R Notebook for Network & belongingness Paper

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Contents

Introduction

This Document was last updated on March 19, 2018. This document is associated with the Campus Connections Social Network Data. Please set the correct working directories in the setwd & load data section of this notebook. When run successfully, all network graphs, separated by semester and night with role attributes will be outputted and saved as a .RDS file into the MERGEALL folder of WTG. If you have any questions concerning this document, please send an email to Neil Yetz at neil.yetz@colostate.edu.

Clear Environment

```
rm(list = ls(all.names = TRUE))
```

Load Libraries

```
#install.packages("CTT")
#install.packages("GGally")
#install.packages("ggplot2")
#install.packages("lattice")
#install.packages("gridExtra")
#install.packages("igraph")
#install.packages("dplyr")
#install.packages("tidyr")
#install.packages("igraph")
#install.packages("statnet")

library(CTT)
library(GGally)
library(ggplot2)
library(lattice)
library(gridExtra)
library(reshape)
library(igraph)
library(tidyverse)
```

setwd & load data

```
setwd("T:/Research folders/CCWTG/Analyses/Data for Stats Dept/FINAL DATA")

#elmk <- read_csv("CC_edgelist.csv")
#saveRDS(elmk,"cc_edgelist.rds")
elmk <- readRDS("cc_edgelist.rds")
youth_att <- read_csv("Mentee_Attributes.csv")
staff_att <- read_csv("Staff_Attributes_Final.csv")
```

Format Edgelist

```
elmk <- elmk %>%
  filter(Receiver_Missing == 0,
         Sender_missing == 0,
         Sender_Final_ID != Receiver_Final_ID) %>%
  mutate(sn1 = ifelse((sn1 == 1 & sn2 == 0), NA, sn1), #marking NA for nominated, but weight = 0
         sn2 = ifelse(is.na(sn1), NA, sn2)) %>%
  select(-Receiver_Missing, -Sender_missing)
```

Format Attributes

```r
youth_att <- youth_att %>%
  mutate(Final_ID = final_ID,
         role1 = Role,
         night1 = tolower(night),
         night2 =NA,
         role2 = NA,
         mentee = NA
         ) %>%
  select(Final_ID, semester, night1, night2, mfcond, role1, role2, room, gender, mentee, impnotes, date_

staff_att <- staff_att %>%
  mutate(date_dropped = NA,
         no_start = NA,
         Final_ID = FInal_ID) %>%
  select(Final_ID, semester, night1, night2, mfcond, role1, role2, room, gender, mentee, impnotes, date_

staff_youth_att <- rbind(staff_att, youth_att)

#Mentors that did NOT consent to survey research but DID consent to social Network (separate consent pr
sn_consent <- staff_youth_att %>%
  filter(is.na(role1) | is.na(night1) & role1 != "mentee")
sn_consent <- as.vector(sn_consent$Final_ID)

#Set night & role of non-consent survey but consent Social Network.
staff_youth_att <- staff_youth_att %>%
  mutate(
         night1 = ifelse(Final_ID == sn_consent[1], "tuesday", night1), role1  = ifelse(Final_ID == sn_co
         night1 = ifelse(Final_ID == sn_consent[2], "tuesday", night1), role1  = ifelse(Final_ID == sn_co
         night1 = ifelse(Final_ID == sn_consent[3], "tuesday", night1), role1  = ifelse(Final_ID == sn_co
          )

#Check sn_consent status again - Should be 0 rows
#staff_youth_att %>%
#  filter(is.na(role1) | is.na(night1) & role1 != "mentee")

staff_youth_att <- staff_youth_att %>%
    #lowercase all
  mutate(role1 = tolower(role1),
         role2 = tolower(role2),
         night1 = tolower(night1),
         night2 = tolower(night2),
         #Set role colors
         role_col = ifelse(role1 == "mentee", "orange", NA),
         role_col = ifelse(role1 == "mentor", "green", role_col),
         role_col = ifelse(role1 == "mentor coach", "dodgerblue", role_col),
         role_col = ifelse(role1 == "lead mentor coach", "red", role_col),
         role_col = ifelse(role1 == "instructor", "grey50", role_col),

         role_col2 = ifelse(role2 == "mentee", "orange", NA),
         role_col2 = ifelse(role2 == "mentor", "green", role_col2),
         role_col2 = ifelse(role2 == "mentor coach", "dodgerblue", role_col2),
```

```
            role_col2 = ifelse(role2 == "lead mentor coach", "red", role_col2),
            role_col2 = ifelse(role2 == "instructor", "grey50", role_col2)
            )

rm(sn_consent)
```

Create Useful Functions

```
#use this function to create plots Adjust here if necessary.
my_sn_g <- function(g, title = "", vertex.label = NA, vertex.size = 10, edge.color = "black", edge.arro
  plot(g,
      vertex.label = NA,
      vertex.size = 10,
      edge.color = 'black',
      edge.arrow.size = .3,
      edge.width = (E(g)$weight / 4),
      layout = layout_nicely(g),
      main = title)
}




#function to make legend creation cleaner
#Create vectors of attributes colors & corresponding colors
my_leg <- function(att, colors) {
  legend("bottomright", legend=att  , col = colors , bty = "o", pch=20 , pt.cex = 1, cex = 1, text.col=
}
```

Set Legend

```
#For Legend roles & corresponding colors
role <-  c("mentee", "mentor", "mentor coach", "lead mentor coach", "instructor")
color <- c("orange","green","dodgerblue", "red", "grey50")
```

