ARLINGTON COUNTY EMERGENCY ALERTS: ENHANCING ENROLLMENT AND EFFECTIVENESS

SDAL SOCIAL & DECISION ANALYTICS LABORATORY
Data Science for the Public Good

Millicent Grant (Iowa State) & Samantha Tyner (Iowa State) with Kathryn Ziemer (SDAL)
Sponsor: Arlington County - Will Flagler & Lauren Stienstra

Research Questions

1. Who should be targeted for enrollment in Emergency Alerts?
   - Who shares information?
2. Where are current enrollees located?
3. How do the alerts affect enrollee behavior?
   - Is there a pattern between type or number of alerts and unsubscribing?
   - What are best practices for the alert messages?

Targeting the Right People

Personality traits of people who share information[1-3]:
- Openness to experience
- Agreeableness
- Conscientiousness
- Extraversion
- Trusting of others
- Affiliative tendency
- Public individuation

Top occupations associated with these traits:
- Teachers
- Instructional coordinators
- Life insurance agents
- Arts/Entertainment managers
- Occupational therapists
- School counselors
- Facilities managers
- Physical therapists

Where are Enrollees Located?

- There is a high number of unweighted enrollment counts in the Metro Corridor, which is unsurprising because of the large population in this location (Figure 1).
- When enrollment location counts are weighted by the population density of the location, North Arlington has much higher enrollment than South Arlington (Figure 2).
- Subscribers can sign up to receive alerts for up to 5 different locations, such as work, home, and school. Most of the "work" enrollee locations are in the Metro Corridor (Figure 3).
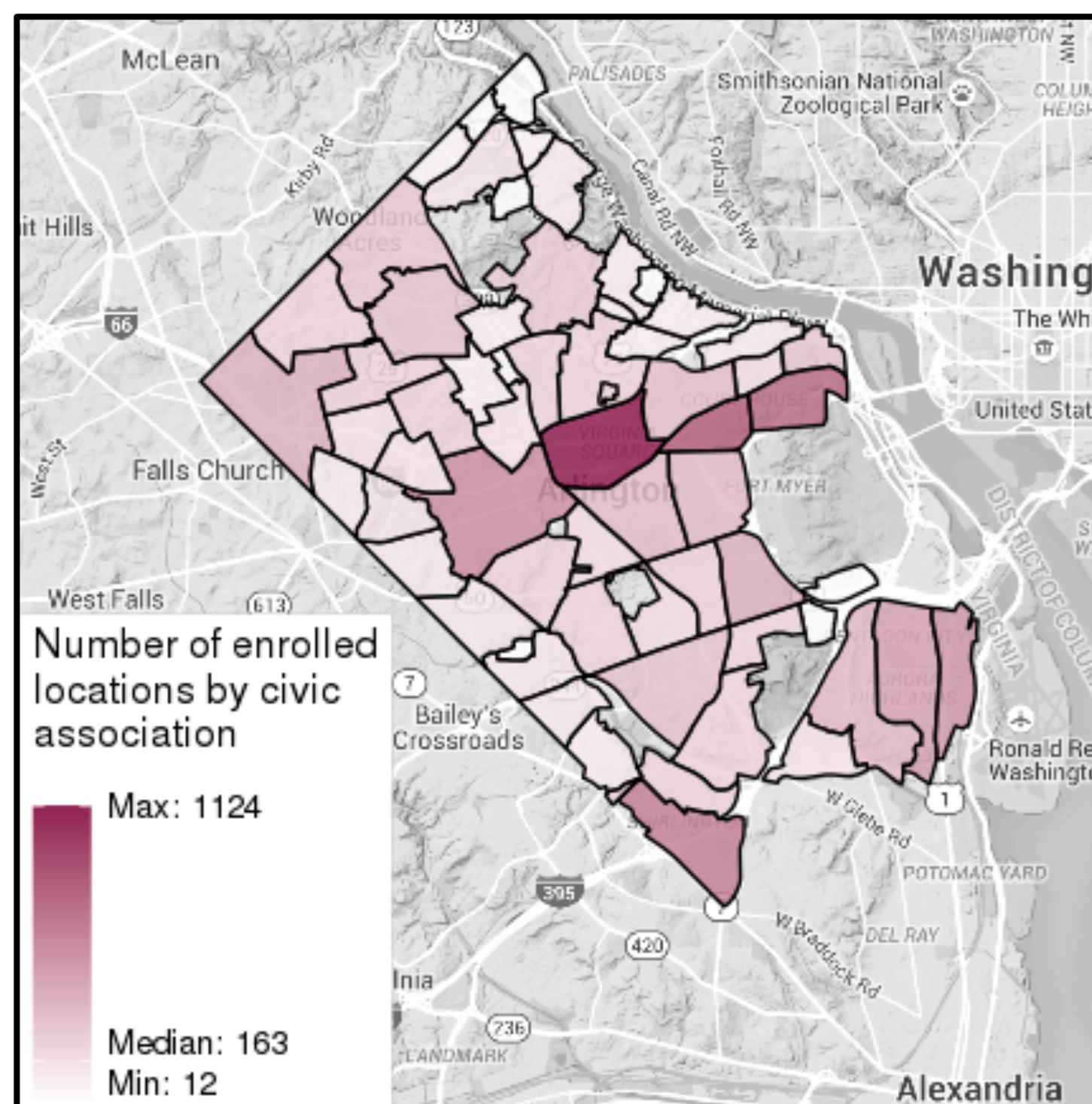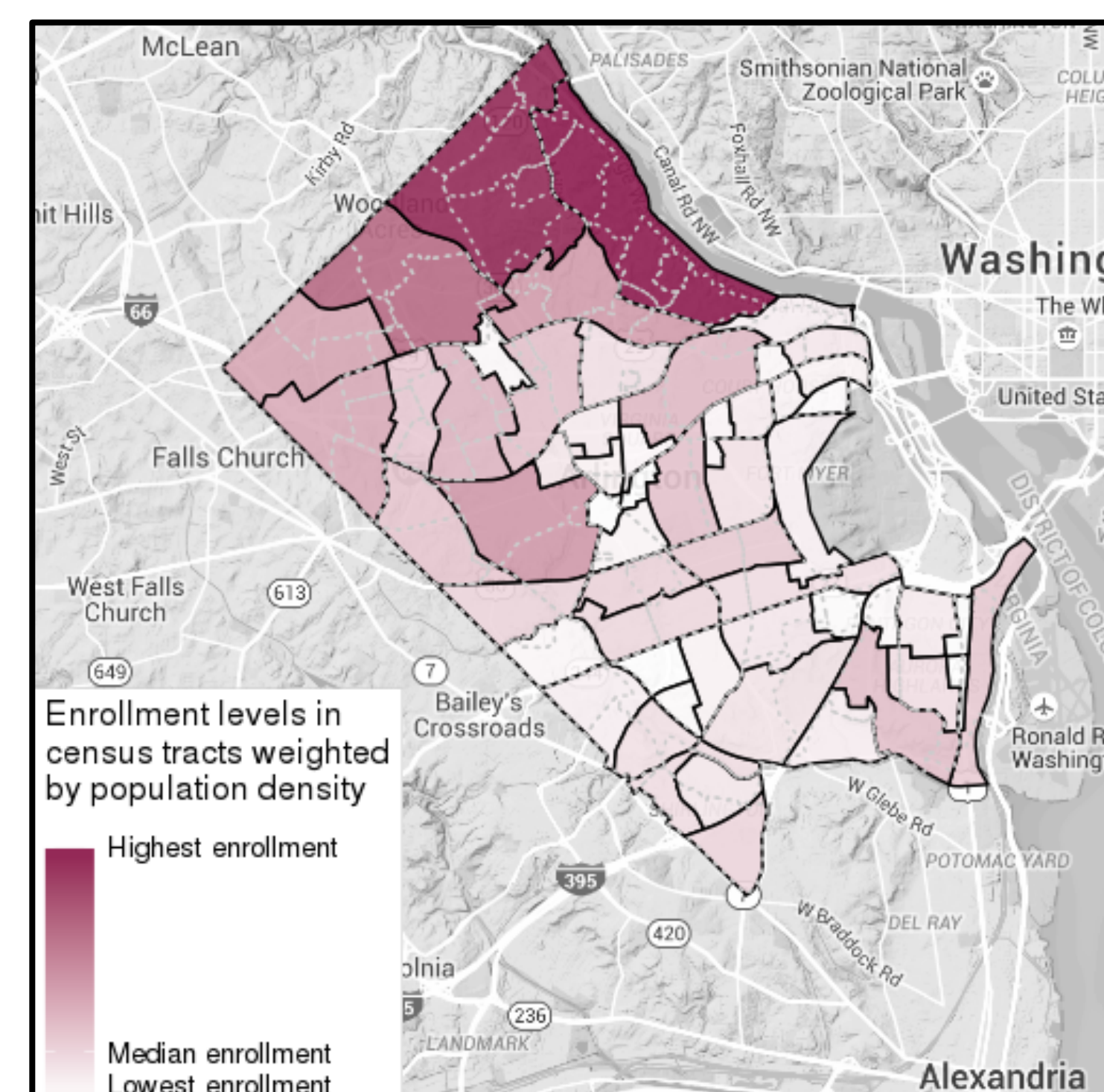

