Data Fusion

Enhancing Survey Sampling and Market Research Applications

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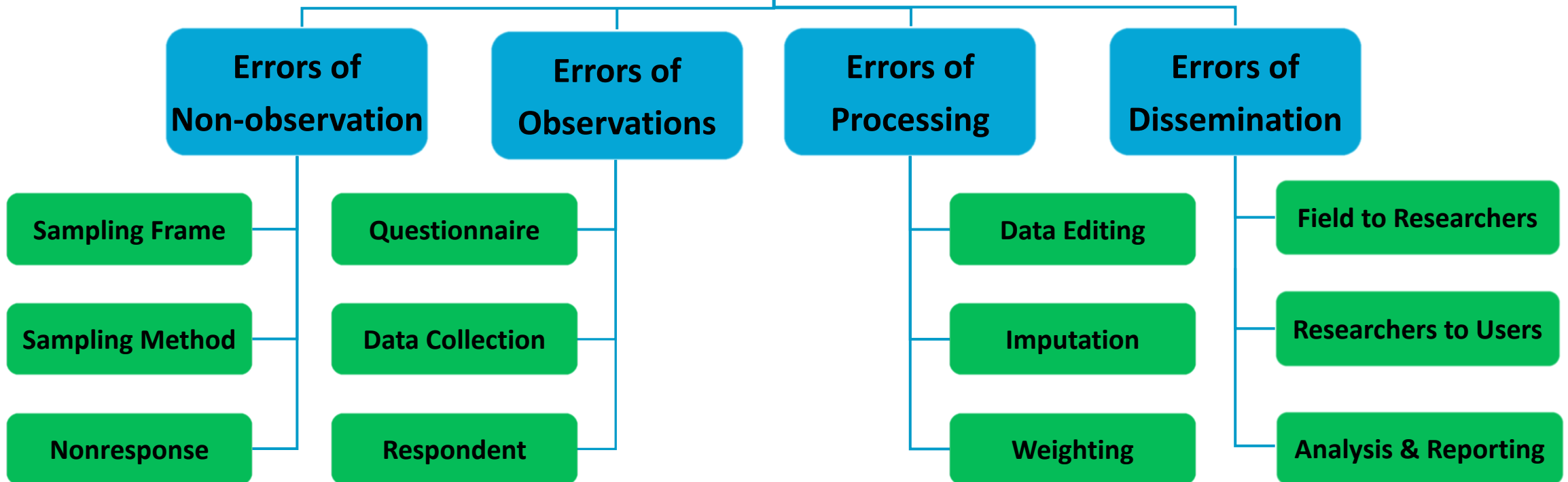
Marketing Systems Group

PRESENTATION LAYOUT

➢ **Big Picture**

➢ **Address-Based Sampling Frame**

➢ **Available Ancillary Data**

➢ **Applications**

➢ **Takeaways**

Big Picture

```
                        ┌─────────────────┐
                        │  Total Survey   │
                        │     Error       │
                        └─────────────────┘
```

Errors of Non-observation	Errors of Observations	Errors of Processing	Errors of Dissemination
Sampling Frame	Questionnaire	Data Editing	Field to Researchers
Sampling Method	Data Collection	Imputation	Researchers to Users
Nonresponse	Respondent	Weighting	Analysis & Reporting

ADDRESS-BASED SAMPLING FRAME

MSG-Enhanced ABS Frame	
Address Type	**Delivery Units**
Total Address	149,249,675
City Style	133,491,398
Drop Units (From 689,532 Drop Points)	1,903,690
Drop Unit Augments (MSG)	39,842
Seasonal	782,477
Educational	99,962
Vacant	3,044,307
Throwback	186,522
Augments (MSG)	71,078
Rural Route/Highway Contract	38,813
PO Box	15,719,464
PO Box (Traditional)	14,299,960
PO Box (OWGM)	1,418,552