Create General Graphs

F15

```
temp <- elmk %>% filter(semester == "F15")

mon <- temp %>% filter(night == "monday")
tue <- temp %>% filter(night == "tuesday")
wed <- temp %>% filter(night == "wednesday")
thu <- temp %>% filter(night == "thursday")

sem <- list(mon = mon,
```

```
              tue = tue,
              wed = wed,
              thu = thu)

rm(mon);rm(tue);rm(wed);rm(thu)
```

Summary

```
sem$mon <- group_by(sem$mon, survnum)
sem$tue <- group_by(sem$tue, survnum)
sem$wed <- group_by(sem$wed, survnum)
sem$thu <- group_by(sem$thu, survnum)

summarize(sem$mon, day = "mon", n = length(unique(Sender_Final_ID)), tie_count = sum(sn1, na.rm = TRUE)
```

```
## # A tibble: 5 x 5
##    survnum day       n tie_count tie_prop
##      <int> <chr> <int>     <int>    <dbl>
## 1        1 mon      69        76    0.361
## 2        2 mon      65       441    2.09
## 3        3 mon      61       672    3.19
## 4        4 mon      58       834    3.96
## 5        5 mon      59       887    4.21
```

```
summarize(sem$tue, day = "tue", n = length(unique(Sender_Final_ID)), tie_count = sum(sn1, na.rm = TRUE)
```

```
## # A tibble: 5 x 5
##    survnum day       n tie_count tie_prop
##      <int> <chr> <int>     <int>    <dbl>
## 1        1 tue      62        73    0.387
## 2        2 tue      61       389    2.06
## 3        3 tue      60       623    3.31
## 4        4 tue      60       760    4.03
## 5        5 tue      61       871    4.62
```

```
summarize(sem$wed, day = "wed", n = length(unique(Sender_Final_ID)), tie_count = sum(sn1, na.rm = TRUE)
```

```
## # A tibble: 5 x 5
##    survnum day       n tie_count tie_prop
##      <int> <chr> <int>     <int>    <dbl>
## 1        1 wed      67       104    0.482
## 2        2 wed      64       482    2.23
## 3        3 wed      64       731    3.39
## 4        4 wed      64       859    3.98
## 5        5 wed      63      1004    4.65
```

```
summarize(sem$thu, day = "thu", n = length(unique(Sender_Final_ID)), tie_count = sum(sn1, na.rm = TRUE)
```

```
## # A tibble: 5 x 5
##    survnum day       n tie_count tie_prop
##      <int> <chr> <int>     <int>    <dbl>
## 1        1 thu      71       126    0.528
## 2        2 thu      71       568    2.38
## 3        3 thu      69       772    3.23
## 4        4 thu      67       830    3.48
## 5        5 thu      67       877    3.67
```

```r
sem$mon <- ungroup(sem$mon)
sem$tue <- ungroup(sem$tue)
sem$wed <- ungroup(sem$wed)
sem$thu <- ungroup(sem$thu)

rm(sem)
```

Monday

```r
#Set to right days
temp_night <- temp           %>% filter(night == "monday")
temp_att   <- staff_youth_att %>% mutate(night =  "monday")

#Surv_1
surv_1 <- temp_night %>%
  filter(survnum == 1) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates1 <- surv_1 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_1 <- surv_1 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 2
surv_2 <- temp_night %>%
  filter(survnum == 2) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates2 <- surv_2 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_2 <- surv_2 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 3
surv_3 <- temp_night %>%
  filter(survnum == 3) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates3 <- surv_3 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_3 <- surv_3 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))
```

```r
#Surv 4
surv_4 <- temp_night %>%
  filter(survnum == 4) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates4 <- surv_4 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_4 <- surv_4 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 5
surv_5 <- temp_night %>%
  filter(survnum == 5) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates5 <- surv_5 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_5 <- surv_5 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

day <- list(sur1 = surv_1,
            sur2 = surv_2,
            sur3 = surv_3,
            sur4 = surv_4,
            sur5 = surv_5,
            iso1 = isolates1,
            iso2 = isolates2,
            iso3 = isolates3,
            iso4 = isolates4,
            iso5 = isolates5)

rm(surv_1);rm(surv_2);rm(surv_3);rm(surv_4);rm(surv_5)
rm(isolates1);rm(isolates2);rm(isolates3);rm(isolates4);rm(isolates5)
```

