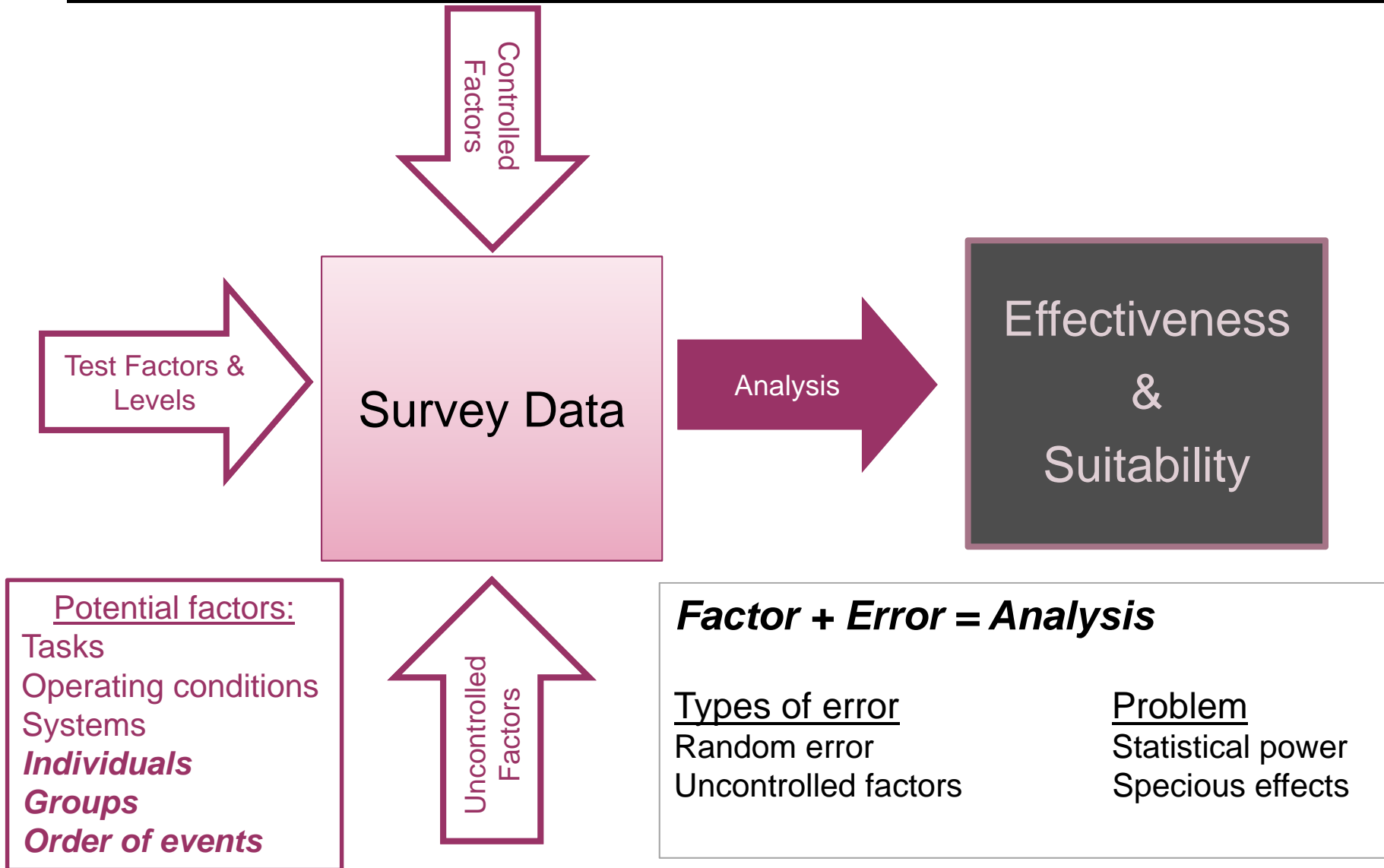

Administration & Analysis of Surveys



- **Considerations when Administering Surveys**
- **Statistical Analysis of Surveys**
- **Examples of Reporting Survey Data**

Accuracy of Survey Data is Affected by Many Factors



IDA Administration Procedures = Controlled Factor

- **Surveys = Measure of thoughts**
 - Thoughts altered by context (time, place, abilities, etc...)
 - Feelings fade quickly
- **Ensure consistency**
 - Same time
 - Same environment
 - Same instructions
 - Same administrator
- **Ensure participants represent population**
 - Range of skills & abilities in test; NOT just best individuals
- **Ensure participant's opinion & not others'**
 - Little interaction between respondents & test team (contractor, PM, etc...)
 - Administrator presents as if no opinion on survey

IDA Considerations for Data Exploration and Analysis

- **Data collected from surveys are bound by the same principles as data collected through other means**
 - Follow best practices for analyzing data in DOE context
 - Exploratory Data Analysis (EDA)
 - » Detect anomalies
 - » Test model assumptions and maximize insights into data
 - Statistical Assumptions
 - » Regression, ANOVA, Chi-Square, etc.
 - Select the appropriate analysis or descriptive statistics for your data scenario and study goals
 - Emphasis on the relationship between demographic variables and survey outcomes

Survey Design & Test Goal Determine Appropriate Statistic

- 1: What measurement scale?
- 2: Descriptive or inferential?
- 3: What is question being asked of data?

