

**2018 Allegheny County Annual
Local Government Case Competition:
Emerging Technologies to Address Human Service Problems**



January 2019



The Allegheny County
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INTRODUCTION

Each year, the Allegheny County Department of Human Services (DHS) hosts a competition for local graduate students. Generously funded by the Human Services Integration Fund¹, the competition challenges interdisciplinary teams of students to learn about a problem facing local government and develop innovative solutions, which they present to a panel of judges.

¹ The Human Services Integration Fund is a group of local foundations that provide flexible funding to DHS for projects that foster integration and support innovation.

2018 marked the 12th year that DHS has hosted the Case Competition. This year's topic, "Emerging Technologies to Address Human Service Problems," asked students to apply game-changing applications of newer technologies in innovative ways to improve the lives of Allegheny County citizens.

Fifty-four students representing four local universities and nine different programs of study participated in this year's competition. Judges from foundations, universities, nonprofits and government agencies volunteered their time and expertise to judge the competition and provide feedback to students.

THE COMPETITION

As part of DHS's 10th anniversary celebration in 2007, DHS instituted the Local Government Case Competition, which has become an annual event. The Case Competition has been an ideal way to give graduate students an opportunity to apply what they are learning in school to real social issues. It also encourages students to consider careers in the public sector; in fact, several past participants have gone on to hold internships and jobs with DHS, the City of Pittsburgh and local nonprofits.

As in past years, this year's Case Competition commenced with a reception on a Wednesday at which team assignments were made and the topic was announced. Following an introduction by DHS Director Marc Cherna, students and judges heard case-framing remarks from Cara Jones, co-founder and CEO of Marinus Analytics, LLC. The case was introduced by DHS Deputy Director Erin Dalton, with the assistance of Deputy Director Abigail Horn.

Student teams spent Wednesday evening through Saturday morning researching, brainstorming and preparing their recommended solutions. On Saturday, the teams gave 20-minute presentations to one of four panels of judges and were judged on the innovation, impact, creativity and feasibility of their solution, as well as their teamwork and oral and visual presentations. The top team from each panel moved on to the final round, in which teams repeated their presentations to all judges and were then awarded prizes for first through fourth place.

THE 2018 CASE

This year's challenge, much broader than in previous years, invited students to apply emerging technology in innovative ways to address a human service problem. Students were charged to think big, but their proposed solution had to include a component that could be implemented within one year. Keynote speaker Cara Jones described how Marinus Analytics, the company she co-founded, has pioneered the use of artificial intelligence and facial recognition technology to help law enforcement, government and the private sector identify and combat criminal activity related to sex trafficking. Ms. Jones framed the challenge and inspired creative yet feasible solutions.

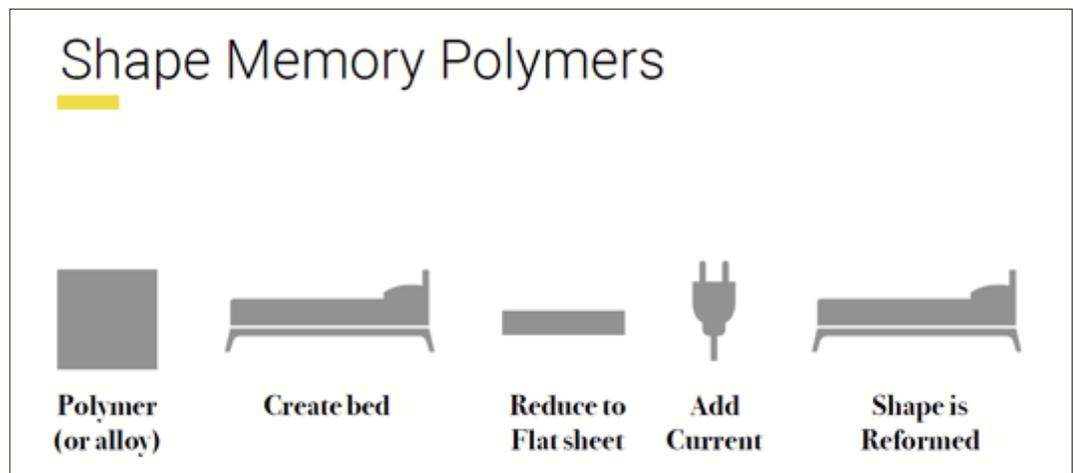
THE WINNING SOLUTIONS

The four finalist teams offered a variety of recommendations that included use of shape-memory polymer furniture to assist with housing stability concerns, apps that combine the best features of many popular apps specifically adapted for human service needs, machine learning applications for improving workforce development, and the use of spatial modeling and predictive analytics to address housing and homelessness issues. See **Appendix A** for a summary of all proposed solutions.