APPENDING ANCILLARY DATA TO ADDRESSES

➢ **The Census and USPS use different geographic units:**

  ▪ USPS is ZIP-based and change frequently
  ▪ Census relies on blocks and change infrequently
  ▪ ZIP Codes and block groups are incongruent

➢ **Geocoding all ~150M delivery points using:**

  ▪ Census TIGERLine streets
  ▪ TomTom geocoded streets & ZIP+4 centroids
  ▪ Other commercial sources

➢ **Unique Lat/Long for each address allows:**

  ▪ Matching each address to its CBG
  ▪ Merging in the ACS estimates
  ▪ Other Census projections

➢ **Various ancillary data from commercial sources:**

  ▪ Household level
  ▪ Person level
  ▪ Behavioral/attitudinal segments

EXAMPLES OF COMMERCIAL DATA SOURCES

➢ **Acxiom**

➢ **Experian**

➢ **Neustar**

➢ **Data Axel (*info*USA)**

➢ **Aristotle**

➢ **US Data**

➢ **Claritas**

Available Ancillary Data (Household)

➢ **Homeownership Status**

➢ **Dwelling Type**

➢ **Household Size**

➢ **Length of Residence**

➢ **Estimated Income**

➢ **Presence of Children**

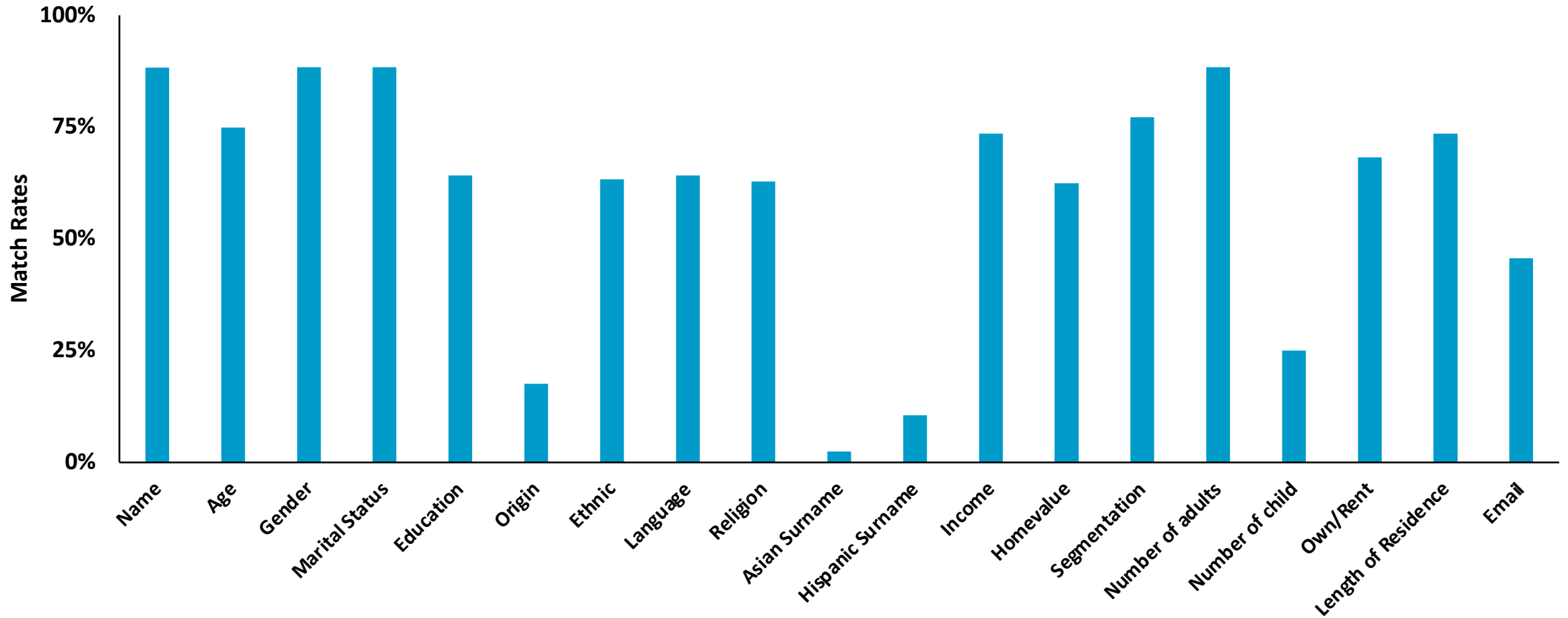➢ **Listed Telephone Numbers**

➢ **Behavioral & Attitudinal Data**

Available Ancillary Data (Person)