General Graphs

```r
#Convert to Matrices

sur1 <- as.matrix(day$sur1)
sur2 <- as.matrix(day$sur2)
sur3 <- as.matrix(day$sur3)
sur4 <- as.matrix(day$sur4)
sur5 <- as.matrix(day$sur5)


# Convert matrix to an igraph object
```

```r
g1 <- graph.edgelist(sur1, directed = TRUE) + vertices(day$iso1$Sender_Final_ID) #Graph edgelist + Add
g2 <- graph.edgelist(sur2, directed = TRUE) + vertices(day$iso2$Sender_Final_ID) #Graph edgelist + Add
g3 <- graph.edgelist(sur3, directed = TRUE) + vertices(day$iso3$Sender_Final_ID) #Graph edgelist + Add
g4 <- graph.edgelist(sur4, directed = TRUE) + vertices(day$iso4$Sender_Final_ID) #Graph edgelist + Add
g5 <- graph.edgelist(sur5, directed = TRUE) + vertices(day$iso5$Sender_Final_ID) #Graph edgelist + Add


#Capture Roles, Nights & Colors

temp_att <- temp_att %>%
  mutate(
          role1    = ifelse((!(is.na(role2)))    & (night2 == night), role2,    role1),
          night1   = ifelse((!(is.na(night2)))   & (night2 == night), night2,   night1),
          role_col = ifelse((!(is.na(role_col2))) & (night2 == night), role_col2, role_col)
          )

#Add staff Role Attribute

V(g1)$role  <- temp_att$role1[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$role  <- temp_att$role1[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$role  <- temp_att$role1[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$role  <- temp_att$role1[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$role  <- temp_att$role1[match(V(g5)$name, temp_att$Final_ID)]

#Add role colors

V(g1)$color <- temp_att$role_col[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$color <- temp_att$role_col[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$color <- temp_att$role_col[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$color <- temp_att$role_col[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$color <- temp_att$role_col[match(V(g5)$name, temp_att$Final_ID)]


#Add Edge weights - Match by edgelist rows Send/ Receive rows & temp_night Send/Receive rows. filter by

w <- left_join(rename(as_data_frame(as_edgelist(g1)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                      filter(survnum == 1) #Match Weights
g1 <-  set_edge_attr(g1, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g2)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                      filter(survnum == 2) #Match weights
g2 <-  set_edge_attr(g2, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g3)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                      filter(survnum == 3) #Match weights
g3 <-  set_edge_attr(g3, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g4)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                      filter(survnum == 4) #Match weights
g4 <-  set_edge_attr(g4, "weight", value = w$sn2) #Add edge attribute
```

```r
w <-  left_join(rename(as_data_frame(as_edgelist(g5)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                   filter(survnum == 5) #Match weights
g5 <-   set_edge_attr(g5, "weight", value = w$sn2) #Add edge attribute

#Set graphs to list
graphs <- list(g1 = g1,g2 = g2, g3 = g3,g4 = g4, g5 = g5)




rm(g1); rm(g2); rm(g3); rm(g4); rm(g5)
rm(sur1);rm(sur2);rm(sur3);rm(sur4);rm(sur5)
rm(temp_att); rm(temp_night); rm(w)
```

Create Monday List

```r
monday <- list(edgelists = day, graphs = graphs)
rm(day);rm(graphs)
```

Tuesday

```r
temp_night <- temp            %>% filter(night == "tuesday")
temp_att   <- staff_youth_att %>% mutate(night =  "tuesday")

#Surv_1
surv_1 <- temp_night %>%
  filter(survnum == 1) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates1 <- surv_1 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_1 <- surv_1 %>%
   select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 2
surv_2 <- temp_night %>%
  filter(survnum == 2) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates2 <- surv_2 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_2 <- surv_2 %>%
   select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 3
surv_3 <- temp_night %>%
```

```r
  filter(survnum == 3) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates3 <- surv_3 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_3 <- surv_3 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 4
surv_4 <- temp_night %>%
  filter(survnum == 4) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates4 <- surv_4 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_4 <- surv_4 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 5
surv_5 <- temp_night %>%
  filter(survnum == 5) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates5 <- surv_5 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_5 <- surv_5 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

day <- list(sur1 = surv_1,
            sur2 = surv_2,
            sur3 = surv_3,
            sur4 = surv_4,
            sur5 = surv_5,
            iso1 = isolates1,
            iso2 = isolates2,
            iso3 = isolates3,
            iso4 = isolates4,
            iso5 = isolates5)

rm(surv_1);rm(surv_2);rm(surv_3);rm(surv_4);rm(surv_5)
rm(isolates1);rm(isolates2);rm(isolates3);rm(isolates4);rm(isolates5)
```

General Graphs

```r
#Convert to Matrices

sur1 <- as.matrix(day$sur1)
sur2 <- as.matrix(day$sur2)
sur3 <- as.matrix(day$sur3)
sur4 <- as.matrix(day$sur4)
sur5 <- as.matrix(day$sur5)


# Convert matrix to an igraph object

g1 <- graph.edgelist(sur1, directed = TRUE) + vertices(day$iso1$Sender_Final_ID) #Graph edgelist + Add
g2 <- graph.edgelist(sur2, directed = TRUE) + vertices(day$iso2$Sender_Final_ID) #Graph edgelist + Add
g3 <- graph.edgelist(sur3, directed = TRUE) + vertices(day$iso3$Sender_Final_ID) #Graph edgelist + Add
g4 <- graph.edgelist(sur4, directed = TRUE) + vertices(day$iso4$Sender_Final_ID) #Graph edgelist + Add
g5 <- graph.edgelist(sur5, directed = TRUE) + vertices(day$iso5$Sender_Final_ID) #Graph edgelist + Add




#Capture Roles, Nights & Colors

temp_att <- temp_att %>%
  mutate(
        role1    = ifelse((!(is.na(role2)))    & (night2 == night), role2,    role1),
        night1   = ifelse((!(is.na(night2)))   & (night2 == night), night2,   night1),
        role_col = ifelse((!(is.na(role_col2))) & (night2 == night), role_col2, role_col)
        )

#Add staff Role Attribute

V(g1)$role  <- temp_att$role1[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$role  <- temp_att$role1[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$role  <- temp_att$role1[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$role  <- temp_att$role1[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$role  <- temp_att$role1[match(V(g5)$name, temp_att$Final_ID)]

#Add role colors

V(g1)$color <- temp_att$role_col[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$color <- temp_att$role_col[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$color <- temp_att$role_col[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$color <- temp_att$role_col[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$color <- temp_att$role_col[match(V(g5)$name, temp_att$Final_ID)]


#Add Edge weights - Match by edgelist rows Send/ Receive rows & temp_night Send/Receive rows. filter by

w <-  left_join(rename(as_data_frame(as_edgelist(g1)), Sender_Final_ID =V1, Receiver_Final_ID = V2), tem
                      filter(survnum == 1) #Match Weights
g1 <-  set_edge_attr(g1, "weight", value = w$sn2) #Add edge attribute
```

```
w <- left_join(rename(as_data_frame(as_edgelist(g2)), Sender_Final_ID =V1, Receiver_Final_ID = V2), tem|
                              filter(survnum == 2) #Match weights
g2 <-  set_edge_attr(g2, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g3)), Sender_Final_ID =V1, Receiver_Final_ID = V2), tem|
                              filter(survnum == 3) #Match weights
g3 <-  set_edge_attr(g3, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g4)), Sender_Final_ID =V1, Receiver_Final_ID = V2), tem|
                              filter(survnum == 4) #Match weights
g4 <-  set_edge_attr(g4, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g5)), Sender_Final_ID =V1, Receiver_Final_ID = V2), tem|
                              filter(survnum == 5) #Match weights
g5 <-  set_edge_attr(g5, "weight", value = w$sn2) #Add edge attribute

#Set graphs to list
graphs <- list(g1 = g1,g2 = g2, g3 = g3,g4 = g4, g5 = g5)




rm(g1); rm(g2); rm(g3); rm(g4); rm(g5)
rm(sur1);rm(sur2);rm(sur3);rm(sur4);rm(sur5)
rm(temp_att); rm(temp_night); rm(w)
```

