



ANGELIA PAYNE

COVID-19 – HILLSBOROUGH FIRE RESCUE DEPARTMENT¹

"The measure of a great department is how well they train their members. I am confident we are well prepared to handle the COVID-19 coronavirus pandemic. We will continue to provide our members with the most current information as well as the equipment and support to succeed in providing uninterrupted service to the citizens we serve."

Dennis Jones, Fire Chief of Hillsborough County Fire Rescue, oversees more than 1,000 firefighters as well as 160 reserve responders, paramedics, and staff. The department answers more than 110,000 calls annually for fire and emergency medical services, conducts fire investigations, does fire prevention inspections, and leads safety programs for the unincorporated areas of Hillsborough County. Entering his sixth year as Fire Chief of Hillsborough County Fire Rescue, Jones faces the daunting task of asking emergency responders to enter an environment where responders are at risk of contracting the virus they are trying to respond to Corona Virus Disease-2019, better known as COVID-19.

COVID-19, a highly contagious and deadly virus, rapidly spread across the world, including the United States, with the first reported case reaching Hillsborough County on March 1, 2020. Jones, Emergency Management, and other Hillsborough County leaders assembled a few days later, to create a comprehensive plan on how Hillsborough County would protect citizens, front line workers, and first responders during this crisis. The first order of business was to immediately upgrade the Emergency Operations Center from Level 1, regular activity to a Level 2 state of partial activation and start monitoring all available metrics.

In December 2019, Hillsborough County adopted a new 488-page Comprehensive Emergency Management Program (CEMP) to guide county leaders in times of emergencies. Part of the updated plan included enhanced technology for internal use and a new website. The website hcflgov.net/staysafe was designed to keep the residents of Hillsborough County safe and informed during an emergency. However, both the CEMP and the website lacked any guidance on a pandemic. Therefore, Jones and the other leaders voted in early March to update the site to include COVID-19.

As both Fire Rescue Chief and supervisor of the Director of Hillsborough County Emergency Management (HCEM), Jones was keenly aware that the decisions he and others had to make would impact the lives and livelihoods of people in the entire community. With that in mind, Jones considered how to manage the pandemic response and how to keep responders safe despite a limited supply of personal protection equipment (PPE). Was the answer to leave teams as they are, create new and smaller teams, reorganize current teams, or consider other solutions?

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COVID-19 and Hillsborough County

In December 2019, the U.S. economy was strong with the stock market at an all-time high and unemployment at an all-time low. The buzz in the air was about the 2020 presidential election. The headlines in December 2019, were littered with the rhetoric of Trump's impeachment, the trade war between the United States and China, and wildfires out of control in Australia. No one had any clue that the headlines, along with so many lives, were all about to change.

COVID-19

Prior to Christmas 2019, no one had heard of COVID-19, but it changed when the center of disease control (CDC) was informed of a mysterious respiratory illness in Wuhan, China on December 31, 2019. Near the start of January 2020, the world also became aware of a new coronavirus, now named COVID-19, which was rapidly spreading throughout Wuhan, China. As events of this deadly virus in China played out on the evening news, conversations about the impending Chinese New Year started. As its tradition, China shuts down all nonessential work for several weeks to celebrate the Chinese New Year, giving families in China time to vacation.

The combination of COVID-19 and the Chinese New Year helped quickly spread the virus around the world to create a deadly pandemic. Outside of China, Europe first felt the fatal effects of COVID-19. By late January, the virus entered the United States; at the same time, the news reported a shortage of personal protection equipment (PPE) and ventilators worldwide. On January 21, Washington State had the first reported case in the United States; the first death in the United States was on February 29. On March 1, Florida became the seventh state in the United States to confirm its first COVID-19 case.

With one case in Manatee County and one case in Hillsborough County on the same day, Governor DeSantis of Florida declared a public health emergency for Florida. On March 11, the World Health Organization (WHO) officially declared COVID-19 a pandemic. Two days later, the United States declared COVID-19 a national emergency. On March 14, DeSantis ordered bars, nightclubs, and schools closed until April 15. By March 17, every state in the United States reported at least one case of COVID-19. With a lack of guidance from the Federal or state level, Mayor Castor of Tampa announced implementing a stay-at-home order on March 21, and all nonessential businesses were to close. On April 1, DeSantis ordered a statewide stay-at-home order to go into effect April 3 for a minimum of 30 days. The deadly consequences of COVID-19 surprised all nations and quickly overwhelmed the medical system. Exhibit 1 provides a timeline of COVID-19.