- First & Last Name

- Telephone Numbers

- Email Address

- Surname Ethnicity

- Gender

- Age

- Education

- Race-Ethnicity

- Marital Status

- Occupation Group

- Country Origin

- Language

- Religion

- Political Affiliation

Estimated Match Rates by Characteristic

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CLARITAS PRIZM SEGMENTS

1. **Upper Crust:** Wealthy Mature without Kids
2. **Networked Neighbors:** Wealthy Middle Age Mostly with Kids
3. **Movers & Shakers:** Wealthy Older Mostly without Kids
4. **Young Digerati:** Wealthy Younger Mostly with Kids
5. **Country Squires:** Wealthy Middle Age Family Mix
6. **Winner's Circle:** Wealthy Middle Age Mostly with Kids
7. **Money & Brains:** Wealthy Older Mostly without Kids
8. **Gray Power:** Wealthy Mature without Kids
9. **Big Fish, Small Pond:** Upscale Mature without Kids
10. **Executive Suites:** Upscale Middle Age Mostly with Kids
11. **Fast-Track Families:** Upscale Middle Age Family Mix
12. **Cruisin' to Retirement:** Upscale Older Mostly without Kids
13. **Upward Bound:** Upscale Middle Age Family Mix
14. **Kids & Cul-de-Sacs:** Upscale Younger Family Mix
15. **New Homesteaders:** Upscale Middle Age Mostly with Kids
16. **Beltway Boomers:** Upscale Middle Age Mostly without Kids
17. **Urban Elders:** Midscale Older Mostly without Kids
18. **Mayberry-ville:** Upscale Older Mostly without Kids
19. **American Dreams:** Upper Midscale Middle Age Mostly without Kids
20. **Empty Nests:** Upper Midscale Mature without Kids
21. **The Cosmopolitans:** Upscale Younger Family Mix
22. **Middleburg Managers:** Upscale Younger Family Mix
23. **Township Travelers:** Upper Midscale Middle Age Family Mix
24. **Pickup Patriarchs:** Upscale Older Mostly without Kids
25. **Up-and-Comers:** Upper Midscale Younger Family Mix
26. **Home Sweet Home:** Upper Midscale Older without Kids
27. **Big Sky Families:** Upscale Middle Age Mostly with Kids
28. **Country Casuals:** Upper Midscale Older Mostly without Kids
29. **White Picket Fences:** Midscale Middle Age Family Mix
30. **Pools & Patios:** Upper Midscale Younger Mostly with Kids
31. **Connected Bohemians:** Midscale Younger Mostly without Kids
32. **Traditional Times:** Upper Midscale Mature without Kids
33. **Second City Startups:** Upper Midscale Younger Mostly with Kids
34. **Young & Influential:** Upper Midscale Younger Mostly without Kids

Claritas PRIZM Segments

35. **Urban Achievers:** Midscale Middle Age Mostly without Kids
36. **Toolbelt Traditionalists:** Upper Midscale Older Mostly without Kids
37. **Bright Lights, Li'l City:** Midscale Older Mostly without Kids
38. **Hometown Retired:** Upper Midscale Younger Family Mix
39. **Kid Country, USA:** Midscale Younger Mostly with Kids
40. **Aspiring A-Listers:** Lower Midscale Older Mostly without Kids
41. **Domestic Duos:** Lower Midscale Mature without Kids
42. **Multi-Culti Mosaic:** Midscale Middle Age Family Mix
43. **City Roots:** Upscale Younger Family Mix
44. **Country Strong:** Lower Midscale Middle Age Family Mix
45. **Urban Modern Mix:** Lower Midscale Older Mostly without Kids
46. **Heartlanders:** Midscale Middle Age Mostly without Kids
47. **Striving Selfies:** Downscale Middle Age Mostly without Kids
48. **Generation Web:** Low Income Middle Age Mostly without Kids
49. **American Classics:** Lower Midscale Mature without Kids
50. **Metro Grads:** Lower Midscale Middle Age Mostly without Kids
51. **Campers & Camo:** Downscale Middle Age Family Mix

