Deriving Population Assessments through Opinion Polls, Text Analytics, and Agent-Based Modeling

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Overview

- Purpose: Updating and forecasting changes in opinions
- Method:
  - Analytical models for utilizing the best features of different sources
    - Polling data (accuracy)
    - Media (timeliness)
  - Simulation model: Updating and forecasting opinions
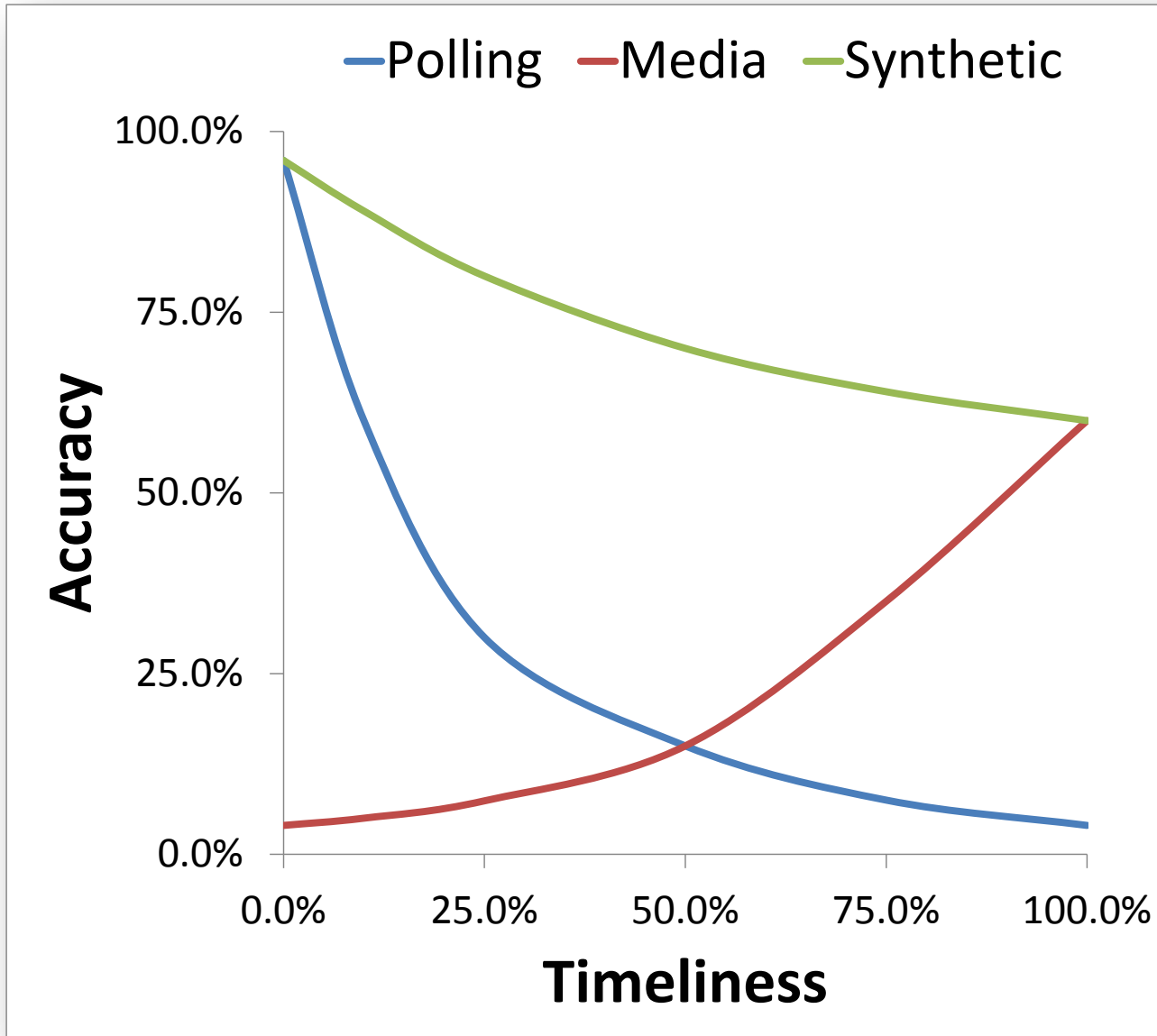- Current results and future research

