Project ASPeCT
(Anonymized, systematic, population e-(geo-fenced) Contagion Tracking)

Geo-fenced Contagion Tracking System
+
Comprehensive Decision Support Dashboard Approach
Phase 1 Plan for Re-opening is Underway

- What do we know for sure -> Movement around the region will grow.
- Some types of movement increase the risk of spreading the virus.
- How do we measure the relative rate and risk of increase in movement? [Spread]
- How do we predict the effect of the increased movement? [Outcome]
- When will it exceed medical hospital capacity to treat COVID patients? [Capability]

Data Requested, Received and Presented to the EPG

- Move from disparate to comprehensive
- Move from descriptive to predictive or prescriptive
- Move from informative to actionable

Discuss an Aggregated Dashboard [Governor’s Task Force]

- Capacity Dashboard [Capability]
- Testing Dashboard [Outcome]
- Movement Dashboard [Spread]

Let’s answer the questions:

- How does each re-opening announcement/phase effect movement?
- How does the type of movement affect risk of spread?
- How can we identify the 5% and intervene?
- How will the movement behavior consume hospital capacity?
- How do we adjust the models through feedback from testing and tracing?
Caveats

**All data presented:**
- Contains no personally identifiable information
- Contains no HIPPA protected information
- Complies with comprehensive data protection laws in 80+ countries including GDPR (EU) and CCPA (California Consumer Privacy Act)
- Device data is Opt-In and Cleaned Daily for Opt-Out

**Analysis performed:**
- Uses Massive Data to replicate the whole population
- Avoids samples filled with self-selection bias or skewed to those with access
- Stochastic in nature with probabilities at levels of confidence (not deterministic)
- Attempts to understand underlying behaviors in this region, and,
- Provides results specific to this region
  - Our demographics
  - Our density
  - Our movement behavior
  - Our social behaviors
Capacity Dashboard – ICU Beds & Ventilators

- Data Sharing Collaboration between:
  - TGH
  - Advent Health
  - BayCare Health System
  - HCA Healthcare
  - Lakeland Regional Health
  - Lee Health
  - Manatee Memorial Hospital

- 51 Hospitals
- 13 Counties
- 5 million lives

Powered by SME
Capacity Dashboard – Generic Models have low Predictive Power in the Region

- Our demographics
- Our density
- Our movement behavior
- Our social behaviors
## Capacity Dashboard

**Coronavirus: characteristics of 36,492 Florida resident cases**

Data verified as of May 5, 2020 at 10 AM

Data in this report are provisional and subject to change.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Cases</th>
<th>Hospitalizations</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4 years</td>
<td>203</td>
<td>1% 13</td>
<td>0% 0</td>
</tr>
<tr>
<td>5-14 years</td>
<td>431</td>
<td>1% 10</td>
<td>0% 0</td>
</tr>
<tr>
<td>15-24 years</td>
<td>2,764</td>
<td>8% 86</td>
<td>1% 0</td>
</tr>
<tr>
<td>25-34 years</td>
<td>5,389</td>
<td>15% 302</td>
<td>5% 12</td>
</tr>
<tr>
<td>35-44 years</td>
<td>5,493</td>
<td>15% 534</td>
<td>8% 27</td>
</tr>
<tr>
<td>45-54 years</td>
<td>6,543</td>
<td>18% 821</td>
<td>13% 59</td>
</tr>
<tr>
<td>55-64 years</td>
<td>6,218</td>
<td>17% 1,092</td>
<td>17% 153</td>
</tr>
<tr>
<td>65-74 years</td>
<td>4,560</td>
<td>13% 1,378</td>
<td>22% 335</td>
</tr>
<tr>
<td>75-84 years</td>
<td>2,975</td>
<td>8% 1,261</td>
<td>20% 441</td>
</tr>
<tr>
<td>85+ years</td>
<td>1,902</td>
<td>5% 833</td>
<td>13% 444</td>
</tr>
<tr>
<td>Unknown</td>
<td>26</td>
<td></td>
<td>0% 0</td>
</tr>
<tr>
<td>Total</td>
<td>36,492</td>
<td>6,330</td>
<td>1,471</td>
</tr>
</tbody>
</table>