Create List

```
tuesday <- list(edgelists = day, graphs = graphs)
rm(day); rm(graphs)
```

Wednesday

```
temp_night <- temp           %>% filter(night == "wednesday")
temp_att   <- staff_youth_att %>% mutate(night =  "wednesday")

#Surv_1
surv_1 <- temp_night %>%
  filter(survnum == 1) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates1 <- surv_1 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_1 <- surv_1 %>%
   select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 2
surv_2 <- temp_night %>%
  filter(survnum == 2) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
```

```r
#Getting isolates
isolates2 <- surv_2 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_2 <- surv_2 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 3
surv_3 <- temp_night %>%
  filter(survnum == 3) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates3 <- surv_3 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_3 <- surv_3 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 4
surv_4 <- temp_night %>%
  filter(survnum == 4) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates4 <- surv_4 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_4 <- surv_4 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 5
surv_5 <- temp_night %>%
  filter(survnum == 5) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates5 <- surv_5 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_5 <- surv_5 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

day <- list(sur1 = surv_1,
```

```
                sur2 = surv_2,
                sur3 = surv_3,
                sur4 = surv_4,
                sur5 = surv_5,
                iso1 = isolates1,
                iso2 = isolates2,
                iso3 = isolates3,
                iso4 = isolates4,
                iso5 = isolates5)

rm(surv_1);rm(surv_2);rm(surv_3);rm(surv_4);rm(surv_5)
rm(isolates1);rm(isolates2);rm(isolates3);rm(isolates4);rm(isolates5)
```

General Graphs

```
#Convert to Matrices

sur1 <- as.matrix(day$sur1)
sur2 <- as.matrix(day$sur2)
sur3 <- as.matrix(day$sur3)
sur4 <- as.matrix(day$sur4)
sur5 <- as.matrix(day$sur5)


# Convert matrix to an igraph object

g1 <- graph.edgelist(sur1, directed = TRUE) + vertices(day$iso1$Sender_Final_ID) #Graph edgelist + Add
g2 <- graph.edgelist(sur2, directed = TRUE) + vertices(day$iso2$Sender_Final_ID) #Graph edgelist + Add
g3 <- graph.edgelist(sur3, directed = TRUE) + vertices(day$iso3$Sender_Final_ID) #Graph edgelist + Add
g4 <- graph.edgelist(sur4, directed = TRUE) + vertices(day$iso4$Sender_Final_ID) #Graph edgelist + Add
g5 <- graph.edgelist(sur5, directed = TRUE) + vertices(day$iso5$Sender_Final_ID) #Graph edgelist + Add




#Capture Roles, Nights & Colors

temp_att <- temp_att %>%
  mutate(
        role1    = ifelse((!(is.na(role2)))    & (night2 == night), role2,     role1),
        night1   = ifelse((!(is.na(night2)))   & (night2 == night), night2,    night1),
        role_col = ifelse((!(is.na(role_col2))) & (night2 == night), role_col2, role_col)
        )

#Add staff Role Attribute

V(g1)$role  <- temp_att$role1[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$role  <- temp_att$role1[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$role  <- temp_att$role1[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$role  <- temp_att$role1[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$role  <- temp_att$role1[match(V(g5)$name, temp_att$Final_ID)]

#Add role colors
```

```r
V(g1)$color <- temp_att$role_col[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$color <- temp_att$role_col[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$color <- temp_att$role_col[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$color <- temp_att$role_col[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$color <- temp_att$role_col[match(V(g5)$name, temp_att$Final_ID)]


#Add Edge weights - Match by edgelist rows Send/ Receive rows & temp_night Send/Receive rows. filter by

w <- left_join(rename(as_data_frame(as_edgelist(g1)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 1) #Match Weights
g1 <-  set_edge_attr(g1, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g2)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 2) #Match weights
g2 <-  set_edge_attr(g2, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g3)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 3) #Match weights
g3 <-  set_edge_attr(g3, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g4)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 4) #Match weights
g4 <-  set_edge_attr(g4, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g5)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 5) #Match weights
g5 <-  set_edge_attr(g5, "weight", value = w$sn2) #Add edge attribute

#Set graphs to list
graphs <- list(g1 = g1,g2 = g2, g3 = g3,g4 = g4, g5 = g5)




rm(g1); rm(g2); rm(g3); rm(g4); rm(g5)
rm(sur1);rm(sur2);rm(sur3);rm(sur4);rm(sur5)
rm(temp_att); rm(temp_night); rm(w)
```