Survey Design

Sample & Data

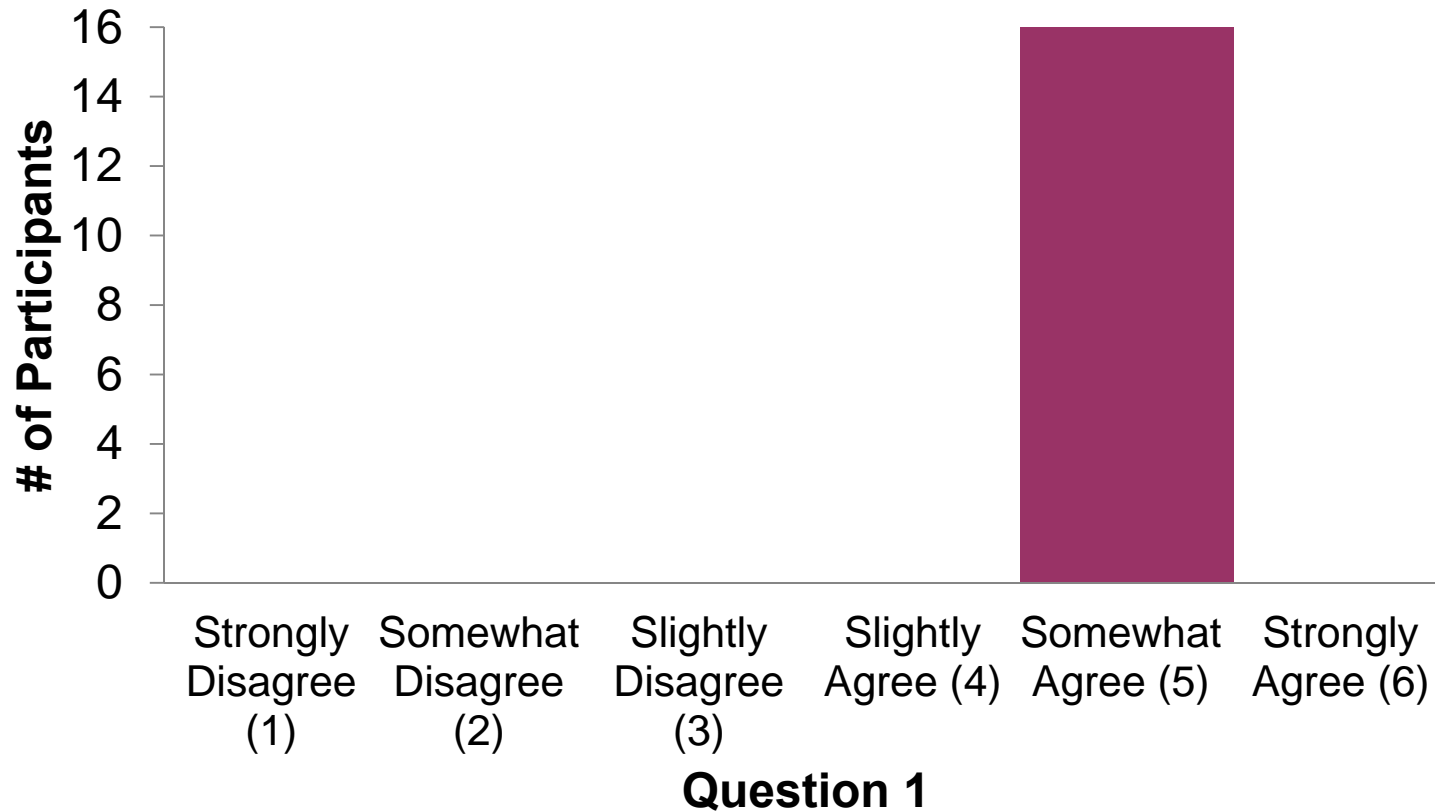
Test Goal

Measurement Scale		Descriptive Statistics	Inferential Statistics
		Describe the data collected	Infer from sample to the population
Categorical	Nominal	<ul style="list-style-type: none"> • Mode • Frequency distribution 	<ul style="list-style-type: none"> • Chi square
	Ordinal	All of the above and...	
		<ul style="list-style-type: none"> • Median 	<ul style="list-style-type: none"> • Sign test
Continuous	Interval/ Ratio	All of the above and...	
		<ul style="list-style-type: none"> • Mean • Standard deviation • Percentiles 	<ul style="list-style-type: none"> • Correlation • Regression • <i>t</i> test • ANOVA

Check the assumptions

- Inferential Analysis Could Aid Interpretation **NO**
- Normally Distributed Data **NO**