Purpose:
Quality and Timeliness
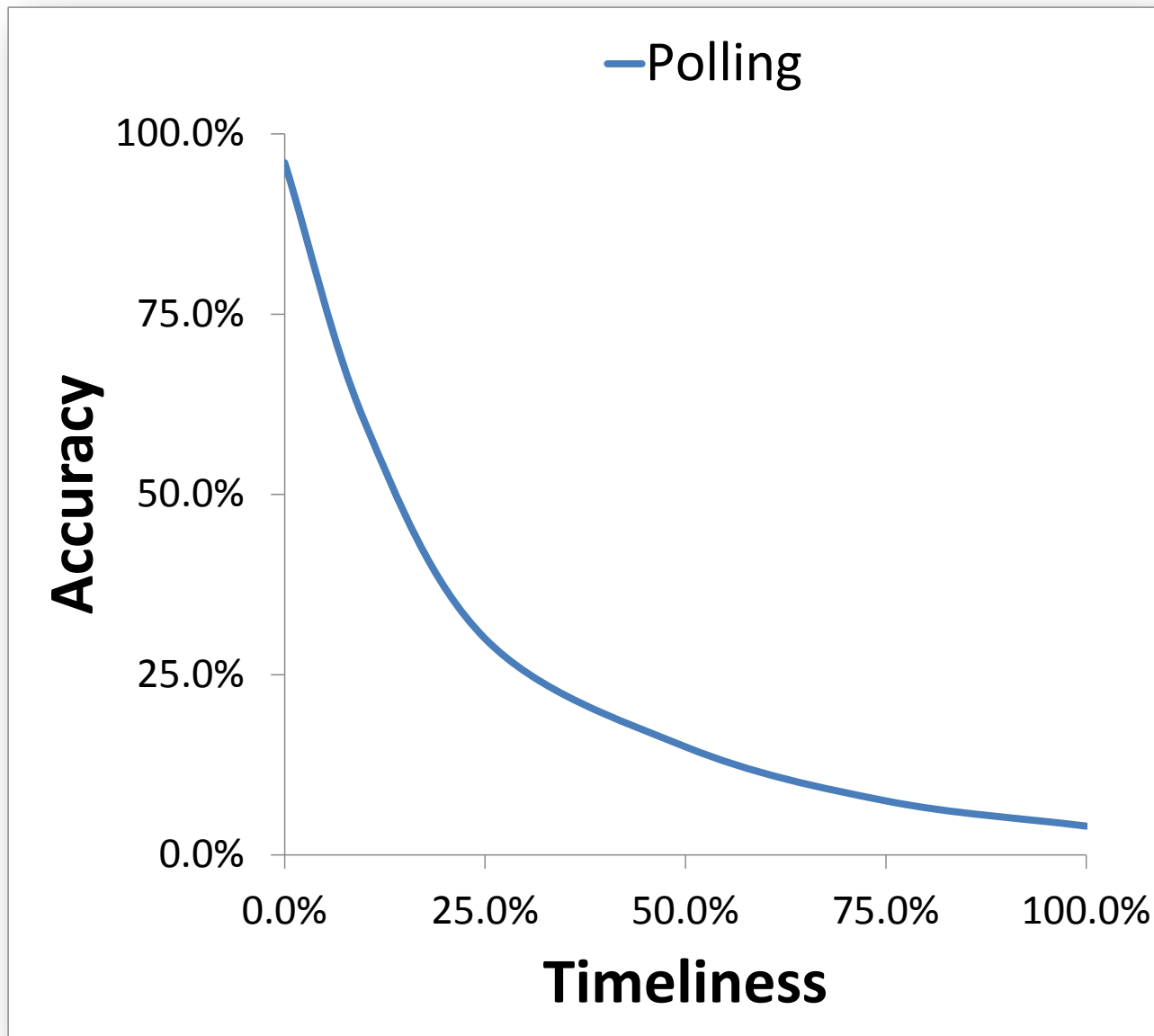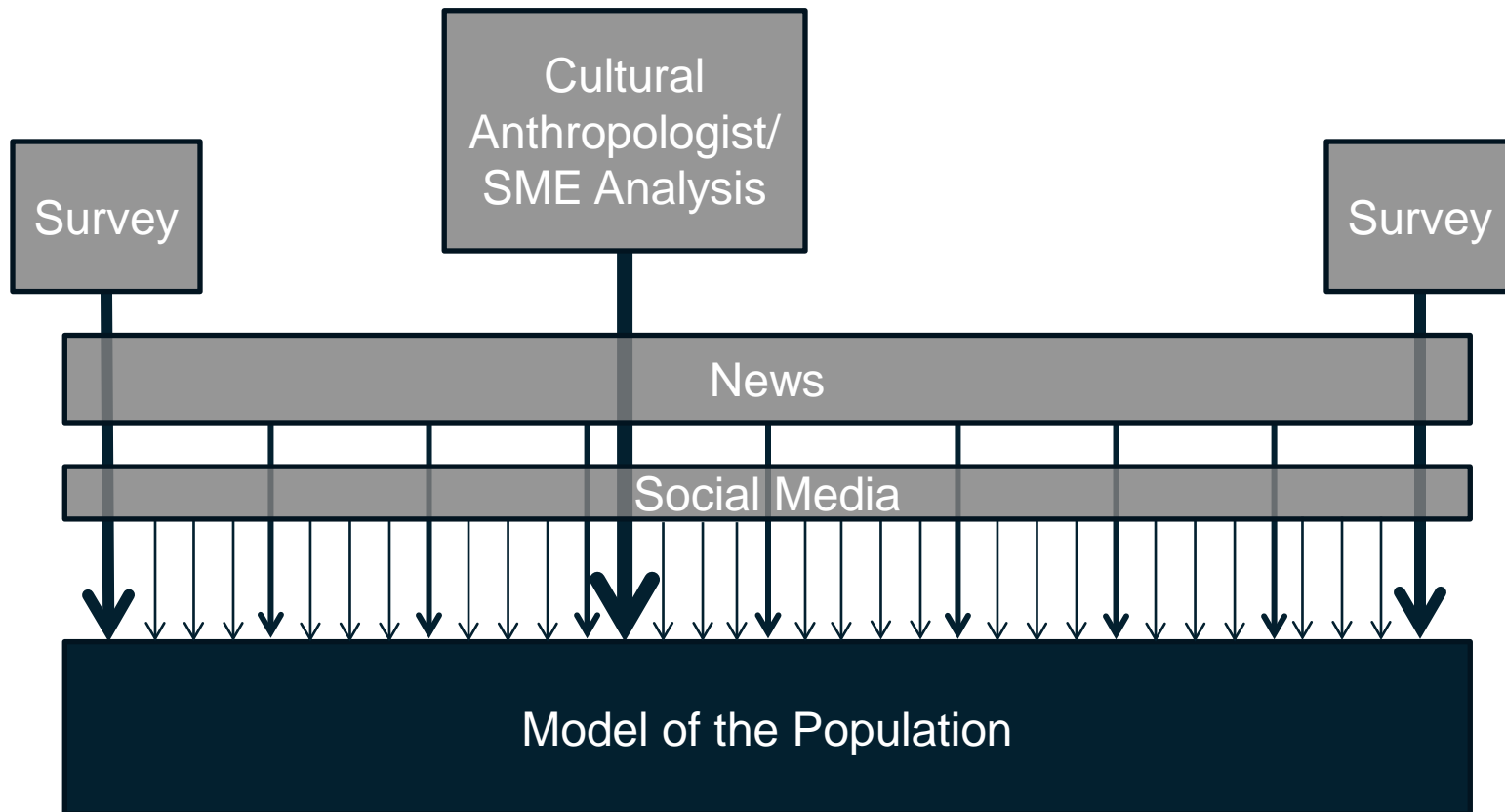
Purpose:
Quality and Timeliness
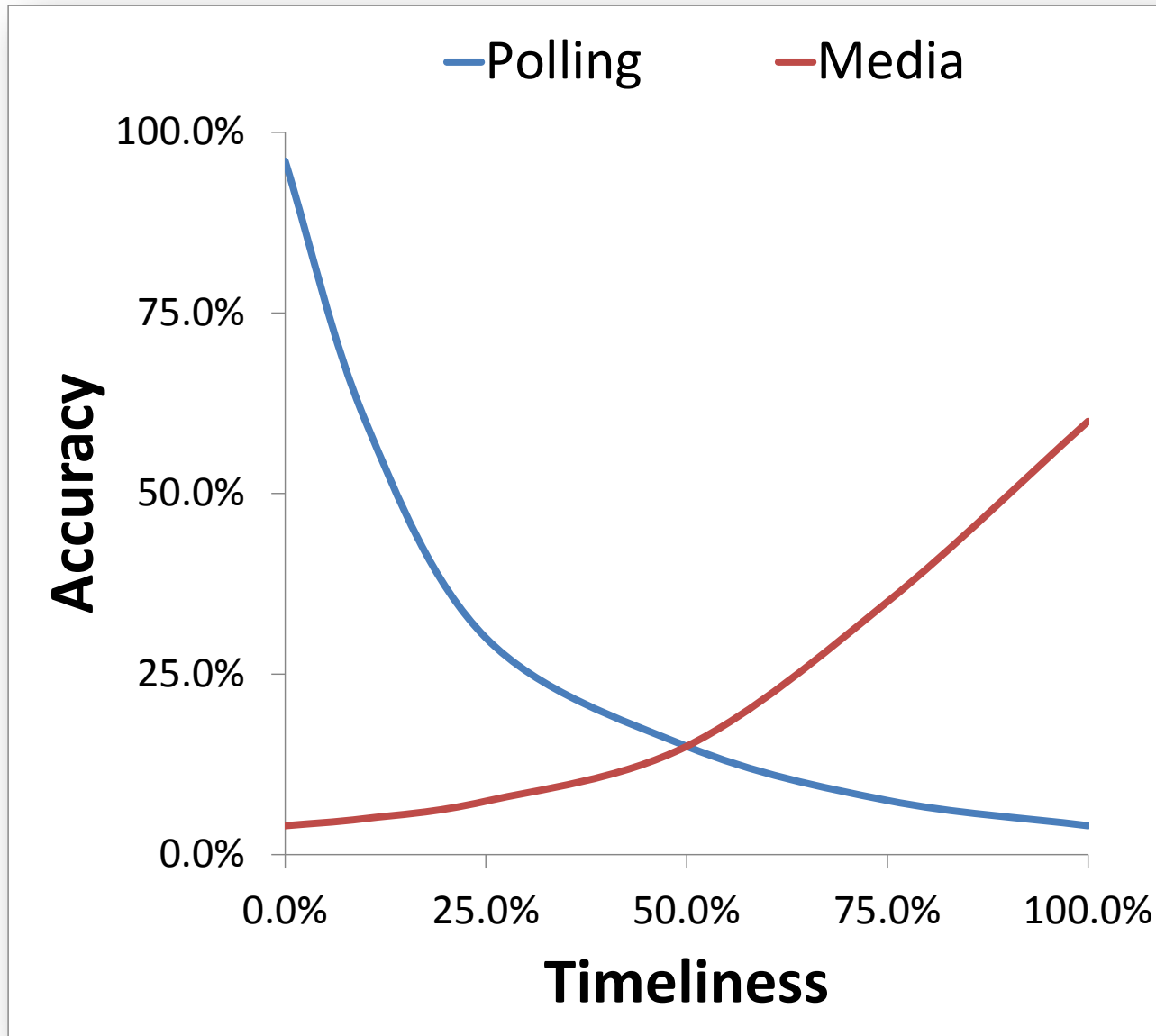
Purpose:
Quality and Timeliness