Create List

```r
wednesday <- list(edgelists = day, graphs = graphs)
rm(day); rm(graphs)
```

Thursday

```r
temp_night <- temp            %>% filter(night == "thursday")
temp_att   <- staff_youth_att %>% mutate(night =  "thursday")

#Surv_1
surv_1 <- temp_night %>%
  filter(survnum == 1) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
```

```r
isolates1 <- surv_1 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_1 <- surv_1 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 2
surv_2 <- temp_night %>%
  filter(survnum == 2) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates2 <- surv_2 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_2 <- surv_2 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 3
surv_3 <- temp_night %>%
  filter(survnum == 3) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates3 <- surv_3 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_3 <- surv_3 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 4
surv_4 <- temp_night %>%
  filter(survnum == 4) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates4 <- surv_4 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_4 <- surv_4 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 5
surv_5 <- temp_night %>%
```

```
  filter(survnum == 5) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates5 <- surv_5 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_5 <- surv_5 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

day <- list(sur1 = surv_1,
            sur2 = surv_2,
            sur3 = surv_3,
            sur4 = surv_4,
            sur5 = surv_5,
            iso1 = isolates1,
            iso2 = isolates2,
            iso3 = isolates3,
            iso4 = isolates4,
            iso5 = isolates5)

rm(surv_1);rm(surv_2);rm(surv_3);rm(surv_4);rm(surv_5)
rm(isolates1);rm(isolates2);rm(isolates3);rm(isolates4);rm(isolates5)
```

General Graphs

```
#Convert to Matrices

sur1 <- as.matrix(day$sur1)
sur2 <- as.matrix(day$sur2)
sur3 <- as.matrix(day$sur3)
sur4 <- as.matrix(day$sur4)
sur5 <- as.matrix(day$sur5)



# Convert matrix to an igraph object

g1 <- graph.edgelist(sur1, directed = TRUE) + vertices(day$iso1$Sender_Final_ID) #Graph edgelist + Add
g2 <- graph.edgelist(sur2, directed = TRUE) + vertices(day$iso2$Sender_Final_ID) #Graph edgelist + Add
g3 <- graph.edgelist(sur3, directed = TRUE) + vertices(day$iso3$Sender_Final_ID) #Graph edgelist + Add
g4 <- graph.edgelist(sur4, directed = TRUE) + vertices(day$iso4$Sender_Final_ID) #Graph edgelist + Add
g5 <- graph.edgelist(sur5, directed = TRUE) + vertices(day$iso5$Sender_Final_ID) #Graph edgelist + Add



#Capture Roles, Nights & Colors

temp_att <- temp_att %>%
  mutate(
        role1    = ifelse((!(is.na(role2)))    & (night2 == night), role2,    role1),
        night1   = ifelse((!(is.na(night2)))   & (night2 == night), night2,   night1),
```

```
            role_col = ifelse((!(is.na(role_col2))) & (night2 == night), role_col2, role_col)
            )

#Add staff Role Attribute

V(g1)$role  <- temp_att$role1[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$role  <- temp_att$role1[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$role  <- temp_att$role1[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$role  <- temp_att$role1[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$role  <- temp_att$role1[match(V(g5)$name, temp_att$Final_ID)]

#Add role colors

V(g1)$color <- temp_att$role_col[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$color <- temp_att$role_col[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$color <- temp_att$role_col[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$color <- temp_att$role_col[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$color <- temp_att$role_col[match(V(g5)$name, temp_att$Final_ID)]


#Add Edge weights - Match by edgelist rows Send/ Receive rows & temp_night Send/Receive rows. filter by

w <- left_join(rename(as_data_frame(as_edgelist(g1)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 1) #Match Weights
g1 <-  set_edge_attr(g1, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g2)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 2) #Match weights
g2 <-  set_edge_attr(g2, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g3)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 3) #Match weights
g3 <-  set_edge_attr(g3, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g4)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 4) #Match weights
g4 <-  set_edge_attr(g4, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g5)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 5) #Match weights
g5 <-  set_edge_attr(g5, "weight", value = w$sn2) #Add edge attribute

#Set graphs to list
graphs <- list(g1 = g1,g2 = g2, g3 = g3,g4 = g4, g5 = g5)




rm(g1); rm(g2); rm(g3); rm(g4); rm(g5)
rm(sur1);rm(sur2);rm(sur3);rm(sur4);rm(sur5)
rm(temp_att); rm(temp_night); rm(w)
```

Create List

```
thursday <- list(edgelists = day, graphs = graphs)
rm(day); rm(graphs)
```