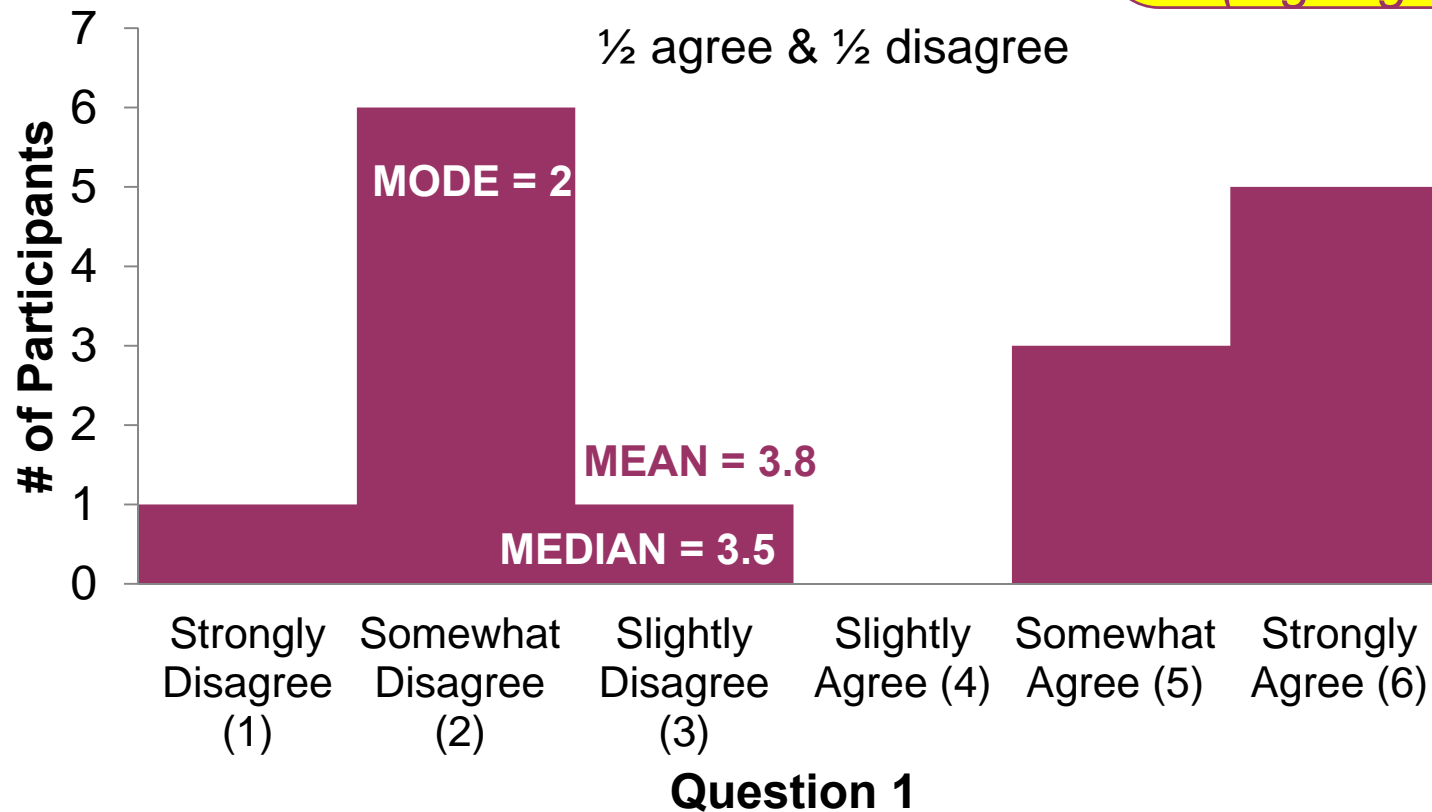
*Report descriptive
statistic/investigate*



Check the assumptions

- Inferential analysis could aid interpretation **Yes**
- Normally distributed data **NO**

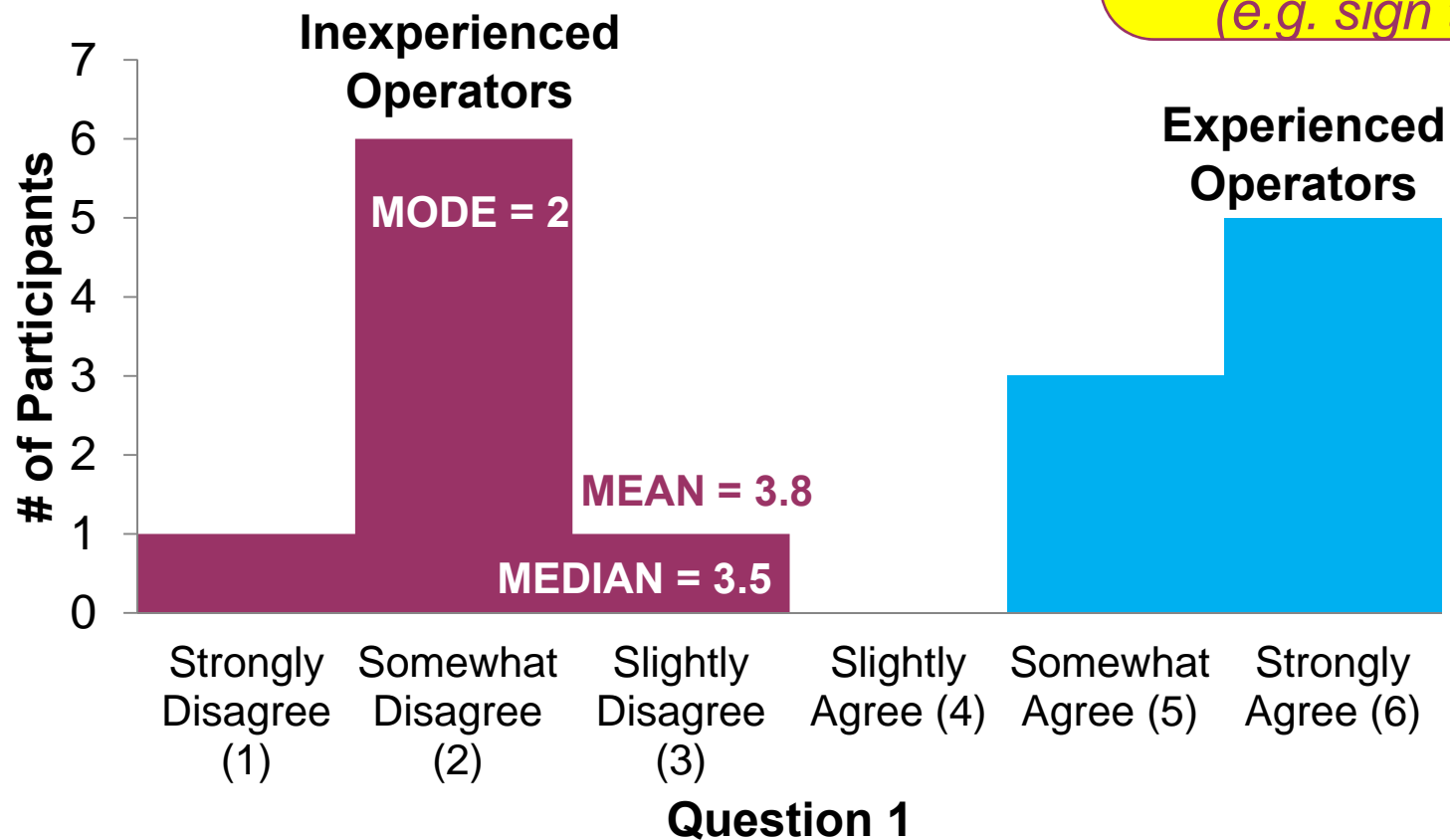
Check demographics. Non-parametric test may be appropriate (e.g. sign test)



