

Why Consulting Firms need Mathematicians

Joint Mathematics Meetings
Mathematics Experiences in Business, Industry,
Government

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Project Teams

- ◆ BS/BA, MS/MA/MBA, PhD Degrees
(Mathematics, Statistics, Computer Science, Quantitative Business)
- ◆ Highly Motivated and broadly trained
- ◆ Strong communication skills

Some Clients

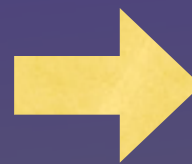
- Department of State (DOS)
- United States Postal Service (USPS)
- Fast Food Chains
- National Highway Traffic Safety Administration (NHTSA)
- Department of Treasury, Large Corporations



Department of State

Project:

Estimate total amount of world land owned/leased by U.S.



developing
industrialized



Department of State

DOS databases incomplete...

Land Value = f (literacy, mortality, GDP, employment, wages)

Assumptions:

- ◆ Approximately Linear (multiple linear regression)
- ◆ Accurate as possible IMF country statistics



Department of State

Results:

- ◆ Estimate of total land owned/leased given
- ◆ Results for audit and presented before Congress
- ◆ Received commendation from DOS



U.S. Postal Service

Project:

Estimate mail volume under new rate structure

- ◆ First-Class Letter Rate
- ◆ First-Class Bulk Pre-sort Rate
- ◆ Standard Mail Bulk Non-profit/Business Rate
- ◆ Periodicals Mail Bulk Rate



U.S. Postal Service

Methodology:

- ◆ Contact top 10 largest mailers in each category
- ◆ Contact random sample of businesses/ organizations/consumers in each mail class (stratified random sampling within each)
- ◆ Obtain current mail volumes in each category and potential mail shifts



U.S. Postal Service

Stratified Random Sampling:

- ◆ Ensures all subpopulation groups represented (proportionate allocation)
- ◆ Number in each group chosen based on smallest subgroup and desired confidence
- ◆ Response rate $> 60\%$ required by USPS (adjust sample numbers accordingly)



U.S. Postal Service

Top 10 mailers
(70% mail volume)

Stratified
Sampled
mailers

Projected to
Population Mail
Volumes



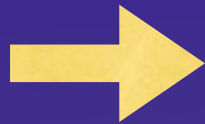
U.S. Postal Service

Results:

- ◆ Results presented before Postal Rate Commission
- ◆ Oral testimony required
- ◆ All documents for project submitted for case

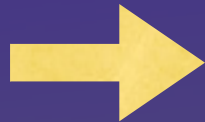
Other Projects

Fast Food Chains



Sales forecasting for
kids' meal toys

NHTSA



Data mining for
correlations between
single-car accidents and
anti-lock brakes

IRS/
Large Corporations



Audit Sampling and
Taxpayer burden