Figure 1. Enrollment counts by civic associations.

Number of enrolled locations by civic association
Max: 1124
Median: 163
Min: 12

Figure 2. Enrollment concentration by census tract, accounting for population density. Gray lines are civic associations, black are census tracts.
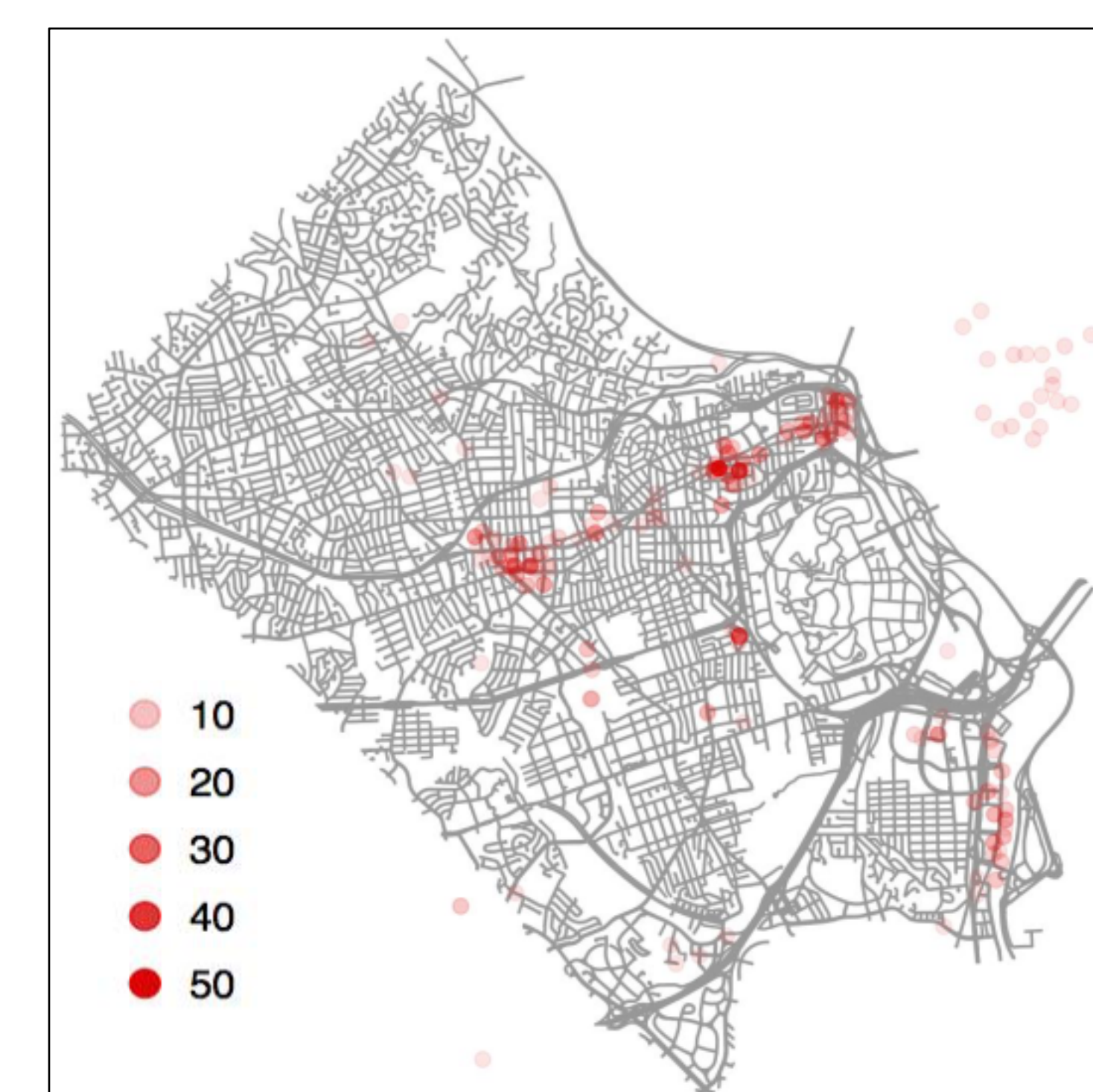
Enrollment levels in census tracts weighted by population density
Highest enrollment
Median enrollment
Lowest enrollment