Check the assumptions

- Inferential analysis could aid interpretation **Yes**
- Normally distributed data **NO**

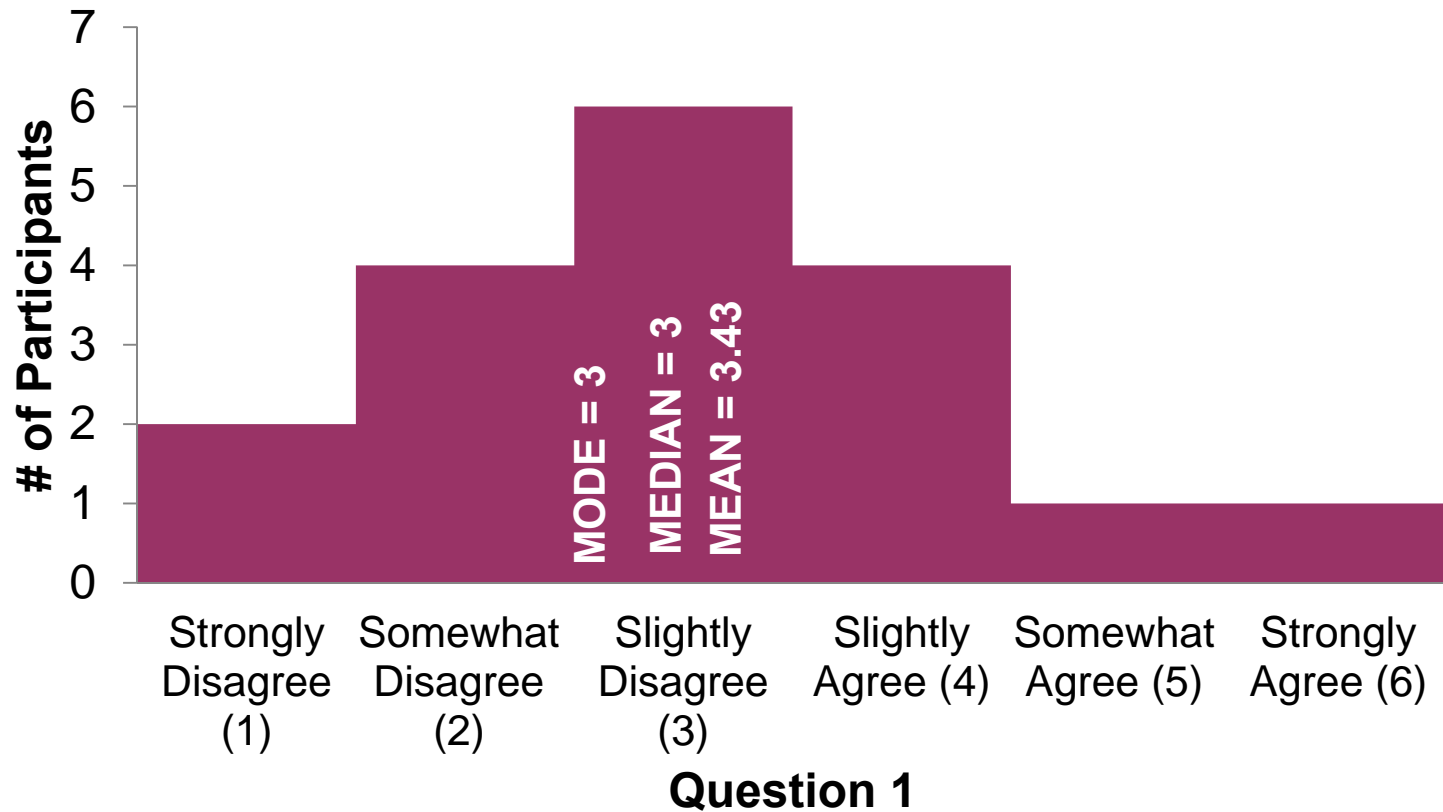
Check demographics. Non-parametric test may be appropriate (e.g. sign test)



Check the assumptions

- Inferential analysis could aid interpretation **Yes**
- Normally distributed data **Yes**

Common Inferential Statistics may be appropriate (e.g. regression)



Survey Design

Data & Sample

Test Goal

Step 1: What measurement scale?