Plot Graphs

```
#Set chart image
par(mfrow=c(4,5))

#Monday Graphs

   my_sn_g(monday$graphs$g1,       title = "Monday - Week 1")   ; my_leg(att = role, colors = color) #Soc
   my_sn_g(monday$graphs$g2,       title = "Monday - Week 3")   ; my_leg(att = role, colors = color) #Soc
   my_sn_g(monday$graphs$g3,       title = "Monday - Week 6")   ; my_leg(att = role, colors = color) #Soc
   my_sn_g(monday$graphs$g4,       title = "Monday - Week 9")   ; my_leg(att = role, colors = color) #Soc
   my_sn_g(monday$graphs$g5,       title = "Monday - Week 11")  ; my_leg(att = role, colors = color) #Soc

#Tuesday Graphs

   my_sn_g(tuesday$graphs$g1,      title = "Tuesday - Week 1")  ; my_leg(att = role, colors = color) #Soc
   my_sn_g(tuesday$graphs$g2,      title = "Tuesday - Week 3")  ; my_leg(att = role, colors = color) #Soc
   my_sn_g(tuesday$graphs$g3,      title = "Tuesday - Week 6")  ; my_leg(att = role, colors = color) #Soc
   my_sn_g(tuesday$graphs$g4,      title = "Tuesday - Week 9")  ; my_leg(att = role, colors = color) #Soc
   my_sn_g(tuesday$graphs$g5,      title = "Tuesday - Week 11") ; my_leg(att = role, colors = color) #Soc

#Wednesday Graphs

   my_sn_g(wednesday$graphs$g1,    title = "Wednesday - Week 1")  ; my_leg(att = role, colors = color) #S
   my_sn_g(wednesday$graphs$g2,    title = "Wednesday - Week 3")  ; my_leg(att = role, colors = color) #S
   my_sn_g(wednesday$graphs$g3,    title = "Wednesday - Week 6")  ; my_leg(att = role, colors = color) #S
   my_sn_g(wednesday$graphs$g4,    title = "Wednesday - Week 9")  ; my_leg(att = role, colors = color) #S
   my_sn_g(wednesday$graphs$g5,    title = "Wednesday - Week 11") ; my_leg(att = role, colors = color) #S


   my_sn_g(thursday$graphs$g1,     title = "Thursday - Week 1")  ; my_leg(att = role, colors = color) #So
   my_sn_g(thursday$graphs$g2,     title = "Thursday - Week 3")  ; my_leg(att = role, colors = color) #So
   my_sn_g(thursday$graphs$g3,     title = "Thursday - Week 6")  ; my_leg(att = role, colors = color) #So
   my_sn_g(thursday$graphs$g4,     title = "Thursday - Week 9")  ; my_leg(att = role, colors = color) #So
   my_sn_g(thursday$graphs$g5,     title = "Thursday - Week 11") ; my_leg(att = role, colors = color) #So
```
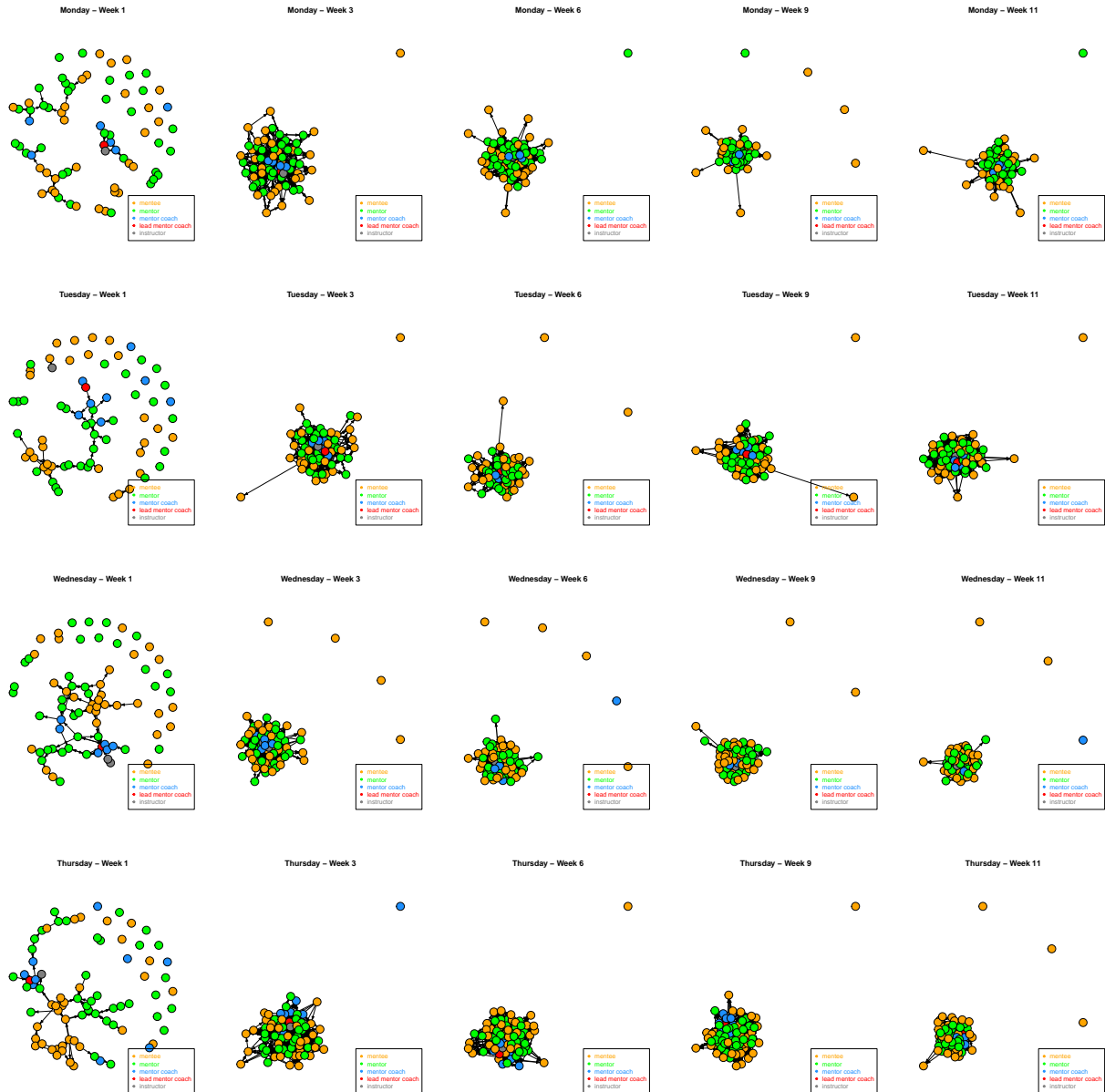
```
#Plot With purrr::walk()
  #walk(.x = monday$graphs, .f = my_sn_g, title = "Monday");my_leg(role, color)
  #walk(.x = tuesday$graphs, .f = my_sn_g, title = "Tuesday");my_leg(role, color)
  #walk(.x =wednesday$graphs, .f = my_sn_g, title = "Wednesday");my_leg(role, color)
  #walk(.x = thursday$graphs, .f = my_sn_g, title = "Thursday");my_leg(role, color)
```