**1ST PLACE****Team West End — Shape-Memory Polymers: Families in Transition**

To provide better housing alternatives in emergency situations, Team West End proposed using shape-memory polymer furniture as a cost-effective solution for families who can't afford conventional furniture and require beds for their children.

As a long-term plan, the team proposed building shape-memory polymer homes to house families and individuals who are homeless or in need of transitional housing. Using this emerging polymer technology would provide a cheap, environmentally friendly alternative to traditional homes and offer higher levels of home security, mobility and overall well-being to families.

FIGURE 1: Shape-Memory Polymers



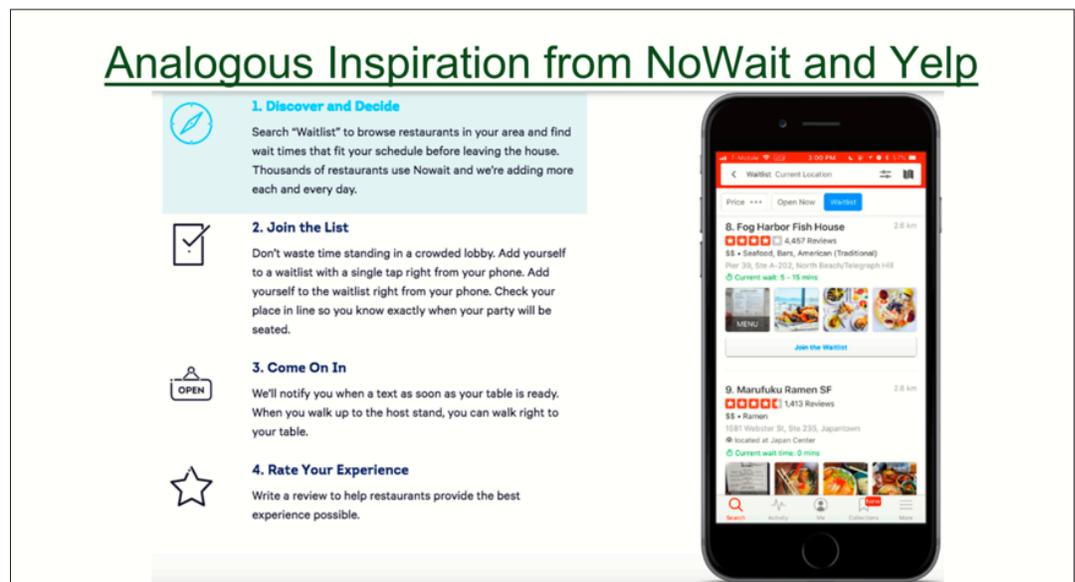
2ND PLACE

Team Highland Park — Integrated Service Portal & Link App

Team Highland Park asked, “What if a client’s experience of seeking housing could be as accessible, streamlined and individually tailored as using their favorite app to choose a restaurant?”

Drawing analogous inspiration from popular existing apps, a client would be able to browse housing options and exercise their choice based on real-time bed capacity, personal preferences, optimized search results and transparent wait times. The client would use the app to complete a standardized intake form, with the information they entered stored centrally, so they would not have to always re-enter the same data. The app would also prompt users for feedback and connect clients to other services they might need.