Step 2: Descriptive or inferential?

Step 3: What is question being asked of data?

Mode	What is the Most Common Response?	Nominal	Descriptive
Median	What is the 50 th Percentile Response?	Ordinal	Descriptive
Mean	What is the Average Response?	Interval	Descriptive
Std. Deviation	How Variable is the Data?	Interval	Descriptive
Chi Square	Is Frequency Distribution Different from Expected?	Nominal	Inferential
Sign Test	Is RV Different from a Threshold/Standard?	Ordinal	Inferential
Correlation	Are 2 Factors Correlated?	Interval	Inferential
Regression	Can a RV Be Predicted from Other Factors?	Interval	Inferential
t test	Is RV Different from a Threshold/Standard?	Interval	Inferential
ANOVA	Is RV Different Under Different Levels of Factor(s)?	Interval	Inferential



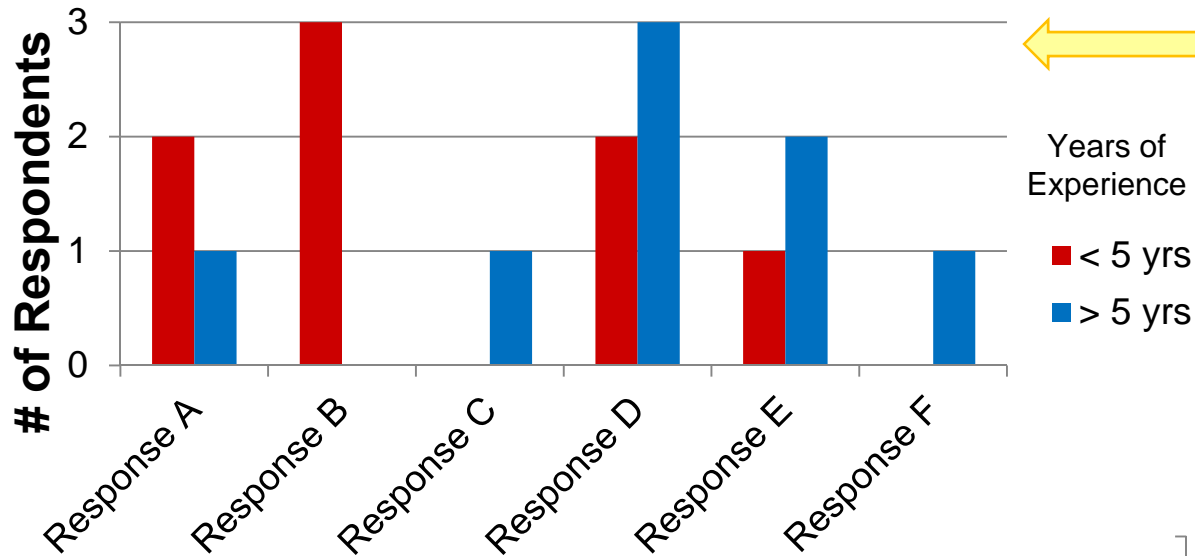
GBS Survey Results

- **Survey ratings are generally positive, but technical orders were insufficient to configure the legacy receive suite for the GBS DECC broadcast, requiring GBSOC help**
 - 7-point scale used with rating levels 1-3 defined as unacceptable and 4-7 as sufficient or better

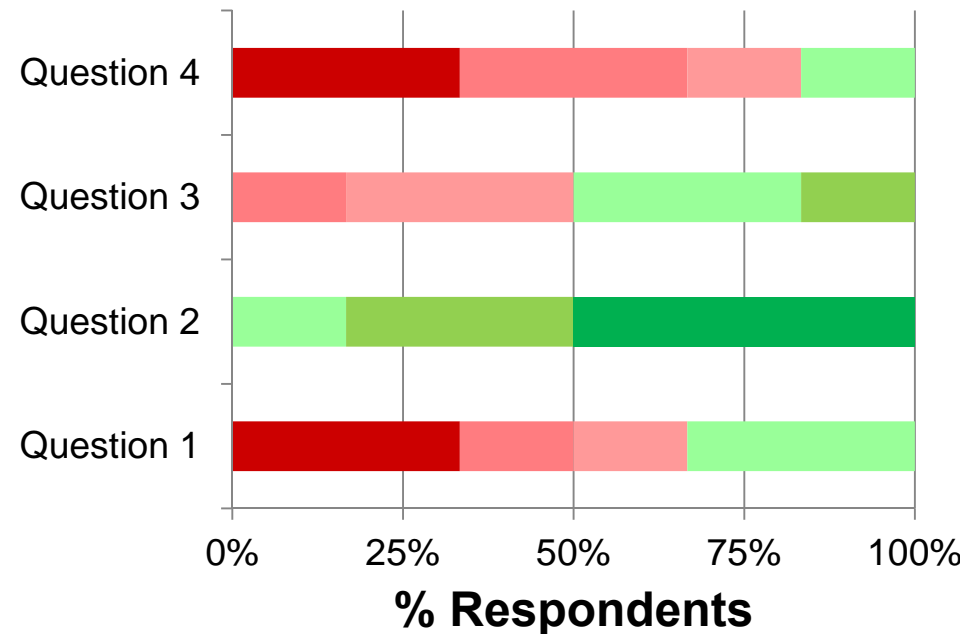
Rating Topic	Number of Respondents	Mode	Number of Answers ≤ 3	
Receive suite operator ratings of overall acceptability of GBS DECC products	4	5	0	
Receive Suite operator ratings of the overall acceptability of the process to develop a GMR	6	7	0	
GBSOC operator ratings of the GBS DECC for planning broadcast missions	12	6	0	
Receive suite operator ratings of the GBSOC Help Desk function	18	6	1	
GBSOC operator ratings of GBS DECC safety	16	7	0	
GBSOC and receive suite operator ratings of GBS DECC documentation	18	6	1	
GBSOC operator ratings of training	14	6	0	
GBSOC operator ratings of human factors topics	13	6	0	
GBSOC operator ratings of the overall acceptability of the GBS DECC planning software	16	6	0	