Method:
Modeling Opinion Change

Analytical and simulation models provide a means for fusing data to provide comprehensive and timely estimates of **current** and **future** social dynamics
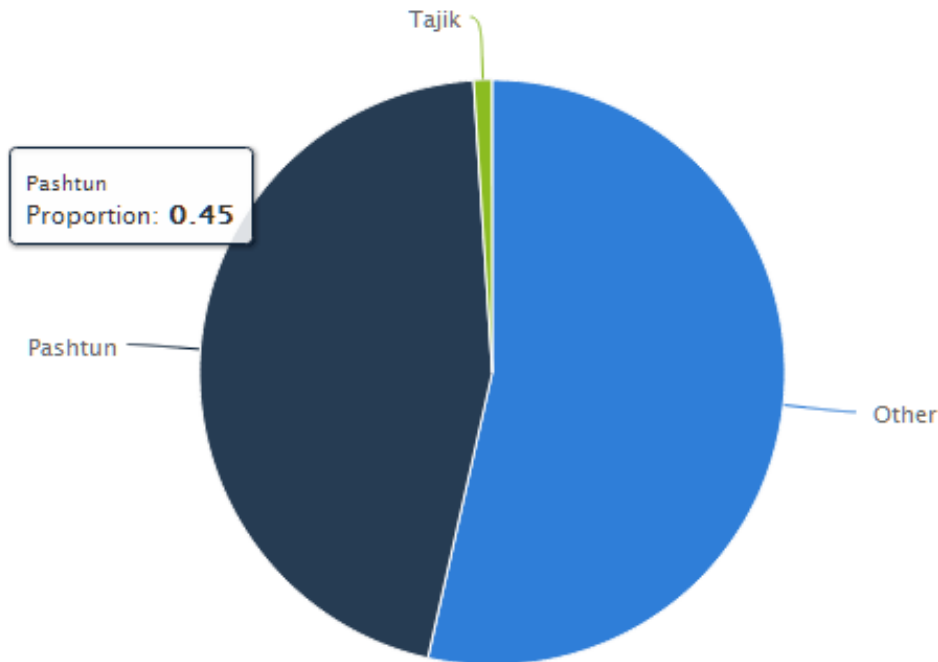
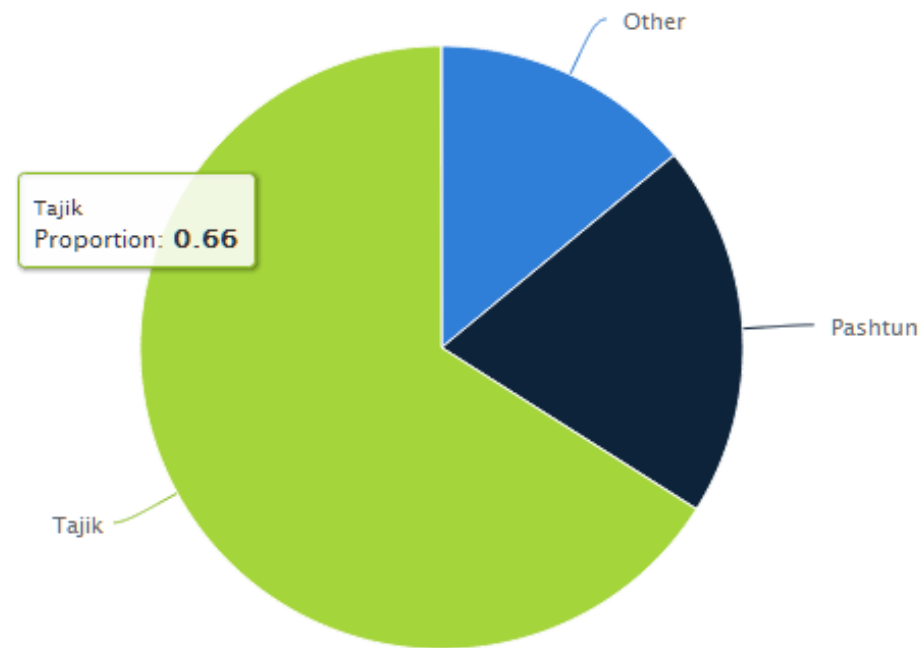Data about opinions come from a variety of sources with different **modalities**, **depths,** and **frequencies**