Hillsborough County

Hillsborough County, located in the west-central portion of Florida with a shoreline stretching over 158 miles on Tampa Bay, was officially formed on January 25, 1834. Wills Hill, the namesake of Hillsborough County, was the Earl of Hillsborough; from 1768 to 1772, he served as the British Secretary of State for the Colonies. Present-day Hillsborough County has a total area of 1,266 square miles, with three cities located within its borders: Tampa, Plant City, and Temple Terrace. Hillsborough County is the fourth-most populous county in Florida with a population of more than 1.5 million people. Known as a major business center, Hillsborough County is home to MacDill Air Force Base home to U.S. Central Command and U.S. Special Operations Command, two universities (the University of South Florida and the University of Tampa), Tampa International Airport, three major sports teams--Tampa Bay Buccaneers (NFL), the Lightning (NHL) and the Yankees AAA baseball team (MLB), minor league, the Straz Center for arts, Busch Gardens theme park, the Florida Aquarium, and Zoo Tampa at Lowry Park. Hillsborough County is governed by a board of seven elected County Commissioners, who oversee emergency management, fire rescue, and many other departments.

Hillsborough County Fire Rescue

Hillsborough County fire protection began with the Department of Forestry. In the 1950s, Volunteer Fire Departments began to spring up in communities throughout the county, with Gibsonton being the first and largest. The first paid firefighter was hired in 1973. In 1997, the former Hillsborough County EMS merged with the Hillsborough County Fire Department to create Hillsborough County Fire Rescue (HCFR). In 2012, the last volunteer fire station was fully staffed with paid firefighters. Qualified volunteers interested in continuing with HCFR were placed into Reserve positions to supplement staffing.

In 2020, Hillsborough County Fire Rescue is comprised of 43 fire stations and one rescue station; each fire station houses one or more apparatus, which comprise 43 Engine, 33 Rescue ambulances, four ladder trucks, and eight water tankers. Chief Jones oversees seven Battalion chiefs, who supervise more than 1,000 firefighters as well as 160 reserve responders, paramedics, and staff. In an average year, the department answers more than 110,000 calls for fire and emergency medical services, conducts fire investigations, does fire prevention inspections, and leads safety programs for the unincorporated areas of Hillsborough County.

Fire stations house between one engine to several different apparatus, depending on what is assigned to a particular location. Fire Fighter shifts run 24/48, 24 hours on, then 48 hours off, starting at 8:00 a.m. and ending at 8:00 a.m. Teams are formed according to the apparatus: Engine, Rescue, Squad, Truck Company, Water Tanker, and Heavy Rescue.

If not at an emergency, firefighters, and EMS train in house daily to maintain a level of readiness for any emergency. Annually, training is conducted six to eight times a year for each company at the Public Safety Operations Complex (PSOC)/Fire Rescue Headquarters. PSOC has a state-of-the-art training facility created out of containers whose features include burn room, flashover simulator, self-contained breathing apparatus (SCBA) maze, standpipe, cantilever balcony, a reusable roof for chimney fires, ventilation, and rappelling options. The facility allows firefighters, EMS, and law enforcement to practice scenarios, such as live burns with fire and smoke, extractions from a burning building or vehicle extrication, elevator and multistory rescue, and biological and chemical hazards. Exhibit 2 presents a sketch of a container training facility.

Emergency Operations

Driving home from church on March 1, 2020, Jones received a call from the Department of Health, the first positive case of COVID-19 was in Hillsborough County. With the initial case being isolated to one patient and well managed, no emergency was called at that time. Later that day, discussions started with staff on planning for a possible pandemic. A few days later, when multiple cases were reported in Hillsborough County, actions were taken to take inventory of all personal protection equipment (PPE), evaluate possible response change for first responders, review all available policies, and talk to Emergency Management about pandemic planning and creating a task force.

