BIA 650 A Homework#10 W&A Chapter 16, Problem 2

# Management Overview

Problem Statement:

To find the number of ambulances to be run in District 1 and District 2 such that multiple goals are tried to be met in the order of their priorities. We solve this using the Goal Programming method.

Data Sources:

* + The **inputs** are the Cost per year for an ambulance. We also have a derived value which is Average time to reach patients and it depends on the number of ambulances in each district.
  + The key **decision variables** are the number of ambulances to be run.
  + **Objective** is to minimize the deviations from the goals in the order of their priorities.

Model Approach:

* + Separate the data into inputs, decision variables, constraints and output and enter them on the spreadsheet. Add a different set of cells to represent deviations from the goals.
  + First, all the goals are added to solver as constraints and run to see if there is a feasible solution satisfying all the conditions. We leave the objective cell in solver empty in this step (No feasible solution obtained in this case)
  + Next, the deviation for the goal with the highest priority is added in the objective cell and it is minimized. Once we get the minimal value after running solver, we then set this value as a hard constraint. Next we choose the deviation for the goal with the second highest priority as the objective unction to be minimized. And we continue the above steps until the goal with the lowest priority.

Solution and Interpretation:

* When the goals (in the order of priorities) are i. Staying within the budget, ii. meeting the Average response time for District 1 and iii. Meeting the Average response time for District 2:

**Gotham City must run 10 ambulances in each District**

* When the goals (in the order of priorities) are i. Meeting the Average response time for District 1 and ii. Meeting the Average response time for District 2 and iii. Staying within the budget:

**Gotham City must run 12 ambulances in District 1 and 11 in District 2**