Analytical Models:
Polling Identities

| Identity Type	Identity Item
Gender	Male/Female
Ethnicity	Which ethnic group do you belong to?
Education	What is the highest level of school you completed [6 point scale]

Region: CentralHighlands

Tajik

Pashtun
Proportion: **0.45**

Pashtun

Other

Region: Northeastern

Other

Tajik
Proportion: **0.66**

Pashtun

Tajik

Analytical Models:
Polling Initial Opinions

Opinion Type	Opinion Item
U.S.	How would you rate the work of the United States in Afghanistan – excellent, good, fair, or poor?
Afghan Government	How would you rate the work of the present government – excellent, good, fair, or poor?
Hamid Karzai	How would you rate the work of Hamid Karzai as president of Afghanistan – excellent, good, fair, or poor?
Taliban	Is your opinion of the Taliban very favorable, somewhat favorable, somewhat unfavorable, very unfavorable

Opinion: United States — All Afghans
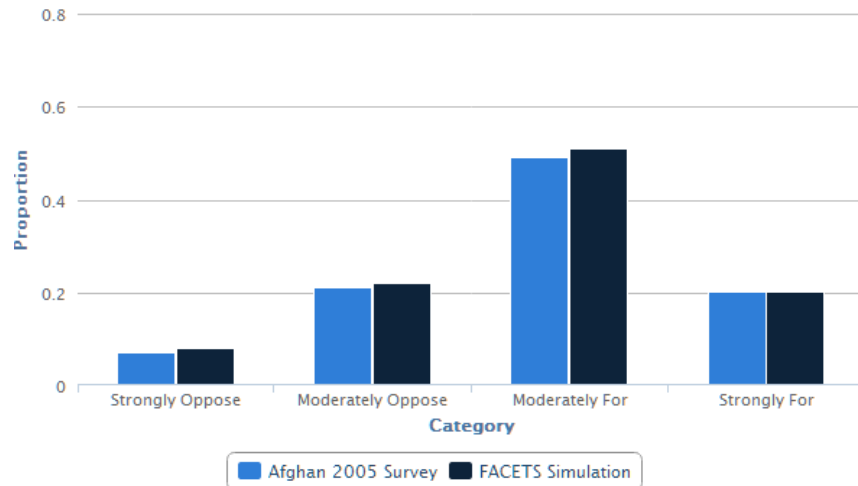
Opinion: Afghan Government — All Afghans
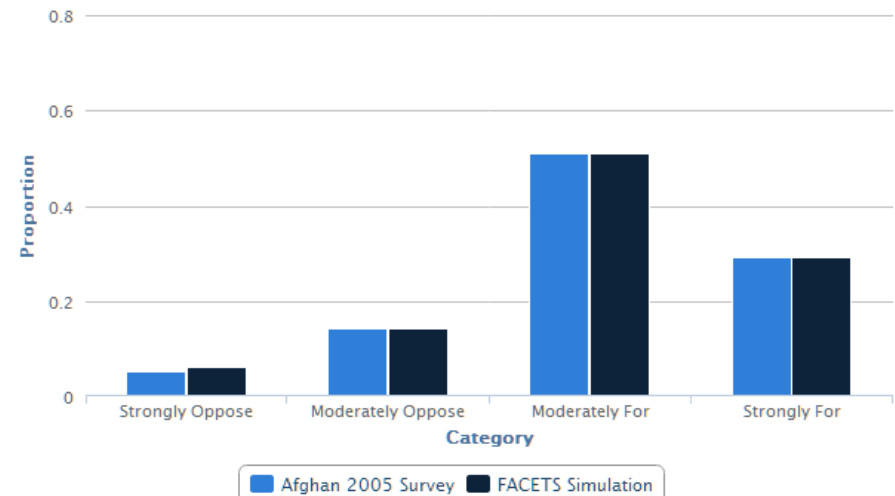
Analytical Models:
Deriving Reactions from Polling (1)

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Select survey item for each event type → **Estimate reactions using statistical model** → **Calculate distribution of reactions per respondent**

Event Type	Reaction Item
Road reconstruction	I would like to ask you about today's conditions in the village/neighborhood where you live. How would you rate the following using very good, somewhat good, somewhat bad or very bad? [Roads, bridges, and other infrastructure]
Security	[Security from crime and violence]
Schools	[The local schools]

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Analytical Models:
Deriving Reactions from Polling (2)

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Select survey item for each event type