**Gender**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>18,195</td>
</tr>
<tr>
<td>Female</td>
<td>18,271</td>
</tr>
<tr>
<td>Unknown</td>
<td>26</td>
</tr>
</tbody>
</table>

- >65 years old
  - 26% of Cases
  - 55% of Admissions
  - 83% of Deaths
Movement Dashboard

Movement Behaviors Affect Risk

- Three types of movement:
  - How Far Traveled (ROGSI)
  - Number of Unique Locations Visited (NULV)
  - Number of Dense Locations Visited (NUDL)

- Combined Risk Score
  - Individual Device Vector
  - Geo-fenced Area Score
    - Social Isolation Score
      - Median NULV,
      - Top 25 NULV Devices,
      - Median NUDL

Movement Risk and Virus Spread

- The Social Isolation Score has been “trained” using actual new cases for thousands of devices across hundreds of zip codes.
- The Social Isolation Score is statistically correlated with number of new cases
  - As the score for an area increase due to increased movement behaviors, the number of new cases climbs
  - Since every area behaves differently the risk score is different by area
  - The risk score is heavily affected by the 5-10% of devices that move the most thru the most dense locations.

Data Partner – Mobilewalla

Geolocation daily of some 3 million devices across 13 counties and 5 million people...
Movement Dashboard – Heat Map (PRE)

Mobilewalla Social Isolation Risk Heat Map

Zip - March 18, 2020

County - March 18, 2020
Movement Dashboard – Risky Cluster ID

Geo-Fenced:
>150 Devices in a 500x500 square-foot area in 8 hours

Two Types of Clusters:
- Movement Risk
- Acuity/Demographic Risk
Movement Dashboard – Capacity Correlation

MW Social Isolation Score correlation

SI Trend - April 10, 2020

Day of Hospital visits [2020]

Mar 30 | Mar 31 | Apr 1 | Apr 2 | Apr 3 | Apr 4 | Apr 5 | Apr 6 | Apr 7 | Apr 8 | Apr 9 | Apr 10 | Apr 11 | Apr 12 | Apr 13 | Apr 14 | Apr 15 | Apr 16 | Apr 17 | Apr 18 | Apr 19 | Apr 20 | Apr 21 | Apr 22 | Apr 23 | Apr 24 | Apr 25

Unique devices seen

MW Social Isolation Score

MW SI Score 14 Days prior to day of hospital visit [2020]

Devices Arriving at TGH 14 Days Later

Risk Score Vicinity TGH

161

0.2704
County: Risk of Spread (Movement Score) vs. Hospital Admissions (% Change)

MW Social Isolation correlation with COVID19 Hospital Admissions (Hillsborough County)
Movement (%△) vs. New Cases (#)

Reference: Playford et. al. How Florida slowed coronavirus everyone stayed home before they were told to, Tampa Bay Times, 5/10/2020.
Movement (%\(\triangle\)) vs. New Cases (#)

Reference: Playford et. al. How Florida slowed coronavirus; everyone stayed home before they were told to, Tampa Bay Times, 5/10/2020.
Region: Movement Behavior
Macro SI Score: calculated by 3 mobility measures
Here's the analysis of the 29.17% decrease in Average of SL_Score between March and April.

Average of SL_Score and Count of SL_Score
BY COUNTY AND MONTH

'Hillsborough' had the most significant impact on the decrease among county.

Hillsborough

<table>
<thead>
<tr>
<th>county</th>
<th>Hardee</th>
<th>Hillsborough</th>
<th>Marion</th>
<th>Pinellas</th>
<th>Polk</th>
</tr>
</thead>
</table>

Average of SL_Score for March: 0.02

Average of SL_Score for April: 0.00

By ZIP and Month

33835, 34250, and 34487, among others, had the most significant impact on the decrease among zip.

<table>
<thead>
<tr>
<th>zip</th>
<th>33835</th>
<th>34134</th>
<th>34250</th>
<th>34487</th>
<th>34636</th>
</tr>
</thead>
</table>

Average of SL_Score for March: 0.02

Average of SL_Score for April: 0.00
Here's the analysis of the 55.34% increase in Average of SI_Score between April and May.