Acronyms this slide: Defense Enterprise Computing Center (DECC); Global Broadcast Service (GBS); GBS Operations Center (GBSOC)

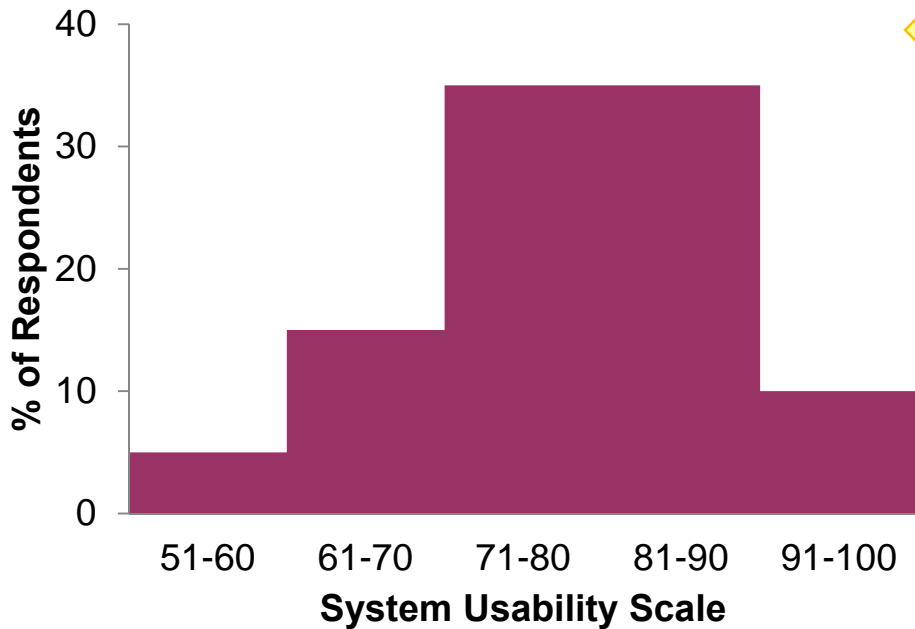
Frequency Distributions for Categorical Survey Data



Stacked Bar Chart:
Presents the *Cumulative Frequency* ("running total") of responses. (ordinal data)