52. **Simple Pleasures:** Lower Midscale Mature without Kids
53. **Lo-Tech Singles:** Downscale Mature Mostly without Kids
54. **Struggling Singles:** Low Income Middle Age Mostly without Kids
55. **Red, White & Blue:** Low Income Middle Age Mostly without Kids
56. **Multi-Culti Families:** Midscale Middle Age Family Mix
57. **Back Country Folks:** Downscale Older Mostly without Kids
58. **Golden Ponds:** Downscale Older without Kids
59. **New Melting Pot:** Lower Midscale Middle Age Family Mix
60. **Small-Town Collegiates:** Downscale Middle Age Family Mix
61. **Second City Generations:** Downscale Mature without Kids
62. **Crossroad Villagers:** Low Income Middle Age Family Mix
63. **Low-Rise Living:** Lower Midscale Middle Age Mostly without Kids
64. **Family Thrifts:** Low Income Middle Age Mostly without Kids
65. **Young & Rustic:** Low Income Middle Age Mostly without Kids
66. **New Beginnings:** Low Income Middle Age Mostly without Kids
67. **Park Bench Seniors:** Downscale Mature without Kids
68. **Bedrock America:** Low Income Middle Age Mostly without Kids

Neustar Lifestyle Segments (Affluent)

1. City Middle-aged Homeowners with Children
2. City Middle-aged Homeowners without Children
3. City Middle-aged Renters
4. City Middle-aged Renters with Children
5. City Older Homeowners
6. City Older Homeowners without Children
7. City Younger Renters
8. Rural Middle-aged Homeowners with Children
9. Rural Middle-aged Homeowners without Children
10. Rural Middle-aged Homeowners without Children
11. Rural Older
12. Rural Older Homeowners with Children
13. Rural Younger Homeowners with Children
14. Suburban Middle-aged

15. Suburban Middle-aged Homeowners with Children
16. Suburban Middle-aged Homeowners with Children
17. Suburban Middle-aged Homeowners with Children
18. Suburban Middle-aged Homeowners with Children
19. Suburban Middle-aged Homeowners without Children
20. Suburban Middle-aged Homeowners without Children
21. Suburban Middle-aged Renters with Children
22. Suburban Older Homeowners without Children
23. Suburban Retired Homeowners
24. Suburban Younger Homeowners with Children
25. Urban Middle-aged
26. Urban Middle-aged without Children
27. Urban-Core Middle-aged with Children
28. Urban-Core Middle-aged Renters

Neustar Lifestyle Segments (High Income)

29. City Middle-Aged Homeowners with Children
30. City Middle-Aged Homeowners with Children
31. City Middle-Aged Homeowners without Children
32. City Older Homeowners without Children
33. City Retired without Children
34. City Retired Homeowners without Children
35. City Younger Homeowners with Children
36. City Younger Homeowners with Children
37. City Younger Homeowners without Children
38. City Younger Renters with Children
39. Rural Middle-Aged Homeowners with Children
40. Rural Middle-Aged Homeowners with Children
41. Rural Middle-Aged Homeowners with Children
42. Rural Middle-Aged Homeowners without Children
43. Rural Older Homeowners without Children
44. Rural Older Homeowners without Children
45. Rural Older Homeowners without Children
46. Rural Retired Homeowners