**Average of SI_Score and Count of SI_Score**

*By County and Month*

'Hillsborough', 'Polk', and 'Lee', among others, had the most significant impact on the increase among county.

<table>
<thead>
<tr>
<th>County</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hillsborough</td>
<td>123</td>
</tr>
<tr>
<td>Polk</td>
<td>456</td>
</tr>
<tr>
<td>Lee</td>
<td>789</td>
</tr>
</tbody>
</table>

**Average of SI_Score**

*By Zip and Month*

34441, 33586, and 33840, among others, had the most significant impact on the increase among zip.

<table>
<thead>
<tr>
<th>Zip</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>34441</td>
<td>123</td>
</tr>
<tr>
<td>33586</td>
<td>456</td>
</tr>
<tr>
<td>33840</td>
<td>789</td>
</tr>
</tbody>
</table>

**Average of SI_Score**

*By Month*

Average of SI_Score for April: 0.01

<table>
<thead>
<tr>
<th>Month</th>
<th>Average of SI_Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>0.01</td>
</tr>
<tr>
<td>May</td>
<td>0.02</td>
</tr>
</tbody>
</table>
Region: Comparison of movement to admissions
State: Infections Continue to Rise w/ Movement

Daily infections and testing

Estimated infections
Confirmed infections
Tests
Tests (projected)

Shaded areas indicate 95% uncertainty interval.
State: Daily Deaths Show Wide Range of Possibilities Related to Assumptions

H(0): Mobility-Spread-Deaths
H(1): Hi Correlation
H(2): Lo Correlation
Personal Privacy Protections

- Not tracing
- Not individual tracking
- Consultative support for the county
- Leverages data supplied in accordance with comprehensive data protection laws (CCPA, GDPR)
- Typically available anonymized movement data similar to those used in airports, traffic flow and shopping malls
- Identifies and spatially highlights mobile movement on the aggregate
- Compares movement to hospital bed utilization without resolution to specific individual or location
- Performs statistical correlation analysis using data on movement and density to:
  - Probability of needed beds, PPE and key medical equipment like ventilators in hospitals
  - Where best to resource first responders to avoid resurgence of the virus
- Response is a function of well established first responder protocols and public policy including personal confidentiality and security.

**All data presented:**
- Contains no personally identifiable information
- Contains no HIPPA protected information
- Complies with comprehensive data protection laws in 80+ countries including GDPR (EU) and CCPA (California Consumer Privacy Act)
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Largest Risks to COVID Hospital Capacity

• Map Targeted Nursing/Group Home Facilities
• Conduct Targeted Daily Cluster Analysis
• Evaluate Daily Correlation Graph (by Hospital)

Data Driven

• Centralize Comprehensive Dashboard (spread, capability, outcomes)
• Explore and Test Key Parameters in the Models
• Pose Tough Questions and Find Insights in the Data

Actionable

• Create daily feeds to Coordinating Officials & EPG Access
• Deploy Mobile testing teams
• Deploy Mobile care triaging/monitoring teams

Data Science

• Automate: How and When to send alerts to key officials...
• Learn: How to use other datasets (syndromic/tracing/demographic) to improve model accuracy...

Actions Moving Forward

• Continue to increase the power and accuracy of the predictive models
• Add prescriptive modeling and generate key insights
• Generate actionable alerts for immediate response and strategic decision making
Steering Team

- Matthew Mullarkey, Ph.D., USF Muma College of Business, ISDS
- Kaushik Dutta, Ph.D., USF Muma College of Business, ISDS
- Wolfgang Jank, Ph.D., USF Muma College of Business, ISDS
- Marissa Levine, M.D., USF College of Public Health
- Lori Collins, Ph.D., USF College of Arts & Sciences, Geo Sciences
- Daniel McSkimming, Ph.D., USF College of Medicine, Bio Informatics
- Alya Limayem, Ph.D., College of Arts & Sciences, Microbiology
- Sidney Fernandes, CIO, USF
- Peter Chang, M.D., Tampa General Hospital
- Brian Hammond, CTO, Tampa General Hospital
- Mike Merrill, County Administrator, Hillsborough County
- Ramin Kouzehkanani, CIO, Hillsborough County
- Dennis Jones, Fire Chief, Hillsborough County
- Gene Early, Health, Hillsborough County
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