→

Estimate reactions using statistical model

→

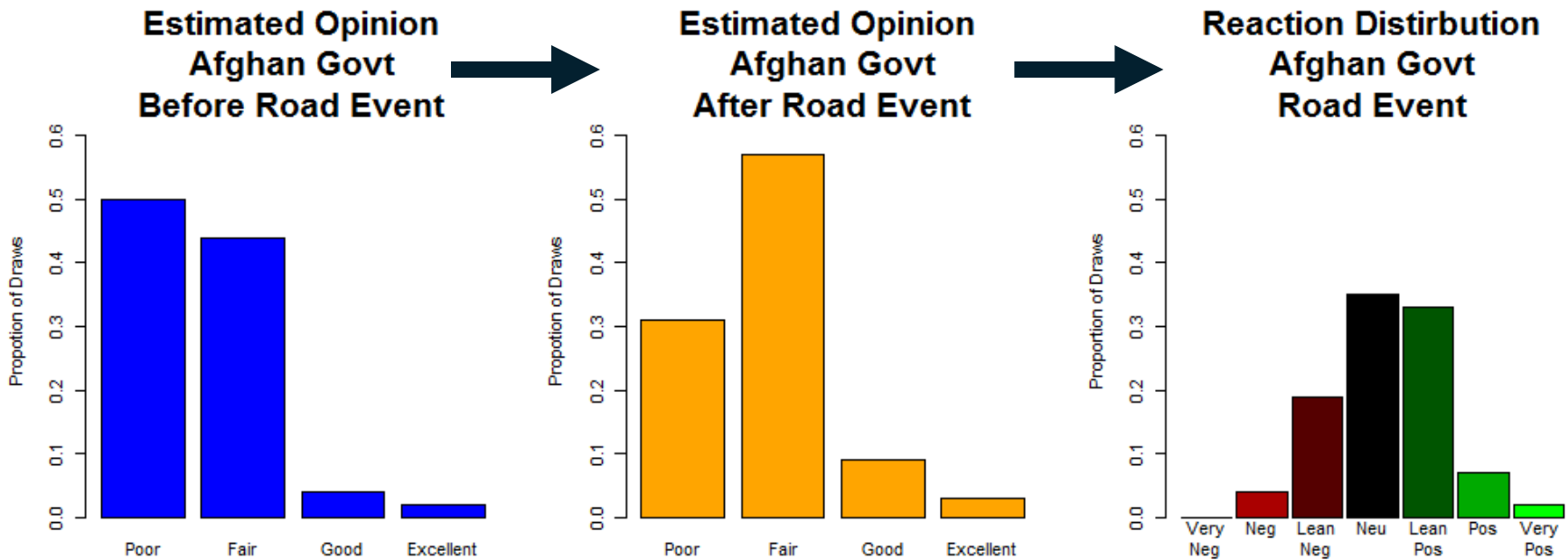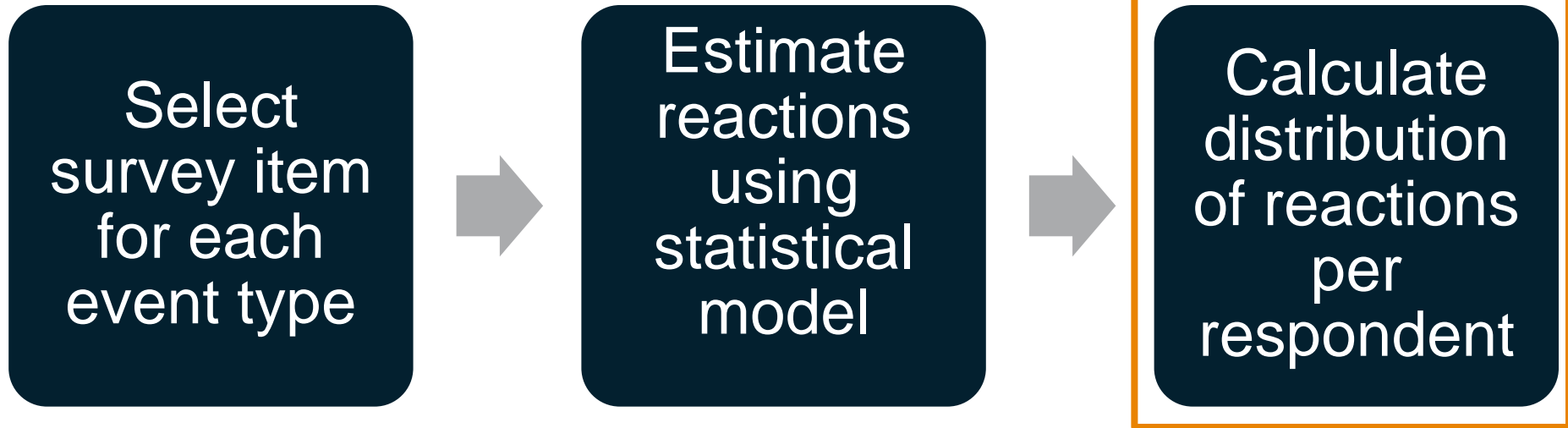Calculate distribution of reactions per respondent
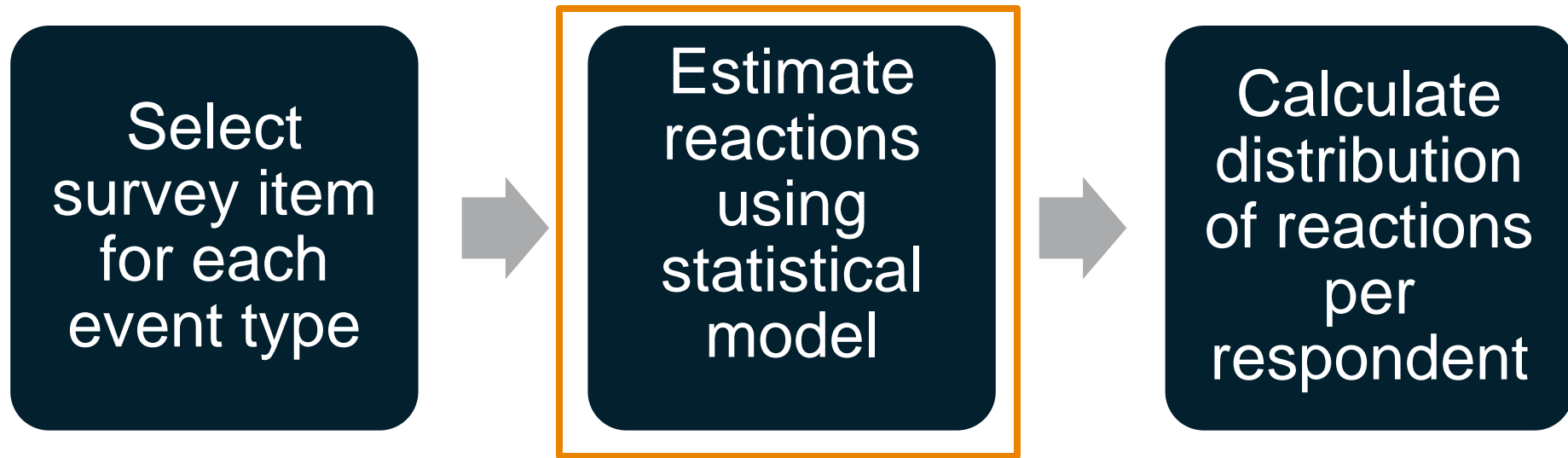
AfghanGovtOpinion= Intercept + Gender + Ethnicity + Education + Region + Road Item + Gender x Road Item + Ethnicity x Road Item + Education x Road Item + Region x Road Item