Chief Dennis Jones – Protagonist

Dennis Jones, a fourth-generation Hillsborough County native, graduated from Hillsborough High School in 1974. He enrolled in the University of South Florida, majoring in medicine, but soon discovered medicine was not his passion. At the urge of his then-girlfriend and now wife, Jones transferred to Hillsborough Community College and earned an AS in Fire Science, then continued on to Columbia Southern University and earned a BS in Fire Science. Finally, following his father and uncles' footsteps, Jones becomes a Tampa firefighter. Jones, now a father of three, has never regretted his career choice. Jones started as a City of Tampa firefighter in May 1978, worked his way up the ranks, and retired as a

Fire Chief in May 2010. Not one to stay idle, Jones came out of retirement in November 2010, to become a fire training specialist for the City of Tampa. In 2015, Jones transitioned from the fire department of the City of Tampa to Hillsborough County Fire Rescue, where he serves as Hillsborough County Fire Rescue Chief and supervises the Director of Emergency Management.

As Fire Chief, Jones supervises the daily operations of Fire/EMS as well as the Director of Emergency Management (EM) for the department of Office of EM. Since COVID-19 entered Hillsborough County, Jones states his focus has changed:

My entire focus, practically, has been on COVID-19 since the first week of March. Days beginning at 0500 filled with seemingly non-stop meetings, conference calls, and planning sessions. Included in the challenge has been the introduction of telework via *virtual* meetings. My focus has shifted from departmental management to county-wide daily interaction with ALL levels of government, including municipalities and constitutionals^[1]. Additionally, weekend conference calls have become the norm, consuming no less than a half-day each Saturday and Sunday. Casual contacts have become intimate partners. Healthcare facility representatives have become trusted allies, and leadership within the county government has been personally stretched to meet the numerous challenges of a pandemic never before experienced. Innovation and "out of the box" thinking have become the norm, e.g., Quarantine & Isolation Hotels, as well as Public collection sites for CV19 testing. (D. Jones, personal communication, May 16, 2020)

Chief Jones' Resume is provided as Exhibit 3.

Emergency Management Center

Jones walks into the Emergency Operations Center (EOC), where all events for Hillsborough County are coordinated; the room is located in the middle of the Public Safety Operations Complex (PSOC). Since an emergency has been declared in Hillsborough County, the EOC and the Emergency Policy Group (EPG) are activated. The EOC has 19 Emergency Support Function (ESFs) representatives from all areas and disciplines, including but not limited to, law enforcement, fire, EMS, health department, nursing homes/adult living facilities coordinator, transportation, purchasing, finance, and legal. The EPG is comprised of the mayors from Tampa, Plant City, and Temple Terrace, along with three county commissioners, the Sheriff, and the School Board Chair. During declared emergencies, broad powers are given to the County Administrator by the County Charter and EPG. Throughout the declared emergency, the EPG and EOC conduct weekly meetings to determine the best course of action for Hillsborough County.

Activation Levels

Hillsborough County EOC has three levels of activation; the situation and response dictate the level of activation to be either monitoring, partial activation, or full activation. With COVID-19 in Hillsborough County, EOC activation changed to level 2, partial activation. In level 2, many positions were moved to virtual, vacations and exchange time^[2] were canceled, face to face communication moved to virtual, and new screening procedures for all guests and employees entering the PSOC/Fire Rescue Headquarters were implemented.

Communication

With level 2 activation in place, face to face communication is replaced with virtual face-to-face communication, using multiple virtual meeting platforms such as WebEx, Zoom, and MS Teams. Telework schedules were implemented for employees working from home. Weekend conference calls for

all stations to share the latest information and policy updates for every station and shift transpired on Friday, Saturday, and Sunday.

Dispatch

With COVID-19 being highly contagious, new dispatch protocols were implemented, creating a screening tool to identify COVID-19 potential patients and the possible need for PPE. Dispatchers interview emergency calls to determine if it is possibly a COVID-19 case. Once teams arrive, the patient is questioned again by the responders to verify that the answers align with answers given to dispatch.

HFCR minimum staffing for its teams is provided in Exhibit 4.

Technology

Jones thought about the situation and what the world had learned in the last three months. COVID-19 spread quickly from person to person. Once a person had COVID-19, he/she may or may not show symptoms. The elderly and people with underlying health conditions were the most susceptible to the disease and were more likely to end up in intensive care unit (ICU) and on a ventilator.