Figure 3. Enrollment counts where locations are specified by an enrollee's "work" address.

10
20
30
40
50

How do Alerts Affect Behavior?

Figure 4. Word cloud of the most frequent user responses to message alerts.
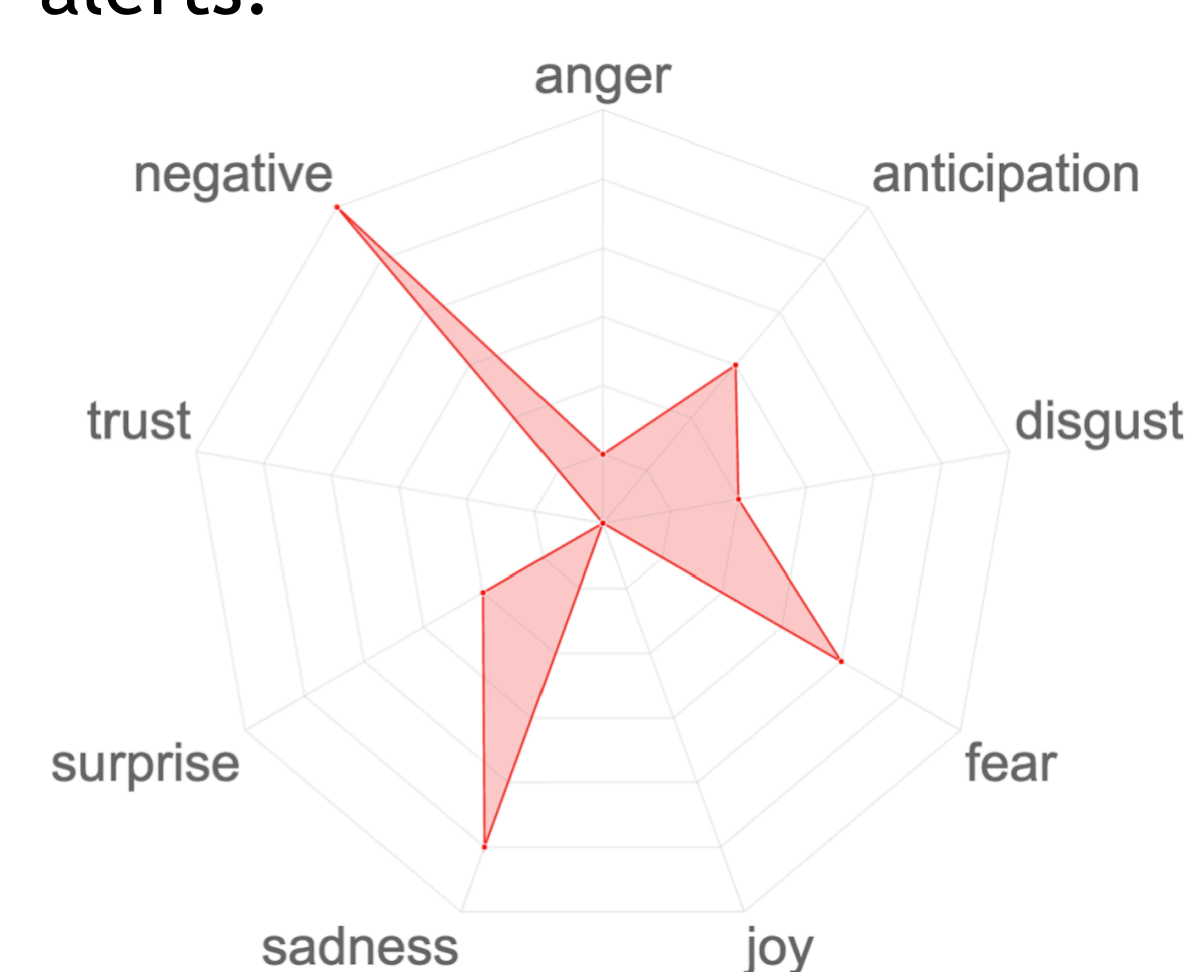

Figure 5. Sentiment analysis of responses to messages.

Responses to Messages
- Word cloud results (Figure 4) indicate that "Stop" is the most common word enrollees use to respond to alerts.
- Sentiment analysis (Figure 5) reveals that enrollees respond to text alerts with negative feelings, particularly sadness and fear.
- Users modified their accounts the most after receiving 3 or more alerts in less than 90 minutes (Figure 6).

Best Practices for Alert Messaging[4]
Danger-Action Structure
- Structure messages to inform recipients of the danger and the action the recipient should take
- Use simple, brief, direct language
- Avoid over-dramatizing
- Help recipients understand the risks and where to get more information