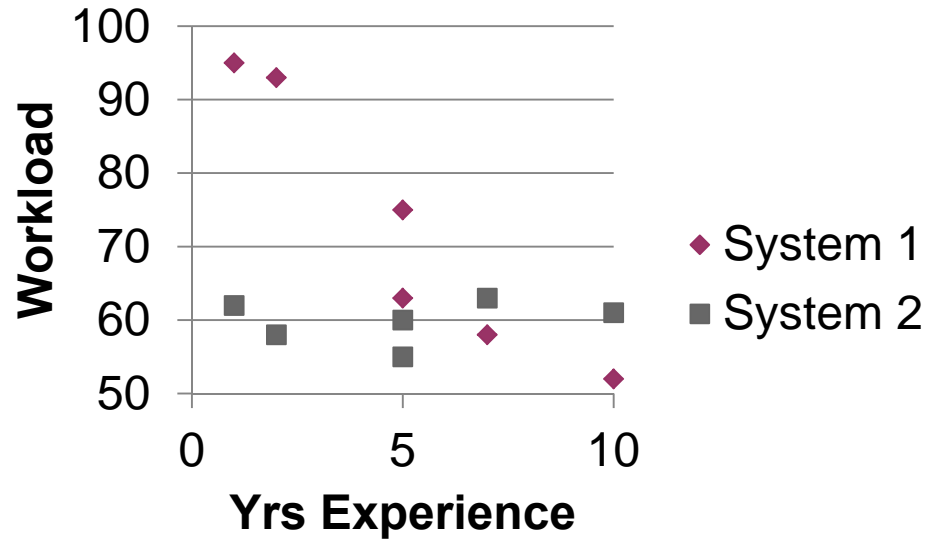


Frequency Distributions for Continuous Survey Data

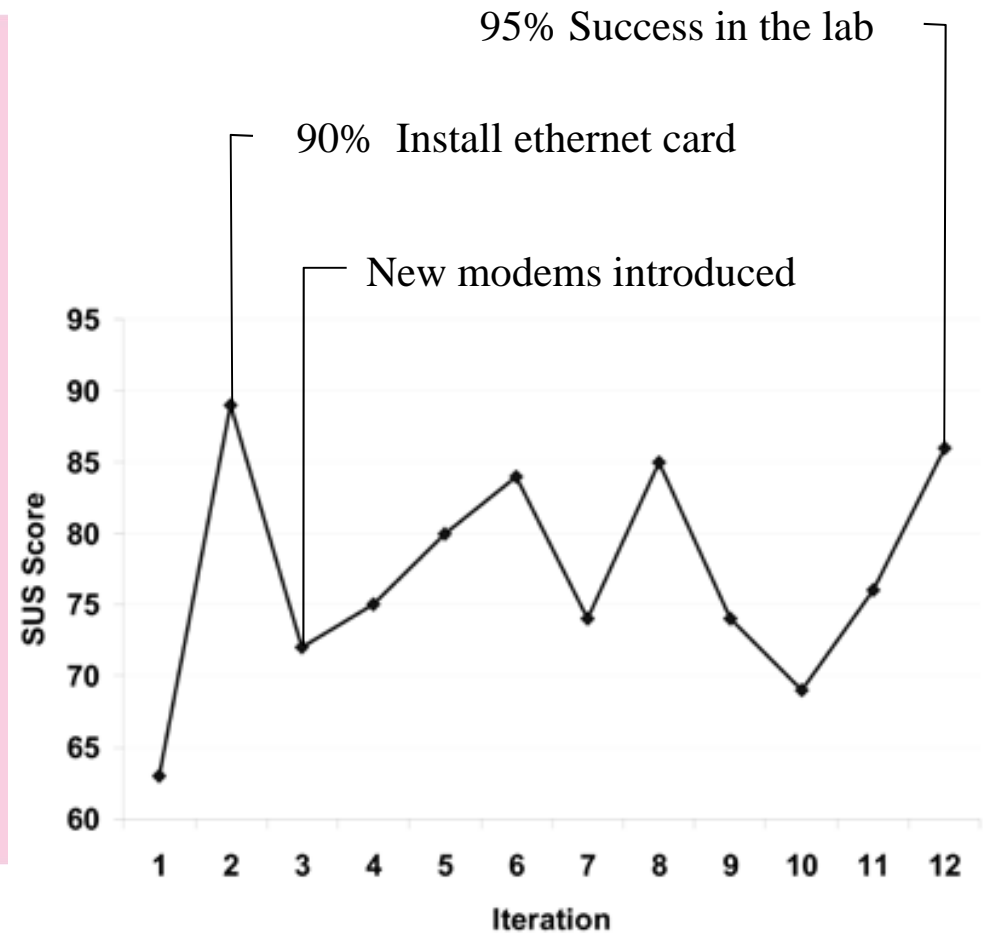
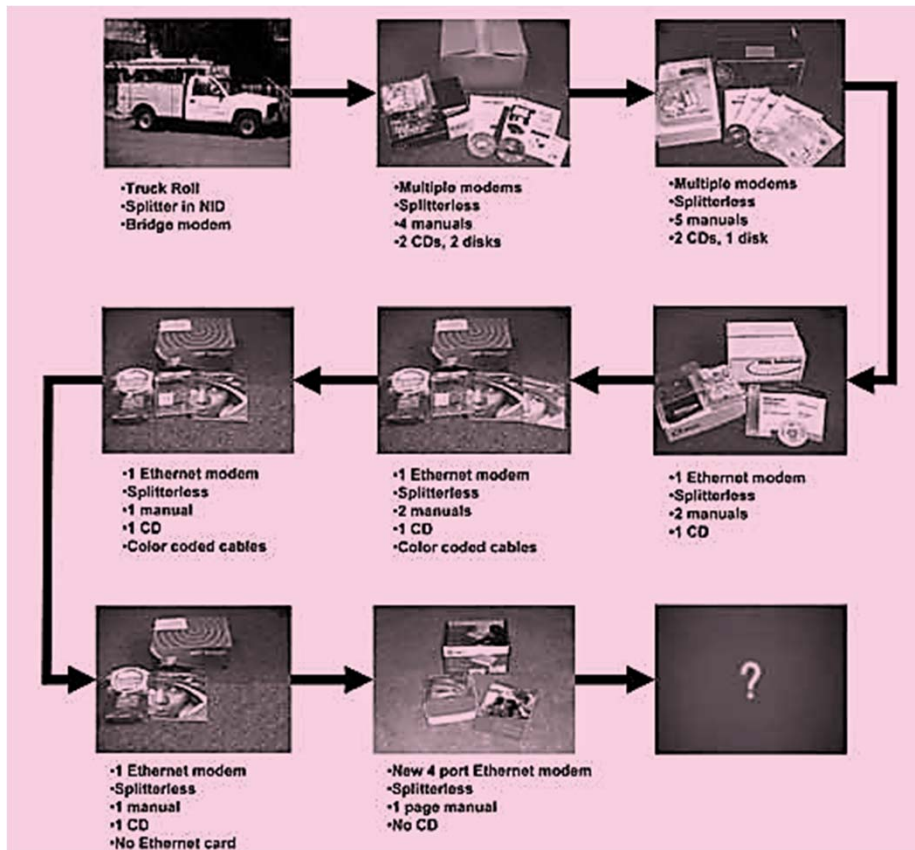


Histogram:
Presents the frequency distribution for intervals of responses.