FIGURE 2: Analogous Inspiration from NoWait and Yelp





3RD PLACE

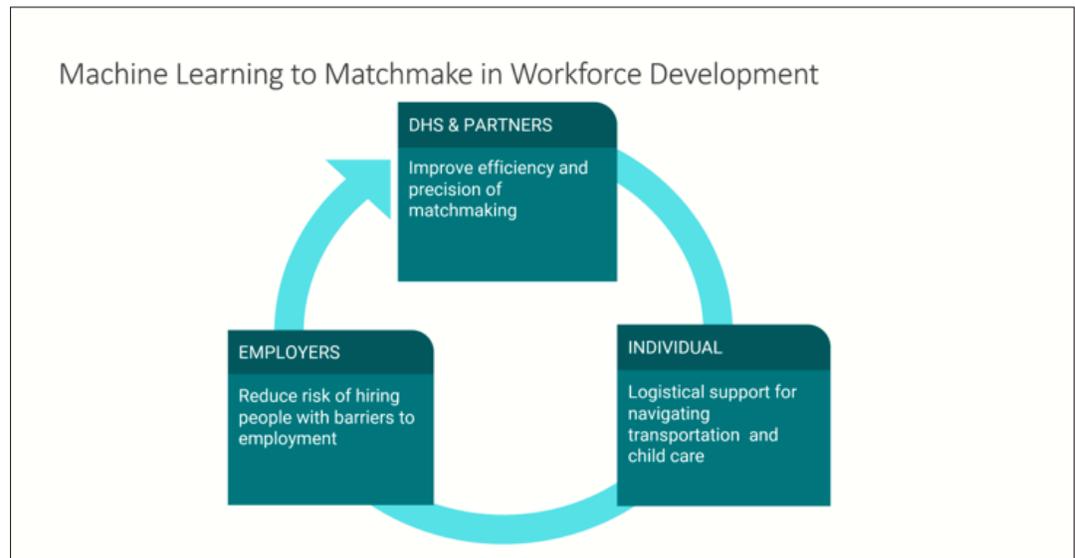
Team Glenwood – Fresh Start 412

Many of the nearly 2,000 Allegheny County residents who participate in the County’s workforce development programs face multiple barriers to employment including, but not limited to, criminal backgrounds, gaps in employment history, and transportation and child care needs.

The Fresh Start 412 program proposes to optimize workforce development efforts with the use of machine learning to find the best combination of employment and/or training options for clients, as well as provide logistical support in determining public transit and child care options in the job search process.

By improving the matching efficiency, Fresh Start 412 would afford workforce development staff more time to focus on program outreach and assistance, rather than sorting through employment opportunities and attempting to match them with participants. In theory, machine learning should provide better matches for the skills, interests and barriers of individuals than a manual process could. It would reduce the risk of hiring individuals with barriers to employment for employers by creating effective employment matches regardless of previous barriers.

FIGURE 3: Machine Learning to Improve Matches Between Clients and Employers



**4TH PLACE****Team Schenley — Preventing Homelessness with Emerging Technologies**

The goal of this proposal was to provide a suite of models that would help policymakers and caseworkers better predict homelessness and connect at-risk individuals with the right resources in Allegheny County.

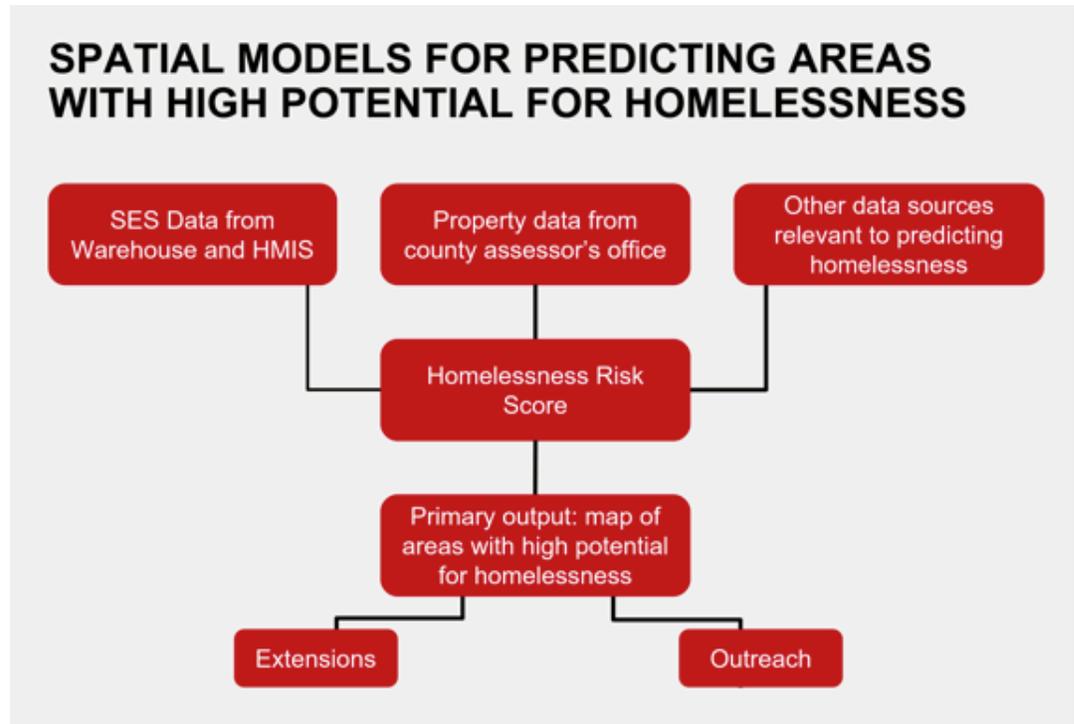
Team Schenley proposed two different models:

