Hack Zika 2017 Challenges

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# Kiosk Game

The purpose of this challenge is to create an interactive education tool that will teach the public about mosquito control and safety, suitable for installation on county library computers.

## Problem

The public needs engaging sources of information about mosquito control. There is a [Statement of Work (SOW)](https://drive.google.com/open?id=0B2lpcjjxYGVuWDFiMkpmOGxhVHIzdWlDMlZFdjB0OVZrRndJ) for this challenge that describes a general approach and audience for the game but does not include any specifics about what aspects of “mosquito control and safety” should be included. Also, there is a deficiency in proof that games can be used by Hillsborough County as educational tools, and if the public will interact with these games. The final interactive educational tool could be part of a research study on usability and effectiveness.

## Outcome

An interactive game that will educate the player on mosquito control and prevention. The SOW requests a Windows based game suitable for library kiosks that could be “completed within one minute” with additional levels/scenarios for those wishing to continue/come back. Examples given for game design include Candy Crush and Fruit Ninja. The SOW requests a game suitable for a broad audience, which may include persons with limited computer experience, and lists as deliverables both a PC game and a game for mobile devices. Once launched, data on usability and effectiveness of this game in educating the public on mosquito control could be collected throughout its use. Some modification of these objectives may be desirable.

## Resources

We have a [Statement of Work for this challenge](https://drive.google.com/open?id=0B2lpcjjxYGVuWDFiMkpmOGxhVHIzdWlDMlZFdjB0OVZrRndJ) as well as an [IFAS Fl Resident Guide to Mosquito Control](https://drive.google.com/open?id=0B2lpcjjxYGVueTcyZE5rUU8zaEpHOU9tRUNkWFFIMUM1ckJz) that can be used as source material to design the game. The SOW and IFAS Mosquito Guide serve as initial resources for this challenge. Additional sources of information would be desirable including web links to mosquito facts as well as more specifics about what should be included in the game.

## Remaining Tasks

While the SOW suggests a “...broad audience including the general public...,” the discussion in our meetings has tended towards a children’s game, at one point as specific as fourth graders. We need to settle on a target audience. Whoever wrote the SOW should probably be part of this discussion.

A concise challenge description needs to be written, and resources need to be collected and installed in an easily accessible location. A GitHub repository for the hackathon is the easiest way to accomplish this.

The phrase “mosquito control and safety” covers a wide range of possible topics, especially with a goal of delivering meaningful information “...within one minute…” We need to list specifics about what should be included or make the decision that this is part of the challenge. Most likely, game developers will know little about mosquito control issues. The more specifics we can provide to them as part of the challenge definition, the better will be the result. While the IFAS guide contains a lot of information, the challenge description needs specific goals.

**Some specifics might include:**

* The variety of mosquito species, habitats, and life histories found in Florida
* Diseases transmitted by mosquitos and which species act as vectors
* The importance of personal protection from bites such as clothing and repellents
* How to reduce breeding sites around the home (homeowner Best Management Practices).
* What the Mosquito Control District does to control mosquitoes (spraying, inspections…)
* Ron mentioned the possibility of a badge or certificate of some sort for residents (Mosquito Hawk). This could be awarded to game “winners” or could be part of the next challenge.

**Task List**

1. Identify SOW author (Andrea Washaven?) and begin dialogue to define the challenge (target audience and information to include) (6/26/17)
2. Specify (finalize?) information requirements to include (7/14/17)
3. Identify other resources (7/14/17)
4. Specify app platforms (desktop or mobile or both) (7/14/17)
5. Assign challenge champion (subject matter expert available at event) (7/21/17)
6. Write challenge description (8/1/17)
7. Upload challenge package to web (hackathon github repository) (8/14/17)
8. Define judging criteria (8/31/17)

# Digital inspector (DIY Inspector App/Adult game?)

This challenge is to provide a means for property owners to self-diagnose and respond to potential mosquito sources on or near their property.

## Problem

MC frequently receives requests from residents for assistance with mosquito problems. MC is required to follow-up every call made about mosquitoes. It can take up to three days after the initial call for someone from MC to be on-site! This leaves a lot of time for the resident to take action and become more informed before their visit. A do-it-yourself checklist or guided computer app for residents may reduce the need for on-site inspections by MC personnel.

## Outcome

A checklist, guide, or even computer game to lead residents on a hunt for mosquito sources on their property. An interactive process between residents and MC personnel is needed to determine if a follow-up inspection is required and would also enable success tracking. Many enhancements to this app are possible such as recording time and place of mosquito problems and response outcomes in a digital journal for the resident with the option of sharing data with the county.

This resource will educate the resident, and encourage productive dialogue between resident and MC regarding mosquito control and prevention. This could include instructive and informative photographs and videos on: reducing exposure to arbovirus’ during mosquito swarm, removing mosquito larvae reservoirs, and even informing the resident that fish are available for free that can be placed in reservoirs that cannot removed.

## Resources

If MC uses a form for inspections, a copy of that form is needed. Additional resources are similar to the kiosk game but focused on mosquito breeding habitats common to homes and businesses.

