interpersonal, informal, and formal communication between the focal group and the targeted semi-autonomous, functionally specialized groups?
- What is the frequency of formal communication between the focal group and your group?

Social Desirability vs Realism

- I frequently belittle and talk down to my fellow employees.

Social Desirability vs Realism

- I frequently belittle and talk down to my fellow employees.
- Members of my work group show respect by eliciting each other's opinions.

Common Issues with Scales

- Variance
  - Number of choices
- Discrimination
  - Difference in choices
- Accuracy
  - Accuracy of labels
- Symmetry
  - Balance
- Direction
  - End of the scale closest to the stem

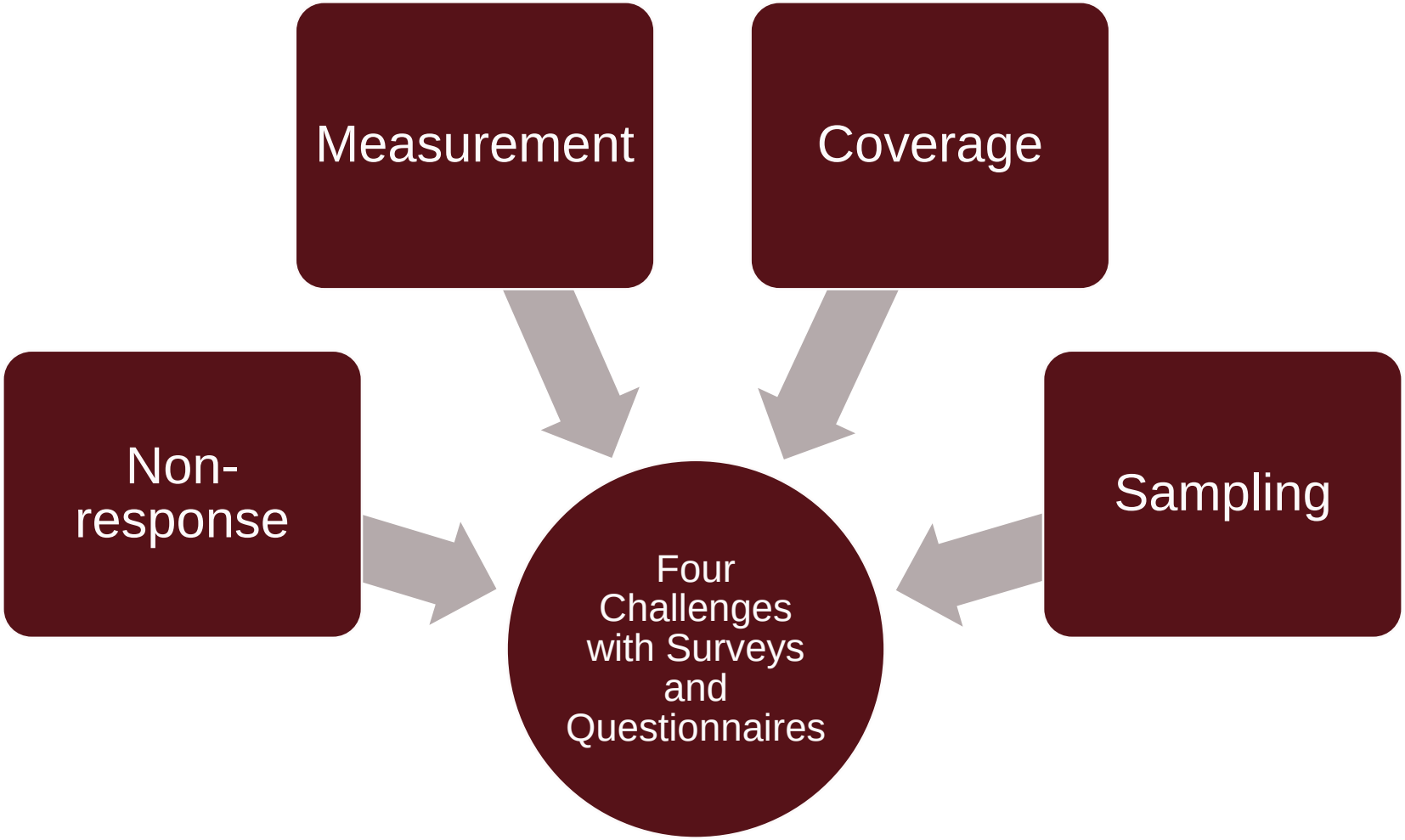
Three-Point Likert Rating Scales		
Very Important	Fairly Important	Not Important
Above Average	Average	Below Average
Strongly Agree	Agree	Disagree

Four-Point Likert Rating Scales			
Excellent	Good	Fair	Poor
Many	Some	Very Few	None
Highest	Next to Highest	Next to Lowest	Lowest

Five-Point Likert Rating Scales				
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Strongly Disapprove	Disapprove	Don’t Know	Somewhat Approve	Strongly Approve
Very High	A Little Above Average	Average	A Little Below Average	Very Low
Practically None	A Few	About Half	Many	Practically All

Direction is most important in face-to-face interviews and least important in anonymous, self-administered questionnaires. It is important when the question asked is potentially embarrassing to respondent.

	Very Much	Much	A Fair Amount	A Little	Not at all
I am afraid to question my client's opinion	☐	☐	☐	☐	☐
I frequently feel anxious before speaking in front of large groups.	☐	☐	☐	☐	☐
I am uncomfortable coaching my employees.	☐	☐	☐	☐	☐



Source: Dillman, D. A., Smyth, J. D., and Christian, L. M. (2009). *Internet, Mail, and Mixed-Model Surveys: The Tailored Design Method* 3rd edition. Hoboken, NJ: John Wiley.

Resources

- Dillman, D. A., Smyth, J. D., and Christian, L. M. (2009). *Internet, Mail, and Mixed-Model Surveys: The Tailored Design Method* 3rd edition. Hoboken, NJ: John Wiley.
- Fink, A. G. (2002) *The Survey Kit*. Thousand Oaks: Sage Publications
- Phillips, P. P. and Phillips, J. J. (2013) *Survey Basics*. Alexandria: ASTD.
- Phillips, P. P. and Phillips, J. J. (2014) *Real World Evaluation*. Alexandria: ASTD.
- Trochim, W. K. Research Methods Knowledge Base www.socialresearchmethods. Net
- Thompson, S. K. (2012) Sampling Third edition. San Hoboken: John Wiley & Sons

Survey Basics
The Four Challenges

Patti Phillips Ph.D.
patti@roiinstitute.net

ASTD
WORKPLACE LEARNING & PERFORMANCE

ROI INSTITUTE™