

Team 3 ETM 540 Project

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```
library (gridExtra)
library (tinytex)
library (magrittr, quietly = TRUE)
suppressPackageStartupMessages(
  library (dplyr, quietly = TRUE))
suppressPackageStartupMessages(
  library (ROI, quietly = TRUE))
library (ROI.plugin.glpk, quietly = TRUE)
library (ompr, quietly = TRUE)
library (ompr.roi, quietly = TRUE)
library (pander, quietly = TRUE)
library (gridExtra)
```

Model

Generalized Model

$$\begin{aligned} & \text{Max } x_k \\ \text{subject to } & \sum_{j=1}^{nPro} C_j x_j \leq \text{Totalfunding} \\ & x_j \geq x'_j \end{aligned}$$

Case Study Model (Portland City)

$$\begin{aligned} & \text{Max } SupportiveHousing \\ \text{subject to } & 8000 * SupportiveHousing + 2460 * HousingPlacement + 3318 * SafetyStreet \leq 109000000 \\ & SupportiveHousing \geq 4828 \\ & HousingPlacement \geq 14355 \\ & SafetyStreet \geq 5136 \end{aligned}$$

```
fundingModel <- MIPModel() %>%
  add_variable(SH, type = "integer", lb = 4828) %>%
  add_variable(HP, type = "integer", lb = 14355) %>%
  add_variable(SS, type = "integer", lb = 5136) %>%
  set_objective(SH, "max") %>%
```

```

add_constraint(8000 * SH + 2460 * HP + 3318 * SS <= 109000000)

res_funding <- solve_model(fundingModel,
                           with_ROI(solver = "glpk"))

res_funding

## Status: optimal
## Objective value: 7080
program <- list("Housing Placement & Retention", "Supportive Housing", "Safety off and on the Streets")
final <- matrix(res_funding$solution,
                 nrow = 3,
                 dimnames = list(program, "Number of programs") )
grid.table (final)

```

	Number of programs
<i>Housing Placement & Retention</i>	14357
<i>Supportive Housing</i>	7080
<i>Safety off and on the Streets</i>	5136

```
grid.table (finalResult)
```

	Number of programs	Total Funding
<i>Housing Placement & Retention</i>	14357	35318220
<i>Supportive Housing</i>	7080	56640000
<i>Safety off and on the Streets</i>	5136	17041248