1. Using spatial modeling to identify areas with a high risk of increased homelessness
2. Using machine learning to provide personal risk assessments and connect clients to available programs

For the spatial model, the solution would harness DHS's abundance of data within the Data Warehouse and, with access to property data from other county sources, create risk scores by census block to give DHS staff a better sense of where to disseminate information in a targeted way.

The machine learning model would provide a personalized housing security risk assessment to be used by both caseworkers and clients. By calculating a standardized score for the caseworker, the model would provide a more accurate assessment of potential homelessness risk to better allocate resources. Furthermore, a client-facing application would be developed to provide tailored recommendations relating to an individual's risk factors for potential housing insecurity.

FIGURE 4: Spatial Models for Predicting Areas with High Potential for Homelessness



CONCLUSION

Participants were asked to propose game-changing solutions using the latest technology to address human service problems. The teams rose to the challenge and presented many original ideas that will help Allegheny County continue to pursue innovative, creative and effective solutions to improve the lives of its citizens.

The annual Case Competition will be held again next year for graduate students interested in learning more about the public sector and contributing to the work of the Allegheny County Department of Human Services.

APPENDIX A: SUMMARY OF ALL TEAMS' PROPOSED SOLUTIONS

TEAM NAME AND MEMBERS	OVERVIEW OF TEAM'S SOLUTION
<p>[1st place] West End</p> <ul style="list-style-type: none"> • LaChrista Douglas <i>Carnegie Mellon University Heinz, MSPPM</i> • Josh LeFevre <i>Carnegie Mellon University Interactive Design</i> • Michaela Morrell <i>University of Pittsburgh SSW, MSW COSA</i> • Rachel Simms <i>Carnegie Mellon University Heinz, MSPPM</i> 	<p>Pathway Polymer: Families in Transition</p> <p>To provide better housing alternatives in emergency situations, Team West End proposed using shape-memory polymer furniture as a cost-effective solution for families who can't afford conventional furniture and require beds, by law, for their children.</p> <p>As a long-term plan, shape-memory polymer homes would be used to house families and individuals who are homeless or in need of transitional housing. Using this innovative polymer would provide a cheap, environmentally friendly alternative to traditional homes and offer higher levels of home security, mobility and overall well-being to families.</p>
<p>[2nd place] Highland Park</p> <ul style="list-style-type: none"> • Christopher Ibeling <i>Carnegie Mellon University Heinz, MSPPM</i> • Kara McFadden <i>University of Pittsburgh GSPIA, MPA</i> • Zachary Michaels <i>University of Pittsburgh SSW, MSW</i> • Marisa Nowicki <i>Carnegie Mellon University Heinz, MSPPM</i> 	<p>Integrated Service Portal & Link App</p> <p>Team Highland Park asked, "What if the client's experience of seeking housing could be as accessible, streamlined and individually tailored as using their favorite app to choose a restaurant?"</p> <p>Drawing analogous inspiration from popular existing apps, a client would be able to browse housing options and exercise their choice based on real-time bed capacity, personal preferences, optimized search results and transparent wait times. The client would use the app to complete a standardized intake form, with the information they entered stored centrally, so they would not have to always re-enter the same data. The app would also prompt users for feedback and connect clients to other services they might need.</p>
<p>[3rd place] Glenwood</p> <ul style="list-style-type: none"> • Chris Bell <i>Carnegie Mellon University Heinz, MSPPM</i> • Rachel Schneider <i>University of Pittsburgh GSPIA, MPA</i> • Kaiqing Yang <i>Carnegie Mellon University Heinz, MSPPM</i> 	<p>Fresh Start 412</p> <p>Many of the nearly 2,000 Allegheny County residents who participate in the County's workforce development programs face multiple barriers to employment including, but not limited to, criminal backgrounds, gaps in employment history, and transportation and child care needs.</p> <p>Fresh Start 412 proposes to optimize workforce development efforts with the use of machine learning to find the best combination of employment and/or training options for clients, as well as provide logistical support in determining public transit and child care options in the job search process.</p>