Matrix

As a firefighter, Jones had spent years in scenario training. (Exhibit 5) This type of training presents scenarios of different emergencies that are discussed and re-discussed to help prepare firefighters to make rapid decisions in an emergency where a split second determines the difference between life and death. Jones, falling back on his scenario training, searched the different matrixes that had been created by universities, governments, and the World Health Organization to determine which matrix would be the most useful to determine a course of action. The matrixes are dashboards designed to show testing data, demographics, percent of positive/negative tests, how and where samples are gathered, trends from testing, numbers of patients hospitalized, ICU bed availability, along with ventilators. The dashboards help track the spread of the pandemic, predict peaks, and help predetermine when ICU beds and ventilators would exceed capacity. Some of the dashboard, matrices Jones evaluated were covid19.healthdata.org, floridahealthcovid19.gov, covid19.who.int, and ASPeCT.

ASPeCT

Anonymized, Systematic, Population e-(geo-fenced) Contagion Tracking (ASPeCT), developed by and run by the Steer Team, is a geo-fenced contagion tracking system with a comprehensive decision support dashboard approach. ASPeCT uses big data to replicate the population by analyzing the demographics, density, movement behavior, and social behaviors of people in a regional community. The information gathered helps determine the spread, outcome, and capability by creating aggregated dashboards, referred to as Movement Dashboard, Testing Dashboards, and Capacity Dashboard, which give a comprehensive overview of a region. The ASPeCT steering team is presented in Exhibit 6.

The Movement Dashboard (Exhibit 7) uses geo-fenced technology, which tracks more than 3 million devices across 13 counties to evaluate movement behaviors. The information analyzes how far a person traveled, the number of unique locations a person visited, and the number of dense areas a person visited to create a Social Isolation Score. The Social Isolation Score is compared against known virus spread. Statistically, a direct correlation exists between the number of new cases and the Social Isolation Score. Three separate Movement Dashboards are derived, using the information gathered from the geo-fenced technology.

The Movement Dashboard - Heat Map shows a map of 13 counties down to the zip code and how much or how little movement happens on any given day. The Movement Dashboard – Capacity Correlation creates a side-by-side graph; one graph, using the Social Isolation Score, shows the risk score in the vicinity of Tampa General Hospital (TGH). The second graph shows the number of devices arriving at TGH 14 days later, to create a comparison analysis of movement and infection rate. The Movement Dashboard – Risky Cluster ID uses geo-fenced technology to locate where 150 or more devices conjugate in a 500X500 square-foot area in an eight-hour time period. The 13 county map pinpoints two different types of clusters: movement risk and acuity/demographic risk.

The Testing Dashboard is a comprehensive dashboard using information supplied by TGH to track the number of patients tested for COVID-19. The metrics used in the dashboard are patients who have tests for COVID-19 and have come out negative, positive, or pending. The dashboard metrics show inpatient pending results, total positive patient in-house, inpatient positive, patients in ICU, patients on ventilators, new positive tests in the last 24 hours, new pending tests in the last 24 hours, new inpatient positive tests in the last 24 hours. Also, the dashboard shows in-house patients vs. discharged patients along with an area map showing the number of COVID-19 tests ordered in Hillsborough County.

The Capacity Dashboards are similar to covid19.healthdata.org, floridahealthcovid19.gov, and covid19.who.int capacity dashboards; the downside of these dashboards is they have low predictive power in a region, due to unreliable or untimely data being reported to the dashboard. ASPeCT's Capacity Dashboards were created using the information gathered from 51 hospitals over 13 counties that encompass 5 million lives. The Capacity Dashboard – ICU Beds & Ventilators show the number of ICU beds and ventilators available vs. occupied at each hospital and as a combined total of all collaborating hospitals. The Capacity Dashboard is used to forecast the number of ICU beds needed in the future, using the 13 county region's demographics, density, movement behavior, and social behaviors. The Capacity Dashboard – Coronavirus: characteristics of Florida resident cases breaks down by age groups the number of cases, hospitalizations, and death in Florida.

The Decision

COVID-19, a highly contagious and deadly virus, rapidly spread across the world, including the United States, with the first reported case reaching Hillsborough County on March 1, 2020. Jones, Emergency Management, and other Hillsborough County leaders assembled to create a comprehensive plan on how Hillsborough County would protect citizens, front line workers, and first responders during this crisis. The first order of business was to immediately upgrade the Emergency Operations Center from Level 1, regular activity to a Level 2 state of restricted access and start to monitor all available matrixes. As Fire Rescue Chief and supervisor of the Director of EM, Jones was keenly aware that the decisions he, along with other leaders, had to make would impact the lives and livelihoods of people in the entire community. With that in mind, Jones pondered the problem of how to manage pandemic first response 24/7 and keep responders safe despite a worldwide shortage of personal protection equipment (PPE), too many unknowns surrounding COVID-19, and little guidance from Federal or State government. Was the answer to create new response teams, reorganize current teams, or change nothing?