Scatter Plot:
Presents the relationship between a continuous response variable & a continuous factor

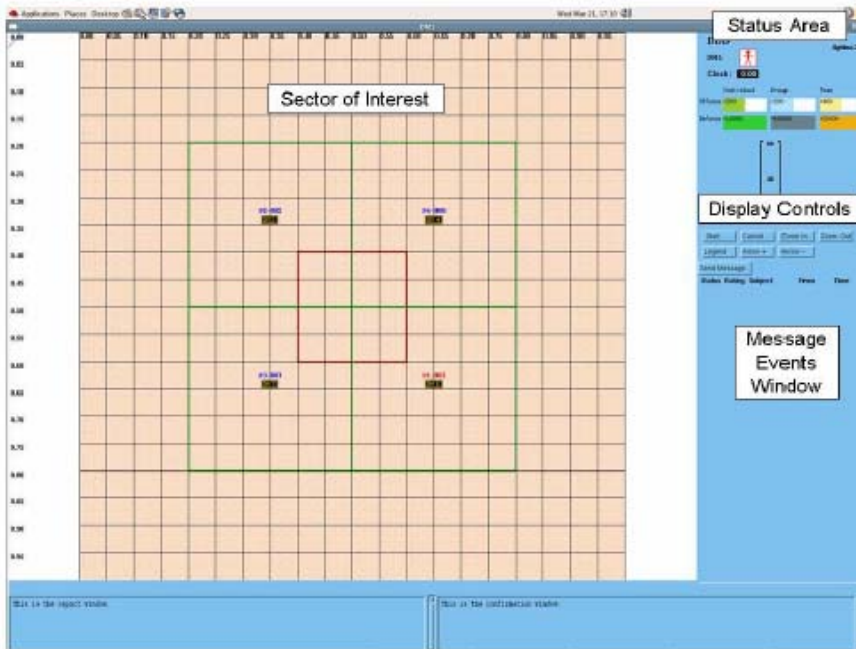


Using SUS to compare versions: DSL self install

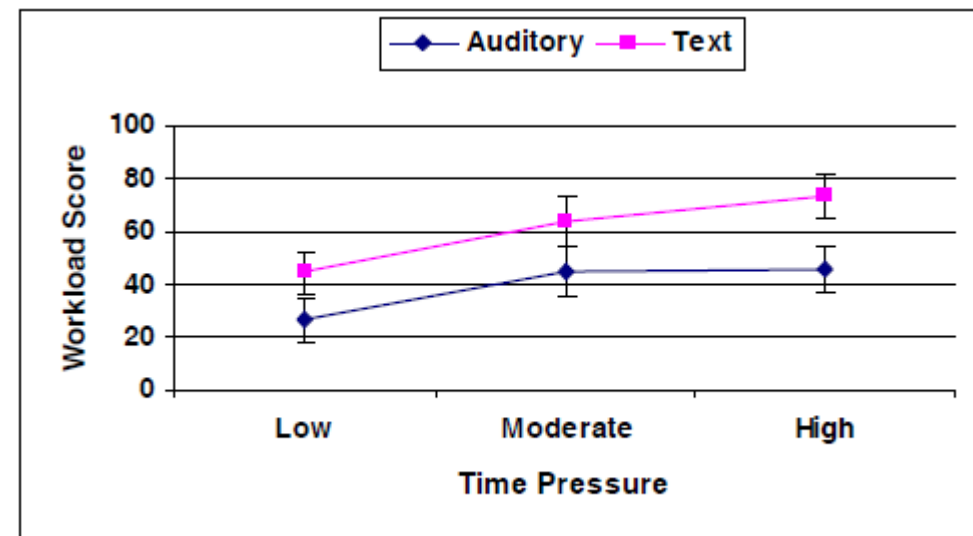
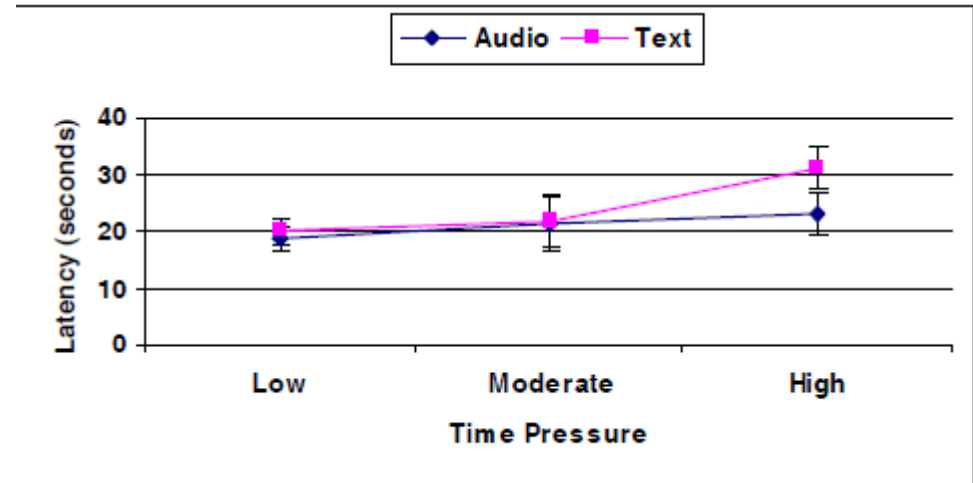


Kortum, P., Grier, R. & Sullivan, M. (2009). DSL Self-installation: From Impossibility to Ubiquity. *Interfaces*, 80, 12-14.

Using NASA TLX to compare versions: value of multi-modal system to C²



Grier, R.A., Parasuraman, R., Entin, E., Bailey, N., & Stelzer, E. (2008). A test of intra- versus inter-modality interference as a function of time pressure in a warfighting simulation. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting in New York City.*



QUESTIONS?