TEAM NAME AND MEMBERS	OVERVIEW OF TEAM'S SOLUTION
<p>[4th place] Schenley</p> <ul style="list-style-type: none"> • Dane Bluestone <i>Chatham University MS Counseling Psychology</i> • Ian Fisher <i>University of Pittsburgh GSPIA, MPA</i> • Nicole Li <i>Carnegie Mellon University Heinz, MSPPM</i> • Peter Wu <i>Carnegie Mellon University Heinz, MS Statistical Practice</i> 	<p>Preventing Homelessness with Emerging Technologies</p> <p>The goal of this proposal was to provide a suite of models that would help policymakers and caseworkers better predict homelessness and connect individuals at risk with the right resources in Allegheny County.</p> <p>Team Schenley proposed two different models:</p> <ol style="list-style-type: none"> 1. Using spatial modeling to identify areas with a high risk of increased homelessness 2. Using machine learning to provide personal risk assessments and connect clients to available programs <p>For the spatial model, the solution would harness DHS's abundance of data within the Data Warehouse and, with access to property data from other county sources, create risk scores by census block to give DHS staff a better sense of where to disseminate information in a targeted way.</p> <p>The machine learning model would provide a personalized housing security risk assessment to be used by both caseworkers and clients. By calculating a standardized score for the caseworker, the model would provide a more accurate assessment of potential homelessness risk to better allocate resources. Furthermore, a client-facing application would be developed to provide tailored recommendations relating to an individual's risk factors for potential housing insecurity.</p>
<p>Andy Warhol</p> <ul style="list-style-type: none"> • Jeff Pflanz <i>Carnegie Mellon University Heinz, MSPPM</i> • Cheryl Rozinski <i>Carnegie Mellon University Heinz, MSPPM</i> • Matt Samach <i>Carnegie Mellon University Heinz, MSPPM – DA</i> 	<p>Be Free!</p> <p>Recognizing that caseworkers spend an inordinate amount of their time handling paperwork and administrative duties at the cost of personal interaction with clients, this team conceived AllCoBot, a chatbot to improve the efficiency of caseworkers and lead to a reallocation of their time away from paperwork and toward relationship-building with clients.</p> <p>AllCoBot will use resource retrieval technology and real-time intelligent voice-to-text capabilities to facilitate higher satisfaction, faster delivery of services and convenient updates. Clients will receive more attention from caseworkers, and their cases will be better documented, leading to less need to repeat their stories. Caseworkers will have more time for relationship-building and problem-solving, more manageable caseloads, and a better ability to prioritize.</p>