47. Rural Retired Homeowners without Children
48. Rural Younger Homeowners with Children
49. Suburban Middle-Aged Homeowners with Children
50. Suburban Middle-Aged Homeowners with Children
51. Suburban Middle-Aged Homeowners with Children
52. Suburban Middle-Aged Homeowners with Children
53. Suburban Middle-Aged Homeowners with Children
54. Suburban Middle-Aged Homeowners with Children
55. Suburban Middle-Aged Homeowners without Children
56. Suburban Middle-Aged Homeowners without Children
57. Suburban Middle-Aged Homeowners without Children
58. Suburban Middle-Aged Homeowners without Children
59. Suburban Middle-Aged Renters with Children
60. Suburban Middle-Aged Renters without Children
61. Suburban Older Homeowners without Children
62. Suburban Older Homeowners without Children
63. Suburban Older Renters without Children
64. Suburban Retired without Children

65. Suburban Retired Homeowners without Children
66. Suburban Retired Homeowners without Children
67. Suburban Retired Homeowners without Children
68. Suburban Younger
69. Suburban Younger
70. Suburban Younger Homeowners with Children
71. Suburban Younger Homeowners with Children
72. Suburban Younger Homeowners with Children
73. Suburban Younger Renters with Children
74. Suburban Younger Renters without Children
75. Urban Middle-Aged Homeowners
76. Urban Middle-Aged Renters with Children
77. Urban Older with Children
78. Urban Older Homeowners
79. Urban Younger
80. Urban Younger Renters with Children
81. Urban-Core Middle-Aged with Children

NEUSTAR LIFESTYLE SEGMENTS (MIDDLE INCOME)

82. City Middle-Aged Homeowners with Children
83. City Middle-Aged Homeowners without Children
84. City Older Homeowners with Children
85. City Older Homeowners without Children
86. City Older Renters
87. City Retired Homeowners
88. City Retired Homeowners without Children
89. City Retired Homeowners without Children
90. City Younger Renters
91. City Younger Renters with Children
92. City Younger Renters without Children
93. Rural Middle-Aged Homeowners with Children
94. Rural Middle-Aged Homeowners with Children
95. Rural Middle-Aged Homeowners without Children
96. Rural Middle-Aged Homeowners without Children
97. Rural Middle-Aged Renters with Children
98. Rural Older Homeowners

99. Rural Older Homeowners with Children
100. Rural Older Homeowners without Children
101. Rural Older Homeowners without Children
102. Rural Retired Homeowners without Children
103. Rural Retired Homeowners without Children
104. Rural Younger Homeowners with Children
105. Rural Younger Renters with Children
106. Suburban Middle-Aged with Children
107. Suburban Middle-Aged Homeowners without Children
108. Suburban Middle-Aged Renters with Children
109. Suburban Older Homeowners with Children
110. Suburban Older Homeowners without Children
111. Suburban Older Renters with Children
112. Suburban Older Renters without Children
113. Suburban Retired Homeowners without Children
114. Suburban Retired Homeowners without Children
115. Suburban Retired Homeowners without Children

116. Suburban Retired Homeowners without Children
117. Suburban Younger Homeowners with Children
118. Suburban Younger Homeowners with Children
119. Suburban Younger Homeowners with Children
120. Suburban Younger Renters with Children
121. Suburban Younger Renters with Children
122. Urban Middle-Aged Homeowners without Children
123. Urban Middle-Aged Homeowners without Children
124. Urban Middle-Aged Renters
125. Urban Older Homeowners without Children
126. Urban Older Renters without Children
127. Urban Younger Renters with Children
128. Urban Younger Renters with Children
129. Urban Younger Renters with Children
130. Urban-Core Retired without Children

NEUSTAR LIFESTYLE SEGMENTS (MODERATE INCOME)