Key Writing Principles
- 3 & 30 Principle: convey key information in 3 short sentences with no more than 30 words
- 6 & 60 Principle: write messages at a 6th grade (or lower) reading level with a 60 or more score on a readability measurement scale
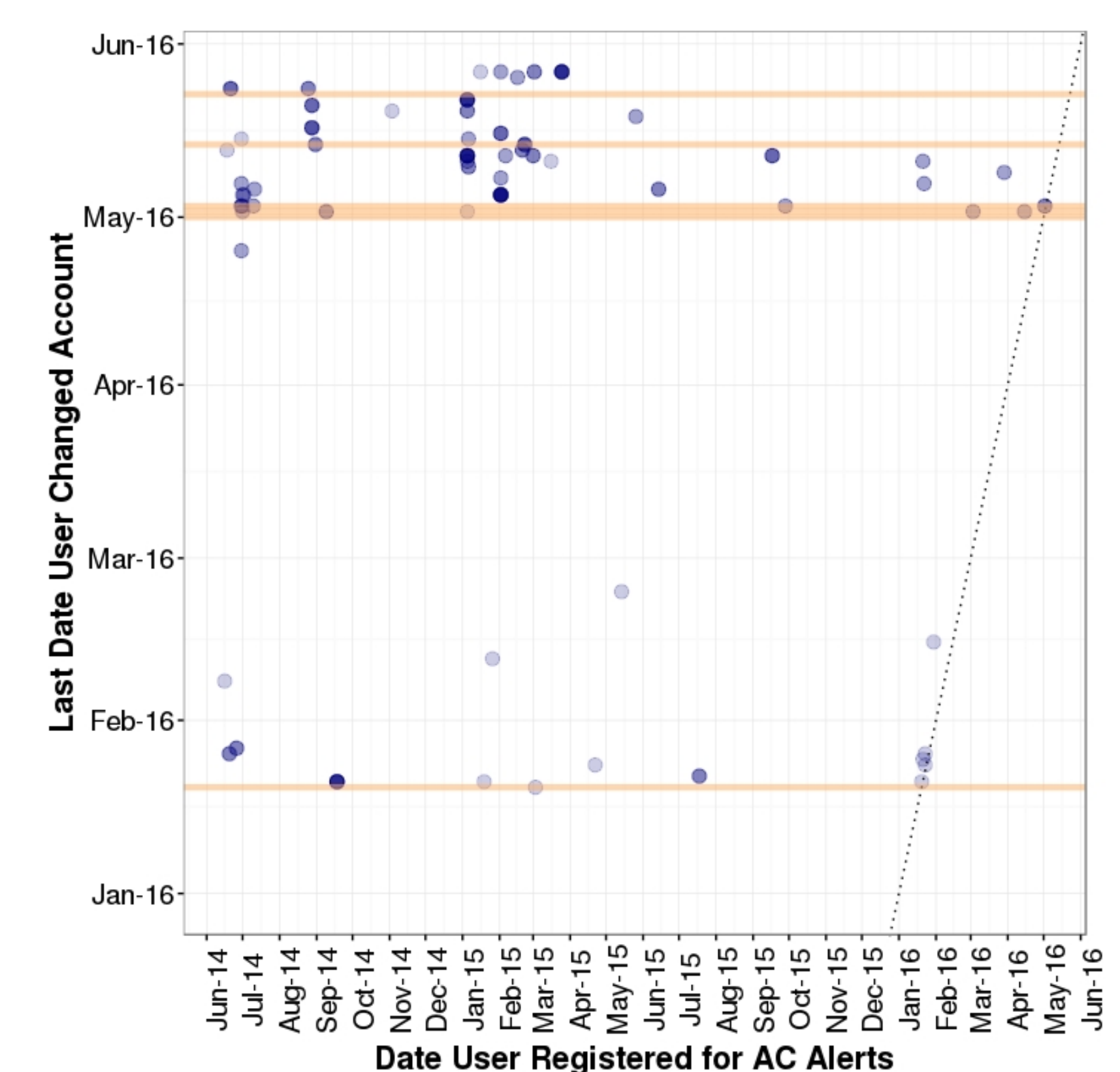

Figure 6. Enrollees' last modification of their account. Orange lines indicate major events where the system sent out many alerts. In January 2016 there was a major blizzard and in May 2016 there were several days with severe thunderstorms.

References

1. Matzler, K., Renzl, B., Mooradian, T., von Krogh, G., & Mueller, J. (2011). Personality traits, affective commitment, documentation of knowledge, and knowledge sharing. The International Journal of Human Resource Management, 22, 296-310.
2. Mooradian, T., Renzl, B., & Matzler, K. (2006). Who trusts? Personality, trust and knowledge sharing. Management Learning, 37, 523-540.
3. Lee, E., & Jang, J. (2010). Profiling good Samaritans in online knowledge forums: Effects of affiliative tendency, self-esteem, and public individuation on knowledge sharing. Computers in Human Behavior, 26, 1336-1344.
4. Chandler, R. (2010). Emergency Notification. Santa Barbara, CA: Praeger.

VirginiaTech Biocomplexity Institute

bi.vt.edu/sdal