Final Capstone Proposal

**D**ynamic **I**ncident **R**esponse **E**nvironment

# Driving issue:

*He remembers talking with my wife and their friends and while he can still hear them it is like they are very distant and everything has gone black at the same time. Amidst the garbled and confusing sound he hears them say he just passed out, we need to breathe for him. He can hear his wife talking to and a faint feeling of something holding his little finger. Someone just whispered THEY are on their way. It occurs to him that his life is on the line and his life is now in the hands of others and THEY seem like an eternity away and eventually the faint sirens seem to come nearer and then fade away.*

# Investigating roles:

When the seconds count the most patients are depending on emergency services to be nearby and ready to respond to their emergency. Regardless of the actual severity of the incident the expectation, and rightly so, is that emergency services will respond quickly to the location to triage and address the situation. In the most serious incidents, a very rapid response can greatly improve patient outcomes. The problem is deciding where to place those valuable assets to provide optimal coverage for the entire response area of an organization. We need a response/staffing plan that can adapt to the changing number of available units as some units are tasked with responding to active incidents, handing off patients to hospital staff or out of service for maintenance.

# Resolution:

To solve our problem we need a solution that can adapt to the number of ambulances active in the system, time of day, day of the week and severity of incident. Our solution will be based on historical and live data can reduce the response times, keep staffing to a minimum and meet any guidelines set by governing bodies.

I anticipate our solution will utilize data cleaning, normalization, feature selection and will likely involve at least two phases of algorithms. I am anticipating the use of pipelines, cross validation using folds, grid search hyperparameter fine tuning and likely some form of time series and/or network analysis. :

# Expected hurdles:

The biggest challenge I will face is the complexity of the incident volume, location and severity as the time of day, day of the week and day of the year affect the data. Staffing ambulances also complicates things because staff will want a somewhat regular schedule and if we make the staffing schedule too complex, we risk decreasing our employee retention and if we have too many ambulances active in the system, we risk affecting our profit margin.