131. **City Middle Aged Homeowners Without Children**

132. **City Middle Aged Renters**

133. **City Younger Homeowners With Children**

134. **City Younger Renters Without Children**

135. **Rural Older Renters Without Children**

136. **Rural Younger Renters Without Children**

137. **Suburban Middle-Aged Homeowners With Children**

138. **Suburban Middle-Aged Renters With Children**

139. **Suburban Younger Homeowners With Children**

140. **Suburban Younger Renters**

141. **Suburban Younger Renters**

142. **Urban Middle-Aged Renters**

143. **Urban Younger Renters**

144. **Urban Younger Renters With Children**

145. **Urban-Core Middle Aged Renters With Children**

Neustar Lifestyle Segments (Low Income)

146. City Older Homeowners without Children
147. City Older Renters
148. City Older Renters without Children
149. City Retired Homeowners without Children
150. City Younger Renters with Children
151. Rural Middle-Aged Homeowners with Children
152. Rural Older Homeowners without Children
153. Rural Retired Homeowners without Children
154. Rural Retired Homeowners without Children
155. Rural Younger Renters with Children
156. Suburban Middle-Aged Renters without Children
157. Suburban Older Homeowners without Children
158. Suburban Older Renters without Children
159. Suburban Retired Homeowners without Children

160. Suburban Retired Renters without Children
161. Suburban Retired Renters without Children
162. Suburban Younger Renters with Children
163. Suburban Younger Renters without Children
164. Urban Middle-Aged Renters with Children
165. Urban Middle-Aged Renters without Children
166. Urban Older Homeowners with Children
167. Urban Older Renters
168. Urban Retired Homeowners without Children
169. Urban Younger Renters
170. Urban Younger Renters with Children
171. Urban-Core Middle Aged Renters with Children
172. Urban-Core Older Renters

OTHER COMMERCIAL POPULATION PROJECTIONS (CBG)

1. **Base Counts**
   a. Population
   b. Households
   c. Housing Units
   d. Vacant Housing Units
   e. Families
   f. Group Quarters Population
   g. Percent Change 2010 to Current Year
2. **Population by Sex, Age, and Race-Ethnicity**
3. **Population by Ancestry**
4. **Hispanic Population by Specific Origin**
5. **Population by Language Spoken at Home**
6. **Group Quarters Population by Type**
7. **Occupied Housing Units by Tenure and Age**
8. **Households by Ethnicity and Race**
9. **Homeownership Status by Unit Value**
10. **Households by Number of People in Household**
11. **Households by Presence of People Under 18**
12. **Housing Units by Year Structure Built**
13. **Housing Units by Units in Structure**
14. **Occupied Housing Units by Year Moved In**
15. **Occupied Housing Units by Vehicles Available**
16. **Household Income**
17. **Householder Age by Household Income**
18. **Households by Race and Household Income**
19. **Households by Ethnicity and Household Income**
20. **Population by Ethnicity, Sex and Education**
21. **Population by Employment Status**
22. **Workers by Means of Transportation to Work**
23. **Workers by Travel Time to Work**
24. **Employed Civilian Population by Class of Worker**
25. **Employed Civilian Population by Occupation**

APPLICATIONS

➢ **Detailed Stratification:**

- Targeting rare analytical subgroups
- Oversampling of low-responding cohorts

➢ **Nonresponse Bias Analyses:**

- Identifying nonresponse patterns
- Frame counts for effective nonresponse adjustments

➢ **Analytical Enhancement:**

- More covariates for modeling
- Enrich consumer databases that are often very skimpy

➢ **Respondent-Friendly Surveys:**

- Certain questions can be answered (approximated) by available ancillary data
- Many respondents take surveys online and most use smartphones

TAKEAWAYS

➢ **It is Becoming a Naked World:**

- There are about 700,000 surveillance cameras in London (1 for every 13 people)
- Many of the internet-based interactions are tracked (worldwide)
- US 9th Circuit reaffirmed scraping web data is not a violation of the Computer and Fraud Abuse Act

➢ **Progressively Richer Data Streams for Data Compliers:**

- Collected data
- Modeled data

➢ **More Nuanced Sampling Frames Can:**

- Accommodate detailed stratifications
- Target rare subgroups
- Support nonresponse adjustments
- Provide additional covariate for analysis
- Declutter survey instruments

THANK YOU

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