Risk-Effectiveness Matrix

The risk-effectiveness matrix (Exhibit 8) identifies the inherent risks between effectiveness of intervention and the possible putting employees at risk due to COVID-19 outbreaks in Hillsborough County.

Options: Teams Dispatched to a Non-Fire Emergency

1. Do Nothing: Teams and response remain the same. Emergency responses are dispatched with a fire rescue, 2 people and engine, 3 people responding together.

Pros: Teams and training remains unchanged

Con: PPE will be used up at an accelerated rate

2. Create New Response Teams: Create special 2 person teams to respond to COVID-19 emergencies.

Pros: Save PPE

Con: Cost and Time for retraining

3. Reorganize Current Teams: Reorganize emergency response from a two-person team to a three-person team, eliminating the engine from these calls.

Pros: Save PPE

Con: Lose cohesiveness

References

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Acknowledgments

This case study is based upon work supported by Fire Chief Jones of Hillsborough County Fire Rescue and Matthew Murlarkey, Ph.D., Professor, University of South Florida.

Biography



Angelia Payne is an entrepreneur with over 20 years' experience in the container industry. She is the Co-founder, President, and CEO of A American Container & Trailer Leasing, Inc. a company that has grown from a concept to a rental and sales fleet of more than 1,100 containers and one of the top providers for portable storage in the region. Currently, Angelia is working on her DBA at USF Muma College of Business.

Exhibit 1: Timeline of COVID-19

- 12/31/19 – CDC becomes aware there was a mysterious respiratory illness in Wuhan, China
- 01/06/20 – WHO advised against travel and restrictions with Wuhan
- 01/08/20 – CDC issues first public Alert about Coronavirus
- 01/20/20 – WHO & China confirm Coronavirus is transmitted from human-to-human
- 01/21/20 – Washington State reports the first case of Coronavirus in the US
- 01/23/20 – China shuts down Wuhan
- 01/27/20 – WHO sends out a world alert, Coronavirus is "high at the global level."
- 01/30/20 – WHO alerts "all countries should be prepared for containment, including active surveillance, early detection, isolation, and case management."
- 01/31/20 – Trump administration declares a public health emergency
imposed a mandatory 14-day quarantine for US citizens who visited China
- 02/26/20 – Vice President Mike Pence – appointed leader of the coronavirus task force
- 02/29/20 – Washington State reported the first death in the US from Coronavirus
- 03/01/20 – Florida becomes the 3rd state with Coronavirus
Hillsborough & Manatee County each reporting one case
- 03/11/20 – WHO declared global pandemic - Novel Coronavirus Disease (COVID-19)
- 03/13/20 – The US declares national emergency – COVID-19
- 03/17/20 – All 50 states are reporting cases of COVID -19

Source: Kennedy, M., (January 30, 2020). WHO declares coronavirus outbreak a global health emergency. NPR. Retrieved 30/05/20 from <https://www.npr.org/sections/goatsandsoda/2020/01/30/798894428/who-declares-coronavirus-outbreak-a-global-health-emergency> and Wood, D.; Adeline, S.; Talbot, R. (June 8, 2020). Coronavirus world map: tracking the spread of the outbreak. NPR. Retrieved 08/06/20 from <https://www.npr.org/sections/goatsandsoda/2020/03/30/822491838/coronavirus-world-map-tracking-the-spread-of-the-outbreak>

Exhibit 2: Sketch of Container Training Facility



Source: <https://3dwarehouse.sketchup.com/model/1b13361948f4c76acf0ad27080dda316/Fire-department-training-center>

Exhibit 3: Dennis Jones Resume

**DENNIS W. JONES
HILLSBOROUGH COUNTY FIRE RESCUE
FIRE CHIEF**

PERSONAL: Fourth generation Hillsborough County native
Wife (41 years)
Son (39) – Firefighter – Tampa Fire Rescue
Daughter (34) – Licensed Mental Health Counselor
Son (19) – junior – University of Central Florida
Member - Riverhills Church of God
Administrative Elder
Finance Committee Chair
Band Member and Choir Director