Setting value of road item allows for incorporating event thresholds (e.g., very bad to very good; somewhat bad to somewhat good)
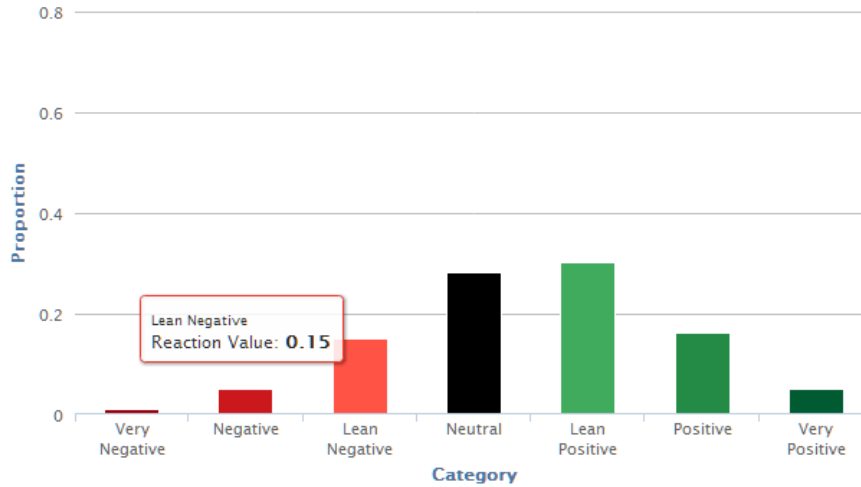
Allows impact of road reconstruction event to vary by identity and region
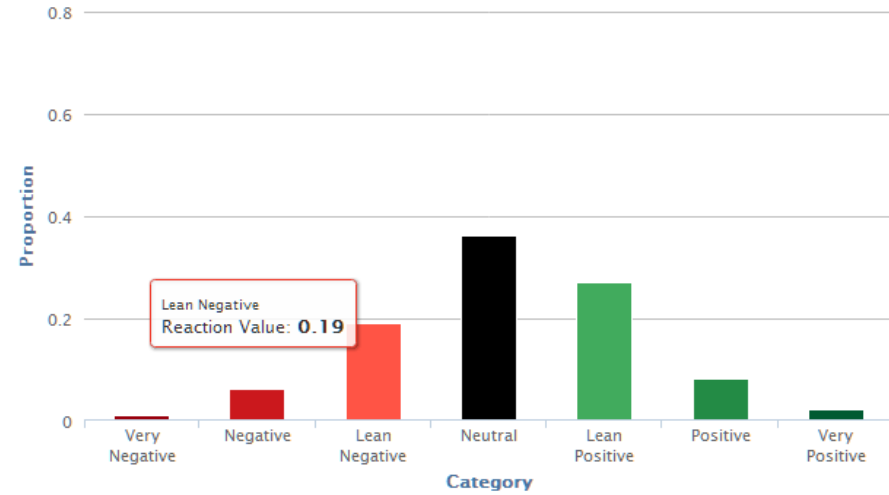
Analytical Models:
Deriving Reactions from Polling (3)

| Select survey item for each event type | → | Estimate reactions using statistical model | → | Calculate distribution of reactions per respondent |

Estimated Opinion Afghan Govt Before Road Event

→

Estimated Opinion Afghan Govt After Road Event

→

Reaction Distirbution Afghan Govt Road Event

Analytical Models:
Example Reaction – Road Reconstruction

Analytical Models: News Media

- ## Source data: Afghanistan News Center
  - www.afghanistannewscenter.com
  - ~15000 articles from 2005-2008

Analytical Models:
Media Analysis – Example Latent Topics

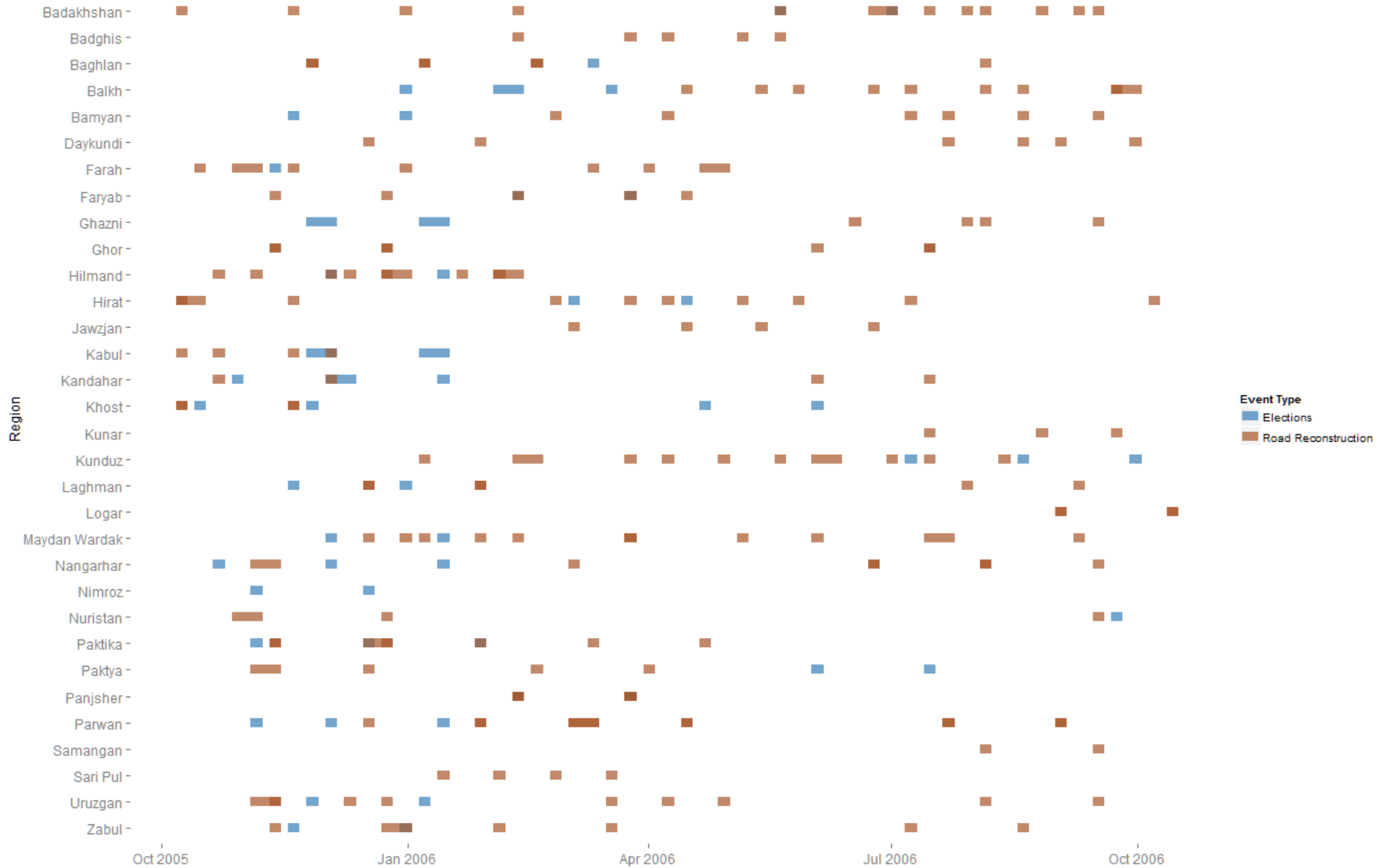| Topic 36 "Civilian Casualties"		Topic 70 "Elections"		Topic 95 "Election Fraud"	
Feature	Probability	Feature	Probability	Feature	Probability
civilian	0.0835	election	0.0810	round	0.0323
casualty	0.0297	candidate	0.0296	election	0.0229
air	0.0189	presidential	0.0276	vote	0.0216
death	0.0177	campaign	0.0220	fraud	0.0194
strike	0.0167	vote	0.0200	Commission	0.0182
killed	0.0150	voter	0.0158	Karzai	0.0162
incident	0.0141	provincial	0.0143	runoff	0.0153
report	0.0104	council	0.0133	ECC	0.0150
operation	0.0103	poll	0.0129	IEC	0.0112
"civilian casualty"	0.0095	polling	0.0118	electoral	0.0100