TEAM NAME AND MEMBERS	OVERVIEW OF TEAM'S SOLUTION
<p>Birmingham</p> <ul style="list-style-type: none"> • Mia Lee <i>Carnegie Mellon University Heinz, MSPPM</i> • Shannon Schroeder <i>Chatham University MS, Psychology</i> • Grant Young <i>University of Pittsburgh, GSPIA, MPA</i> 	<p>The Neighborhood Texting Service</p> <p>This proposal seeks to build a community support structure and enhance the social capital resources of the underserved populations of Allegheny County, helping to provide the means and opportunity to succeed.</p> <p>The proposed Neighborhood Texting Service uses big data to identify when and where needs arise, engages the whole community as a problem-solving force through collaboration, and integrates artificial intelligence technology to connect clients in need of a hand with the appropriate people and agencies that have the ideas, the resources, and the willingness to help. In addition, aggregate data collected can be further leveraged to predict and plan delivery of needed and timely services, positioning DHS to best serve its community.</p>
<p>Fort Duquesne</p> <ul style="list-style-type: none"> • Jam Hammond <i>University of Pittsburgh MPA, MSW</i> • Varun Joshi <i>Carnegie Mellon University Heinz, MSPPM</i> • Victoria Hoang <i>University of Pittsburgh GSPIA, MS International Development</i> • Maura Saxon <i>Carnegie Mellon University MS, Health Policy and Management</i> 	<p>Better Food Finder</p> <p>This solution aims to reduce long-term obesity rates among the underserved communities throughout Allegheny County through the development of an app, Better Food Finder, that will create awareness about healthy food vendors within the immediate vicinity of Allegheny County residents.</p> <p>Better Food Finder will use geospatial analysis to connect low-income communities to the closest and most cost-effective grocery stores and farmers markets within their immediate vicinity. While serving to foster and facilitate healthier eating habits within underserved communities during the short term, this initiative ultimately aims to reduce this population's obesity rates and associated healthcare costs in the long run.</p>
<p>Fort Pitt</p> <ul style="list-style-type: none"> • Sam Duran <i>Carnegie Mellon University Heinz, MSPPM</i> • Marin Kheng <i>University of Pittsburgh MPH/MD</i> • Elizabeth Speigle <i>Carnegie Mellon University Heinz, MSPPM</i> • Sarah Tanjung <i>Carnegie Mellon University Heinz MS – Statistical Practice</i> 	<p>COMEBACK Program</p> <p>This solution addresses the challenge and expense of providing treatment and social support services to formerly incarcerated individuals with substance abuse disorders. COMEBACK is a multi-pronged program that brings support services directly to the individual through a combination of integrated services, on-demand support, acute relapse event detection, and linkage to successful re-entry services. It features two key technological solutions:</p> <ol style="list-style-type: none"> (1) a mobile application that utilizes recent strides in artificial intelligence technology, most notably generative adversarial networks, and provides on-demand, individualized therapy and connects users to social and re-entry service supports (2) a linked state-of-the-art biosensor that monitors for signs of potentially fatal opioid intoxication and contacts 911 in the event of a life-threatening overdose

TEAM NAME AND MEMBERS	OVERVIEW OF TEAM'S SOLUTION
<p>Greenfield</p> <ul style="list-style-type: none"> • Fairleigh Barnes <i>University of Pittsburgh MSW</i> • Denis Permana <i>University of Pittsburgh GSPIA, MPA</i> • Gabriella Kuffour <i>Chatham University MS Biology</i> • Tara Jerry <i>Carnegie Mellon University Heinz, MSPPM</i> 	<p>MyDHS</p> <p>Considering the enormous volume of calls, emails, referrals and other requests for service DHS receives daily, MyDHS would be developed to enable users to quickly and easily access routine information about services DHS provides, such as finding an emergency shelter or information about the nearest treatment center.</p> <p>Using emerging technologies such as big data and predictive analytics, this app will not only allow users to access information related to the services they seek but can predict others they may need as well. Additionally, this tool could capture extraordinary amounts of data about the services that Allegheny County residents are seeking and ultimately using once provided with an array of options that can be used to further develop DHS programs.</p>
<p>Hot Metal</p> <ul style="list-style-type: none"> • Alice Beattie <i>Carnegie Mellon University Heinz, MSPPM</i> • Annamarie Green <i>University of Pittsburgh SSW, MSW</i> • Sean Hoover <i>Carnegie Mellon University Heinz, MSPPM</i> • Ramita Singh <i>Carnegie Mellon University Heinz, MPH</i> 	<p>Family Room</p> <p>Family Room is a two-pronged program aiming to lessen the challenges of single motherhood by connecting moms to find housing together, and, as technology evolves, providing in-home artificial intelligence-based DHS “Assistants” to single moms to support and guide them through the challenges of parenting.</p> <p>Family Room will facilitate connection of single mothers through an existing social network platform, called CoAbode, to find housing together, which will help to build support systems that are often lacking for single parents. Once housing is established, Family Room will provide an artificially intelligent in-home “DHS Assistant,” which uses simple questions and machine learning to:</p> <ol style="list-style-type: none"> (1) help mothers provide the best environment for their children’s development as well as their own physical and mental health (2) recommend community programs (3) connect directly to DHS and other services