## Remaining tasks

* Obtain copy of inspection form or draft checklist items
* Identify further resources and websites (photos and videos?)
* Write challenge text

**Task List**

1. Inspection form or ideas for checklist (6/30/17)
2. If no form, interview inspector or shadow during an inspection? Take photos? (7/14/17)
3. Identify other resources (7/14/17)
4. Specify app platforms (desktop or mobile or both: mobile preferred?) (7/14/17)
5. Assign challenge champion (subject matter expert available at event**: an inspector?**) (7/21/17)
6. Write challenge description (8/14/17)
7. Upload challenge package to web (hackathon github repository) (8/31/17)
8. Define judging criteria (8/31/17)

# Spray Truck Routing (Turn by Turn Navigation)

The challenge is to produce a path through spray zones that cover all roads with the least amount of retracement.

## Problem

MC has the county divided into spray zones that are used for targeting areas for spray trucks. The drivers need to cover these zones efficiently, travelling every road while retracing their path as little as possible. The overall travel direction through a zone is determined by the prevailing wind direction during spraying, so paths need to be different for different wind directions.

## Outcome

An application that produces a set of four to eight paths for each zone, with driving directions, for spray trucks to follow. Since road construction will ultimately require paths to be updated, the application should be able to be easily re-run on individual zones given new data.

## Resources and Data

GIS coverage of the spray zones and roads that need coverage. Historical truck route data?

## Remaining tasks

We need to specify how many wind directions to include (just cardinal directions (N, E, S, W), or include intercardinal directions (NE, SE,...), or more).

We need the GIS coverages of zones and ideally, roads. We can make these available online unless there is some reason not to.

Ron mentioned at the last meeting that after speaking with his staff he had some new aspects to include.

Task List

1. Specify wind directions (6/30/17)
2. Identify other resources (7/14/17)
3. Obtain GIS layers (7/21/17)
4. Specify app platforms (desktop or mobile or both) (7/14/17)
5. Assign challenge champion (subject matter expert available at event**: a driver?**) (7/21/17)
6. Write challenge description (8/14/17)
7. Upload challenge package to web (hackathon github repository) (8/31/17)
8. Define judging criteria (8/31/17)

# Zone Picker (Prescriptive Analytics)

This challenge is to provide a scientifically defensible method to choose which zones to spray *by truck* (?) on a daily basis.

## Problem

MC routinely sends personnel to predefined zones to apply mosquito treatment. Currently, these zones are selected by a senior individual with knowledge of MC best practices. An objective method to choose which zones to treat each day is needed to allocate limited resources and efficiently protect public health.

## Outcome

A [prescriptive analytics](https://en.wikipedia.org/wiki/Prescriptive_analytics) computer application that produces a list of a user specified number of zones for daily treatment, taking into account the current methods for treatment practiced by MC. A minimum requirement is to include mosquito baseline data and demographic proximity to mosquito density centers. Possible enhancements include options to handle “neglected zones,” and to improve/suggest trap locations by indicating areas with greatest uncertainty.

## Resources and Data

While the approach still needs to be clarified (and to some degree is part of the challenge), some data sources are obvious:

* Recent weather conditions (rainfall, temperature, …)
* County census data
* Hillsborough County Mosquito species life history database?
* Historic data on mosquito abundance (baseline data)
* Recent resident requests/reports (calls for service)
* The county mosquito habitat map
* A record of recently sprayed zones (more precisely, a method to include these records).
* Mosquito Trap Data
* Sentinel Chicken data
* Arbovirus data (non-human infections, human infections, immunological response data)

## Remaining tasks

I have been conducting a literature search/review to determine the state-of-the-art. We need to agree on an overall approach and what the objectives are. The State of California has a reasonably sophisticated arbovirus risk assessment protocol but it does not translate into threat response. We need to agree on how to turn a risk assessment into action. A special case is instructive: if no viruses are detected, the arbovirus threat may be low, but mosquito treatment will still be conducted. An objective method to chose treatment zones will depend on factors other than viral occurrence.

Do we need to have an inventory of what equipment MC currently deploys, and what its target is (ex. Larva, flying mosquitoes, etc.)? This might help with selecting data, and in defining model parameters and output. Any existing protocols used by the department regarding treatment, prevention, etc. would also help define the ……….This is so we can set the priority levels and such for taking action. Presenting the equipment used and it’s function to a specialist could give us a rough draft for how to prioritize treatment areas.

Task List

1. Specify treatment methods applied to zones (6/30/17)
2. Assign challenge champion (subject matter expert available at event**: Ron? USF consultant?**) (7/21/17)
3. Identify data sources (7/21/17)
4. Obtain GIS layers and other data (7/31/17)
5. Write challenge description (8/14/17)
6. Upload challenge package to web (hackathon github repository) (8/31/17)
7. Define judging criteria (8/31/17)

## References

There are lots, might as well add a link to the CA Surveillance Response Plan here. Their objective is different than ours, but the result is instructive. <https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/2017CAMBVirusSurveillanceResponsePlan.pdf>

[I’ve been working on a literature review with notes contained here.](https://docs.google.com/document/d/1VgzGSdEAtqvvr5MRVv-IgzEIrYSksaAxDXErUjUeIP8/edit?usp=sharing)

[IBM on prescriptive analytics.](http://www-03.ibm.com/software/products/en/category/prescriptive-analytics)