Create Semester List

```
F15 <- list(monday = monday, tuesday = tuesday, wednesday = wednesday, thursday = thursday)
rm(monday);rm(tuesday);rm(wednesday);rm(thursday)
rm(temp)
```

S16

```r
temp <- elmk %>% filter(semester == "S16")

mon <- temp %>% filter(night == "monday")
tue <- temp %>% filter(night == "tuesday")
wed <- temp %>% filter(night == "wednesday")
thu <- temp %>% filter(night == "thursday")

sem <- list(mon = mon,
            tue = tue,
            wed = wed,
            thu = thu)

rm(mon);rm(tue);rm(wed);rm(thu)
```

Summary

```r
sem$mon <- group_by(sem$mon, survnum)
sem$tue <- group_by(sem$tue, survnum)
sem$wed <- group_by(sem$wed, survnum)
sem$thu <- group_by(sem$thu, survnum)

summarize(sem$mon, day = "mon", n = length(unique(Sender_Final_ID)), tie_count = sum(sn1, na.rm = TRUE)
```

```
## # A tibble: 5 x 5
##   survnum day       n tie_count tie_prop
##     <int> <chr> <int>     <int>    <dbl>
## 1       1 mon      75        86    0.342
## 2       2 mon      71       454    1.80
## 3       3 mon      66       652    2.59
## 4       4 mon      66       799    3.18
## 5       5 mon      64       789    3.14
```

```r
summarize(sem$tue, day = "tue", n = length(unique(Sender_Final_ID)), tie_count = sum(sn1, na.rm = TRUE)
```

```
## # A tibble: 5 x 5
##   survnum day       n tie_count tie_prop
##     <int> <chr> <int>     <int>    <dbl>
## 1       1 tue      69        87    0.364
## 2       2 tue      68       419    1.75
## 3       3 tue      64       679    2.84
## 4       4 tue      65       927    3.88
## 5       5 tue      63      1062    4.45
```

```r
summarize(sem$wed, day = "wed", n = length(unique(Sender_Final_ID)), tie_count = sum(sn1, na.rm = TRUE)
```

```
## # A tibble: 5 x 5
##   survnum day       n tie_count tie_prop
##     <int> <chr> <int>     <int>    <dbl>
## 1       1 wed      75       110    0.432
## 2       2 wed      73       404    1.59
## 3       3 wed      66       674    2.65
## 4       4 wed      67       854    3.35
## 5       5 wed      67       917    3.60
```

```r
summarize(sem$thu, day = "thu", n = length(unique(Sender_Final_ID)), tie_count = sum(sn1, na.rm = TRUE)

## # A tibble: 5 x 5
##   survnum day       n tie_count tie_prop
##     <int> <chr> <int>     <int>    <dbl>
## 1       1 thu      72       136    0.546
## 2       2 thu      71       545    2.19
## 3       3 thu      70       827    3.32
## 4       4 thu      69       924    3.71
## 5       5 thu      69      1035    4.15
```

```r
sem$mon <- ungroup(sem$mon)
sem$tue <- ungroup(sem$tue)
sem$wed <- ungroup(sem$wed)
sem$thu <- ungroup(sem$thu)


rm(sem)
```