TEAM NAME AND MEMBERS	OVERVIEW OF TEAM'S SOLUTION
<p>McKees Rocks</p> <ul style="list-style-type: none"> • Johnathan Brame <i>Carnegie Mellon University Heinz, MSPPM</i> • Amanda Dawkins <i>University of Pittsburgh SSW, MSW</i> • Tingting Gu <i>Carnegie Mellon University Heinz, MSPPM</i> 	<p>The Allegheny Housing Watch</p> <p>The Allegheny Housing Watch will reduce the number of homeless individuals in Allegheny County by predicting increases in neighborhood and household homelessness risk through the utilization of predictive analytics and data mining.</p> <p>Historical and real-time data will be collected for each Allegheny County neighborhood and, eventually, each household, through online surveys, DHS entry questionnaires and open-source databases. These risk factors would then be quantified into a homelessness risk scale. Each neighborhood's individual risk scores will be translated into an all-encompassing Housing Security Score (HSS), reflecting the neighborhood's overall homelessness risk. Through machine learning, patterns of homelessness will be predicted, enabling DHS to respond appropriately.</p>
<p>Panther Hollow</p> <ul style="list-style-type: none"> • Erin Jensen <i>University of Pittsburgh MSW</i> • Edward Taylor <i>Duquesne University MBA</i> • Katie LeFevre <i>Carnegie Mellon University Heinz, MSPPM</i> 	<p>KAMP: Kids' Asthma Management Program</p> <p>KAMP addresses the reality that rates of asthma in children in Allegheny County are well above the national average. Asthma exacts a high toll on children, families and the medical system.</p> <p>KAMP consists of three parts: wearable technology, an introduction workshop and support groups. The main component of KAMP is the ADAMM wearable technology. This device, worn on the body, detects and alerts the wearer to the early stages of an asthma attack. Early detection allows the wearer to use a rescue inhaler and avoid experiencing serious symptoms that would warrant hospitalization. To receive the technology, participants must attend an introductory workshop to learn how to use the technology and attend other asthma management-related classes. Participants will also attend monthly focus groups to help them overcome some of the behavioral and emotional effects of asthma.</p> <p>In addition to the improved health of the children, KAMP will lead to significant cost savings by reducing the number of unnecessary hospitalizations.</p>

TEAM NAME AND MEMBERS	OVERVIEW OF TEAM'S SOLUTION
<p>Rankin</p> <ul style="list-style-type: none"> • Logan Bialik <i>University of Pittsburgh GSPiA, MPA</i> • Annie Gould <i>Carnegie Mellon University Heinz, MSPPM</i> • Eddie Solomon <i>Carnegie Mellon University Heinz, MSPPM</i> • Matthew Tettlebach <i>Carnegie Mellon University Heinz, MSPPM</i> 	<p>Minimizing Risk Through Proactive intervention</p> <p>Because DHS is often the last resort for individuals in periods of high stress or crisis, call volumes can be high, service wait times can be long, and resource availability can be unpredictable. While opportunities to secure these resources exist before the crisis point is reached, clients often initiate contact only once the crisis has set in.</p> <p>By using machine learning algorithms to build a predictive model of risk and creating an automated, natural language text messaging system, DHS can identify high-risk cases and connect them to resources before the point of crisis. SHAWNA (Systematic Help with Nudging Attributes) would function as a proactive virtual first response service coordinator by facilitating information about resources and access to caseworkers. Supplementing service coordinators, SHAWNA would take on simple tasks:</p> <ul style="list-style-type: none"> • Basic Intake: aggregate client data and ask for updates, and answer questions from DHS website • Streamlined Scheduling: coordinate appointments with caseworkers unique to client needs • Nudge Texts: proactive outreach and follow-up with clients based on risk assessments or triggers <p>SHAWNA would initiate intervention while strengthening clients' access to the network of existing support services, facilitating a more stable network of support for individuals experiencing multiple challenges. Additionally, SHAWNA could relieve some burden from staff by removing excessive paperwork, freeing up time spent answering simple questions, and allowing staff to focus on more complex cases.</p>