Analytical Models:
Example topic over time – Road Construction

Road Reconstruction Projects

Commission Formed to
Plan Afghan Reconstruction Projects
Thursday January 26, 9:22 AM
KANDAHAR CITY, Jan 26 Asia Pulse - The Afghan Ministry of Economy has opened a new department in the southern province of Kandahar to plan reconstruction projects and coordinate donors.
Planning Manager Haji Mohammad Rahim Rahimi told Pajhwok Afghan News, the new office, called the Provincial Development Commission, was

Analytical Models:
Example events over time

Simulation Model:
Social Influence Theory
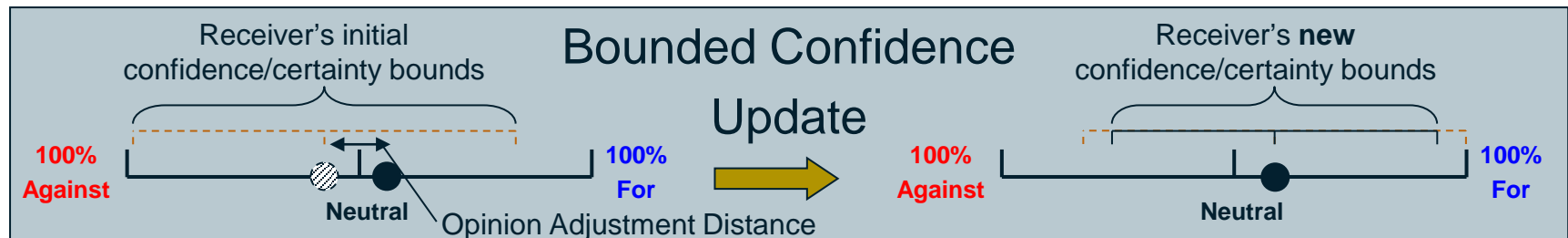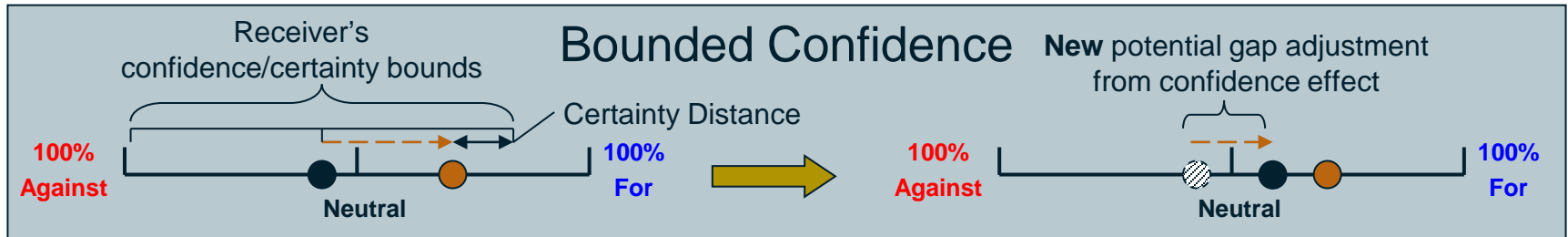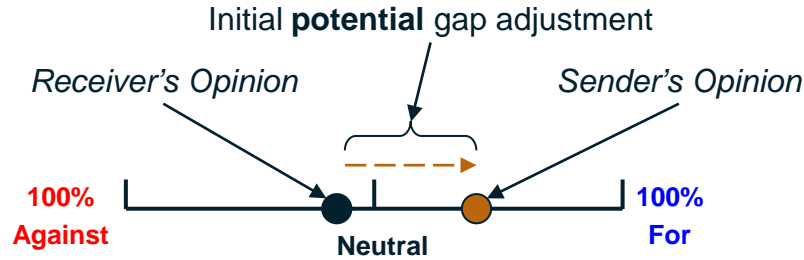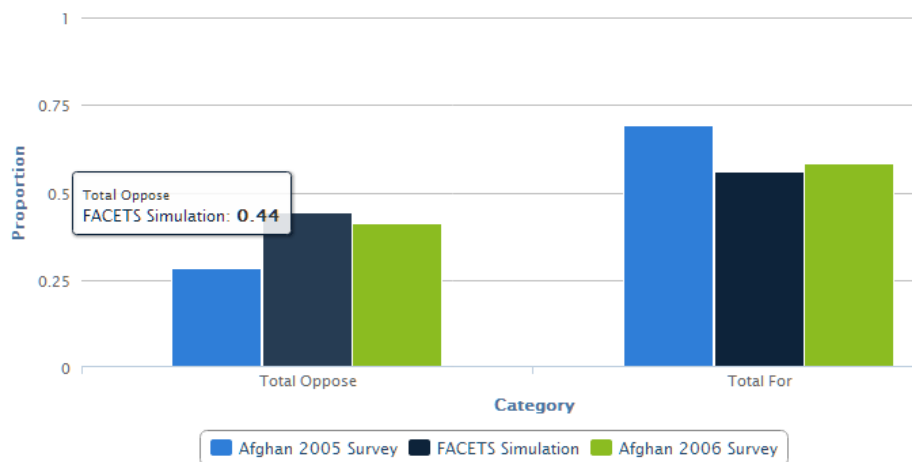
Initial **potential** gap adjustment