EDUCATION: Hillsborough High School '74 (Drum Major/Interact President/Alumni Hall of Fame-2019)
Hillsborough Community College – AS, Fire Science
University of South Florida
Columbia Southern University – BS, Fire Science

EMPLOYMENT HISTORY: Tampa Fire Rescue – May 1978
EMT State Certification – October 1978
Paramedic State Certification – August 1981
Assigned; Rescue 18 – August 1981
Promoted; Driver/Engineer – October 1981
Received A/S Degree Fire Science – December 1981
Assigned; Engine 12 (Paramedic Pump) – March 1982
Assigned; Training Instructor – May 1984
Promoted; Fire Captain – February 1985
Assigned; Captain HazMat / Special Ops – April 1986
Promoted; District Fire Chief – July 1989
Assigned; Airport Division – December 1996
Promoted; Division Chief – March 1997
Promoted; Fire Chief – October 2004
Retired; May 2010
Re-employed; Fire Training Specialist – November 2010
Resigned for new opportunity; April 2015
Employed; Fire Chief – Hillsborough County Fire Rescue – April 27, 2015

CERTIFICATIONS: EMT-P
Fire Instructor III
Fire Officer One
Municipal Fire Safety Inspector
Advanced Cardiac Life Support
ACLS/BCLS/PALS Instructor
Live Fire Training Instructor

PAST ACTIVITIES AND ACCOMPLISHMENTS:
Worked in every station and all vehicles – Tampa Fire
Airport Firefighter
Rescue Driver / Acting Sr. Paramedic / Acting Rescue Supervisor
Engine/Paramedic Pump Driver
Engine & Aerial Captain
Originating Special Operations Captain

International Extrication Competition – Team Member/Judge/Host
 Originating TMRT member – Served as Team Leader
 Auxiliary Police Officer – City of Tampa
 NAUI Diver & Search and Recovery Diver
 Honor Guard Member 24 years – Team Leader
 Urban Search and Rescue Team Leader
 Departmental Emergency Management Coordinator
 City of Tampa Emergency Manager
 Mayor's Terrorism Task Force
 Awards Review Board
 Training & Education Committee
 Smallpox Taskforce
 NFPA 1710 Committee
 EMS Initiatives Committee
 Sykes Heroes' Luncheon Liaison
 International Association of Fire Chiefs
 Metropolitan Fire Chiefs Association
 Southeastern Fire Chiefs Association
 Florida Fire Chiefs Association
 International Society of Fire Service Instructors – Region 4 Chairman
 EMS Educators of Florida
 Emergency Medical Planning Commission
 Firemen's Benevolence – Board Member
 Friends of Tampa Fire Rescue
 Hillsborough County Fire Rescue Foundation
 Tampa Fire Sick Bank Committee Member – Served as Chairman
 Employment Placement Officer
 Pump Operator Promotional Practical Assessment
 Departmental WMD Coordinator
 DOD & DOJ Equipment Grant Administrator
 Leadership, curriculum development and instruction in:
 Field Training Officer Program
 Driver/Engineer Development
 Officer Candidate School
 Fire Company Officer Program
 Incident Command System
 Simple Triage and Rapid Treatment
 High Rise Firefighting
 Personnel Accountability
 Recruit Indoctrination
 EMT Recertification
 Foam Firefighting
 Firefighter Minimum Standards
 Ladder Operator Class for HCC Degree Program
 Pump Class for HCC Degree Program
 EMT for HCC Degree Program
 Paramedic for HCC Degree Program
 Advanced Cardiac Life Support for HCC Degree Program
 First Responder for Law Enforcement Academy
 Firefighting for Law Enforcement Academy
 Hazardous Materials for Law Enforcement Academy

Source: Dennis Jones

Exhibit 4: HCFR Teams Staffing

STANDARD MINIMUM STAFFING PER UNIT:

43 ENGINE (PUMPER) = 3/EACH

33 RESCUE (AMBULANCE) = 2/EACH

4 SQUAD (PARAMEDIC RAPID RESPONSE WITHOUT TRANSPORT) = 2/EACH

4 TRUCK COMPANY (LADDER) = 4/EACH

8 WATER TANKER = 1/EACH

7 BATTALION CHIEF = 1/EACH

1 HEAVY RESCUE = 3/EACH

Exhibit 5: Lower-Order Themes From Firefighter Near-Miss report

TABLE 1
Lower-Order Themes From Firefighter Near-Miss Reports

<i>Secondary Categories</i>	<i>Definition</i>	<i>Lowest-Order Categories</i>
Situational awareness	Maintaining cognizance of surroundings and the environment	Continually assessing environment for surprises Challenging assumptions and double-checking work
Direction setting	Use of formal and informal authority to influence adherence to policies and procedures, encouraging vigilance as a social norm, and properly directing actions of those involved in the situation	Ensuring personnel follow safety procedures Maintaining knowledge of team members' actions Reminding team members of situational priorities
Talk	Facilitating sensemaking through verbal cues	Repeating reports until meanings are shared Negotiating instances of conflicting information
Knowledge	Using information from both prior experience and training to purposefully guide action	Comparing current hazards with prior experiences Reminding team members of situational expectations Relying on those with the most expertise
Role acting	Reducing ambiguity through behaving in accordance with expected roles and using the expected division of labor to anticipate others' behavior	Performing tasks expected due to positional title Assigning specific roles to divide and control work Acting appropriately in relation to others' roles
Agility	Rapidly adjusting behavior due to changing conditions	Thinking and acting quickly when plans go awry Readjusting priorities in the face of change
Role modeling	Personally enacting examples of mindful behavior	Wearing personal protective equipment Following policies and procedures
Trust	Believing in the reliability of coworkers and depending upon them when necessary	Staying together as a team, in proximity and goals Avoiding lone actions that jeopardize others

Note. $N = 100$ near-miss reports. The 19 lowest-order categories constitute leaders' actions, and the secondary categories comprise both leaders' actions (direction setting, role acting, and role modeling) and leadership as a collective process (situational awareness, talk, knowledge, agility, and trust).

Source: aran, B. E., & Scott, C. W. (2010). Organizing ambiguity: A grounded theory of leadership and sensemaking within dangerous contexts. *Military Psychology*, 22(sup1), S42-S69.