TEAM NAME AND MEMBERS	OVERVIEW OF TEAM'S SOLUTION
<p>Roberto Clemente</p> <ul style="list-style-type: none"> • Laura Obregon <i>Carnegie Mellon University Heinz, MS Health Care Policy</i> • David Contreras <i>Carnegie Mellon University Heinz, MSPPM – Data Analytics</i> • Kate Vander Wiede <i>Carnegie Mellon University Heinz, MSPPM</i> • Amanda Welby <i>University of Pittsburgh SSW, MSW</i> 	<p>Mila, a Digital Assistant for Curious Parents</p> <p>This proposal seeks to support the efforts of the 26 Allegheny County Family Support Centers in improving the health and outcomes of the children and families they serve via a chatbot named Mila.</p> <p>Mila is a conversational assistant that can answer questions about parenting, children's health, nutrition and child development. Mila will use machine learning and natural language processing technologies to provide, via phone call or text, answers to questions about these topics and referrals to other DHS services that might be needed. By combining these two technologies, Mila will be able to learn and improve her skills in answering questions and suggesting referrals.</p> <p>In the first year, DHS will work with strategic partners, such as doctors, nutritionists, social workers and, most important, the community, to collect keywords, resources, education and questions that Mila will need to be able to answer. It is expected that Mila will be able to provide accurate and accessible information any time families need it and will be able to suggest follow-up and referral services to individuals who can benefit from other DHS programs. By providing this information and connection, the hope is that Mila may be able to increase maternal and infant health and improve parenting skills.</p>
<p>Swinburne</p> <ul style="list-style-type: none"> • Emily Fitzpatrick <i>University of Pittsburgh MPH – Epidemiology</i> • Owen Stevenson <i>Carnegie Mellon University Heinz, MSPPM – Data Analytics</i> • Emily Woodward <i>Carnegie Mellon University Heinz, MSPPM</i> 	<p>Ask Ally: Increasing Service Use with Conversational Technology</p> <p>This solution proposes a chatbot — Ally, after Allegheny County — that answers citizen inquiries and uses proactive communication to notify targeted users of new programs via text message. Users are targeted for notifications based on predictive analytics.</p> <p>The chatbot capabilities include answering questions about service availability and contact points, sending push notifications about relevant services and resources, forwarding concerns directly to the appropriate DHS caseworker, and providing feedback about user experiences with DHS services and with Ally specifically.</p>

APPENDIX B: CASE COMPETITION JUDGES AND PARTICIPATING UNIVERSITIES

Judges

Angelia Adediran, *DHS Deputy Director of the Office of Administration*

Sanjeev Baidyaroy, *Manager, Data Analytics, Allegheny County Probation*

Dave Coplan, *Executive Director, Human Services Center Corporation*

Lauri Fink, *Senior Program Officer, Hillman Foundation*

Edie Godwin, *2017 Case Competition Winner*

Jake Goodman, *The Opportunity Fund*

Kathryn Hefferen, *Associate Product Manager, UPMC Enterprises*

Ella Holsinger, *Vice President for Human Services, Goodwill Industries*

Deb Killmeyer, *Community College of Allegheny County*

Denise Macerelli, *DHS Deputy Director, Office of Behavioral Health*

Ian Maverro, *DHS Chief Technology Officer*

Jessica Ruffin, *DHS Senior Leader for Equity and Inclusion*

Anne Sekula, *Principal, Sekula Consulting*

Tammy Thompson, *Executive Director, Circles Greater Pittsburgh*

Pat Valentine, *DHS, Executive Deputy Director for Integrated Program Services*

Yin-Jen (Angela) Wang, *2017 Case Competition Winner*

Shimira Williams, *Co-Founder, C.C. Busy*

Participants

Chatham University (3 students)

School of Psychology

Carnegie Mellon University (33 students)

Heinz College

School of Design

Duquesne University (1 student)

School of Business

University of Pittsburgh (17 students)

School of Social Work

Graduate School of Public Health

Graduate School of Public and International Affairs

Katz School of Business

School of Medicine