Receiver's Opinion   *Sender's Opinion*

100% Against — Neutral — 100% For

Bounded Confidence

Receiver's confidence/certainty bounds

Certainty Distance

New potential gap adjustment from confidence effect

100% Against — Neutral — 100% For

Social Identity

Receiver's Identities	Sender's Identities
Male	Female
Republican	Republican
Employed	Employed

Actual gap adjustment from confidence & identity effects

100% Against — Neutral — 100% For

Bounded Confidence Update

Receiver's initial confidence/certainty bounds

Opinion Adjustment Distance

Receiver's **new** confidence/certainty bounds

100% Against — Neutral — 100% For
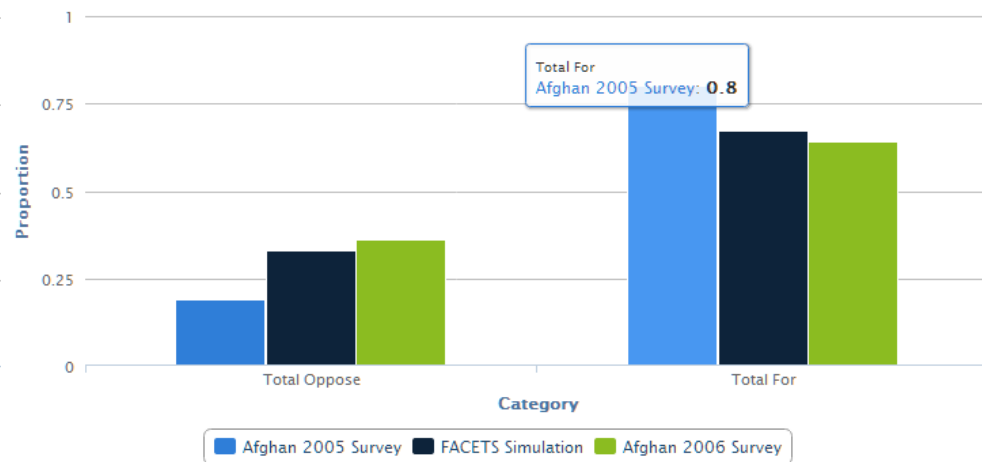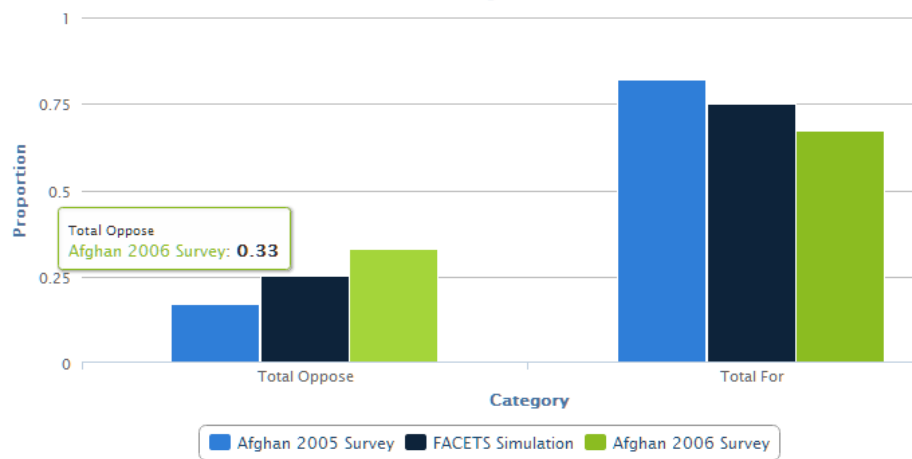
Current Results
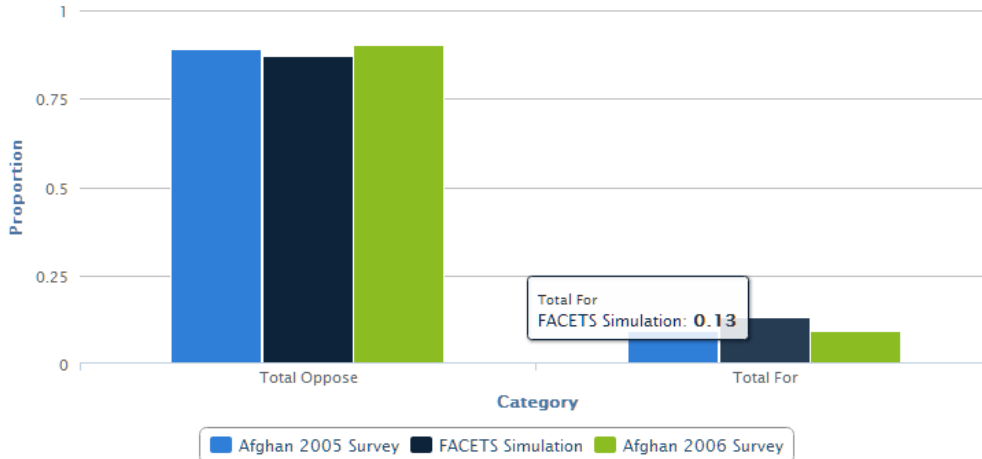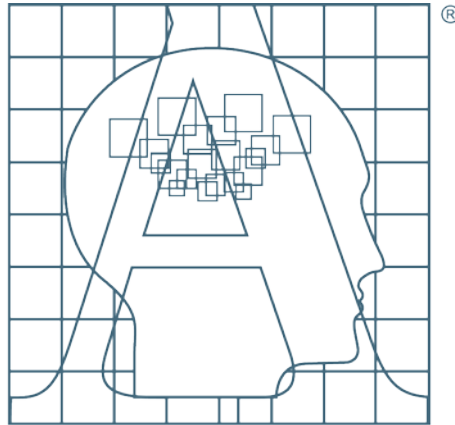
Future Research

- Additional Afghanistan longitudinal studies
  - 2006-2007
  - 2007-2008
- Pakistan region study
  - 2006-2008
- Integration with seasonal/climate impact forecasts
- Integration with other impact models

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