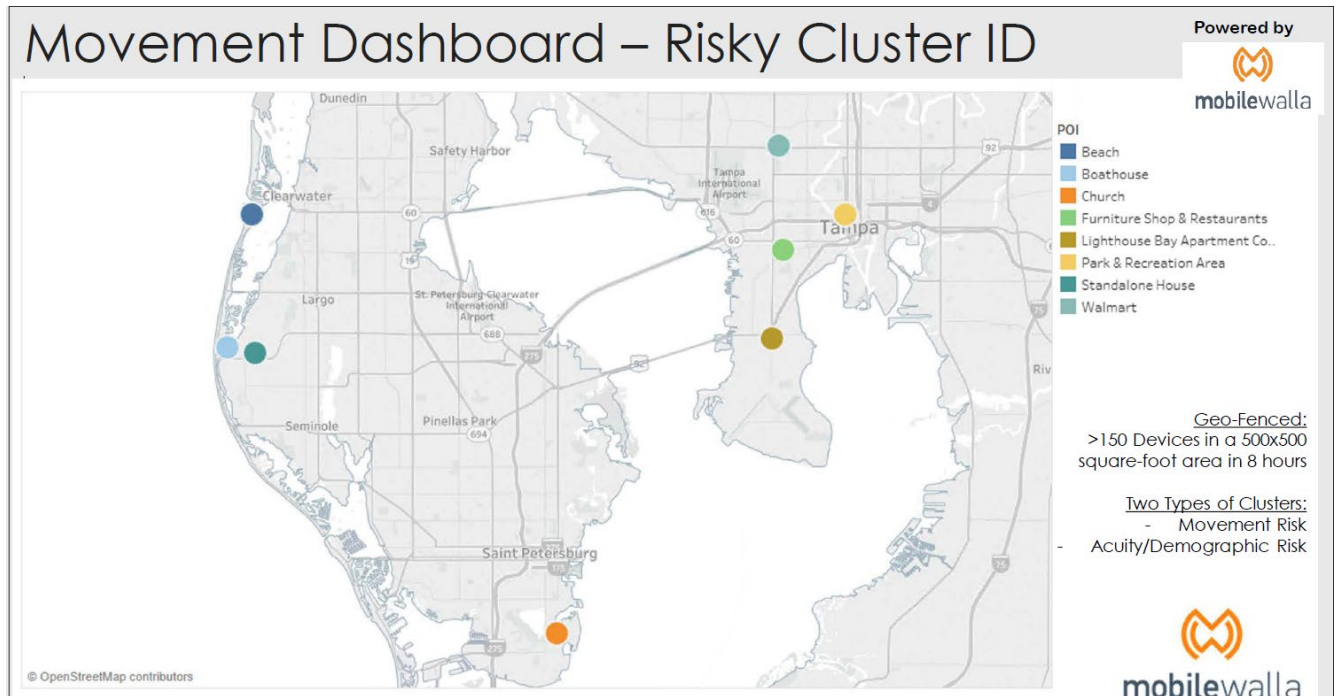
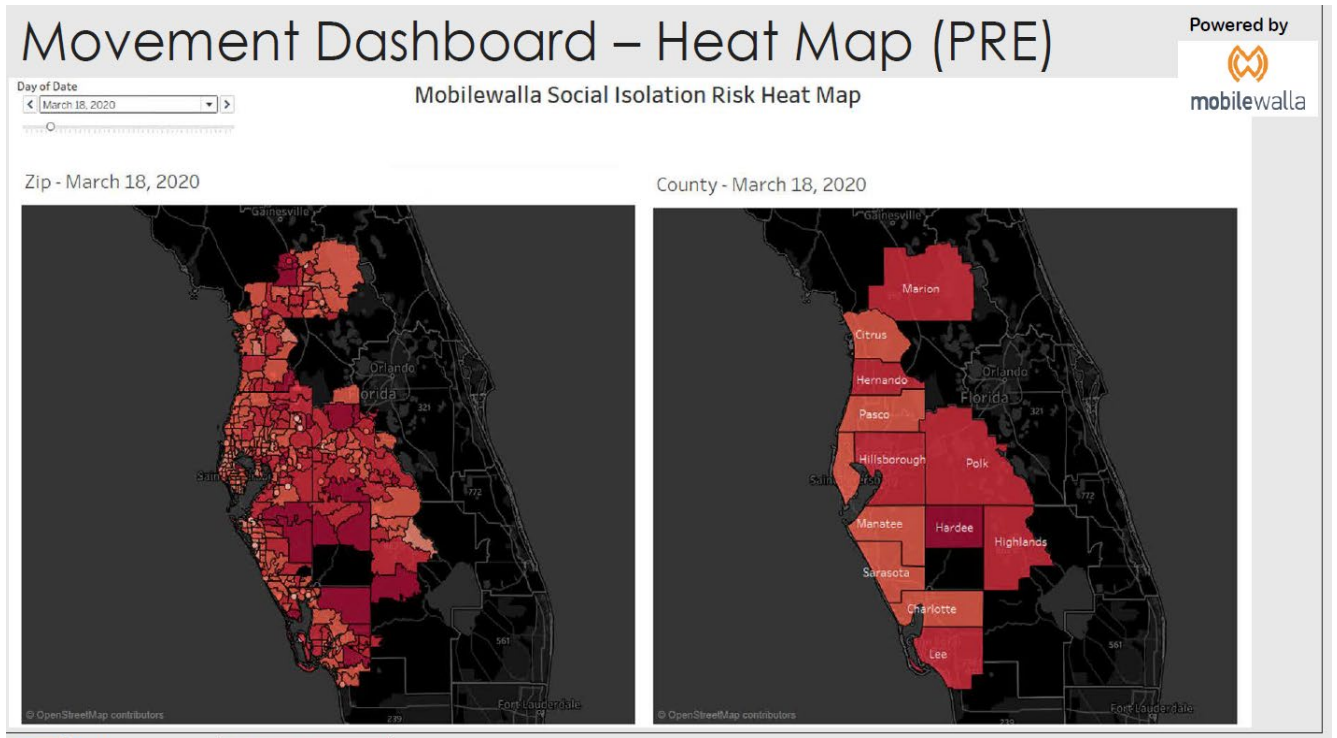
Exhibit 6: Steering Team

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

Source: Matthew Mullarkey

Exhibit 7: Movement Dashboard



Source: Matthew Mullarkey.

Exhibit 8: Risk-Effectiveness Matrix

Effectiveness of Intervention	LO	I	II
	HI	IV	III
		LO	HI

Employee Risk

- I. Low effectiveness and Low Employee Risk
- II. Low effectiveness and High Employee Risk
- III. High effectiveness and High Employee Risk
- IV. High effectiveness and Low Employee Risk