Monday

```r
temp_night <- temp           %>% filter(night == "monday")
temp_att   <- staff_youth_att %>% mutate(night =  "monday")

#Surv_1
surv_1 <- temp_night %>%
  filter(survnum == 1) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates1 <- surv_1 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_1 <- surv_1 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 2
surv_2 <- temp_night %>%
  filter(survnum == 2) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates2 <- surv_2 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_2 <- surv_2 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 3
surv_3 <- temp_night %>%
  filter(survnum == 3) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
```

```r
#Getting isolates
isolates3 <- surv_3 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_3 <- surv_3 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 4
surv_4 <- temp_night %>%
  filter(survnum == 4) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates4 <- surv_4 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_4 <- surv_4 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 5
surv_5 <- temp_night %>%
  filter(survnum == 5) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates5 <- surv_5 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_5 <- surv_5 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

day <- list(sur1 = surv_1,
            sur2 = surv_2,
            sur3 = surv_3,
            sur4 = surv_4,
            sur5 = surv_5,
            iso1 = isolates1,
            iso2 = isolates2,
            iso3 = isolates3,
            iso4 = isolates4,
            iso5 = isolates5)

rm(surv_1);rm(surv_2);rm(surv_3);rm(surv_4);rm(surv_5)
rm(isolates1);rm(isolates2);rm(isolates3);rm(isolates4);rm(isolates5)
```

General Graphs

```r
#Convert to Matrices

sur1 <- as.matrix(day$sur1)
sur2 <- as.matrix(day$sur2)
sur3 <- as.matrix(day$sur3)
sur4 <- as.matrix(day$sur4)
sur5 <- as.matrix(day$sur5)


# Convert matrix to an igraph object

g1 <- graph.edgelist(sur1, directed = TRUE) + vertices(day$iso1$Sender_Final_ID) #Graph edgelist + Add
g2 <- graph.edgelist(sur2, directed = TRUE) + vertices(day$iso2$Sender_Final_ID) #Graph edgelist + Add
g3 <- graph.edgelist(sur3, directed = TRUE) + vertices(day$iso3$Sender_Final_ID) #Graph edgelist + Add
g4 <- graph.edgelist(sur4, directed = TRUE) + vertices(day$iso4$Sender_Final_ID) #Graph edgelist + Add
g5 <- graph.edgelist(sur5, directed = TRUE) + vertices(day$iso5$Sender_Final_ID) #Graph edgelist + Add




#Capture Roles, Nights & Colors

temp_att <- temp_att %>%
  mutate(
        role1    = ifelse((!(is.na(role2)))    & (night2 == night), role2,    role1),
        night1   = ifelse((!(is.na(night2)))   & (night2 == night), night2,   night1),
        role_col = ifelse((!(is.na(role_col2))) & (night2 == night), role_col2, role_col)
        )

#Add staff Role Attribute

V(g1)$role  <- temp_att$role1[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$role  <- temp_att$role1[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$role  <- temp_att$role1[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$role  <- temp_att$role1[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$role  <- temp_att$role1[match(V(g5)$name, temp_att$Final_ID)]

#Add role colors

V(g1)$color <- temp_att$role_col[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$color <- temp_att$role_col[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$color <- temp_att$role_col[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$color <- temp_att$role_col[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$color <- temp_att$role_col[match(V(g5)$name, temp_att$Final_ID)]


#Add Edge weights - Match by edgelist rows Send/ Receive rows & temp_night Send/Receive rows. filter by

w <- left_join(rename(as_data_frame(as_edgelist(g1)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                          filter(survnum == 1) #Match Weights
g1 <-  set_edge_attr(g1, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g2)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
```

```
                                    filter(survnum == 2) #Match weights
g2 <-  set_edge_attr(g2, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g3)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                    filter(survnum == 3) #Match weights
g3 <-  set_edge_attr(g3, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g4)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                    filter(survnum == 4) #Match weights
g4 <-  set_edge_attr(g4, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g5)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                    filter(survnum == 5) #Match weights
g5 <-  set_edge_attr(g5, "weight", value = w$sn2) #Add edge attribute

#Set graphs to list
graphs <- list(g1 = g1,g2 = g2, g3 = g3,g4 = g4, g5 = g5)




rm(g1); rm(g2); rm(g3); rm(g4); rm(g5)
rm(sur1);rm(sur2);rm(sur3);rm(sur4);rm(sur5)
rm(temp_att); rm(temp_night); rm(w)
```

Create List

```
monday <- list(edgelists = day, graphs = graphs)
rm(day);rm(graphs)
```

Tuesday

```
temp_night <- temp            %>% filter(night == "tuesday")
temp_att   <- staff_youth_att %>% mutate(night =  "tuesday")

#Surv_1
surv_1 <- temp_night %>%
  filter(survnum == 1) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates1 <- surv_1 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_1 <- surv_1 %>%
   select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 2
surv_2 <- temp_night %>%
  filter(survnum == 2) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
```

```r
isolates2 <- surv_2 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_2 <- surv_2 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 3
surv_3 <- temp_night %>%
  filter(survnum == 3) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates3 <- surv_3 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_3 <- surv_3 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 4
surv_4 <- temp_night %>%
  filter(survnum == 4) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates4 <- surv_4 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_4 <- surv_4 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 5
surv_5 <- temp_night %>%
  filter(survnum == 5) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates5 <- surv_5 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_5 <- surv_5 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

day <- list(sur1 = surv_1,
            sur2 = surv_2,
```

```
          sur3 = surv_3,
          sur4 = surv_4,
          sur5 = surv_5,
          iso1 = isolates1,
          iso2 = isolates2,
          iso3 = isolates3,
          iso4 = isolates4,
          iso5 = isolates5)

rm(surv_1);rm(surv_2);rm(surv_3);rm(surv_4);rm(surv_5)
rm(isolates1);rm(isolates2);rm(isolates3);rm(isolates4);rm(isolates5)
```

General Graphs

```
#Convert to Matrices

sur1 <- as.matrix(day$sur1)
sur2 <- as.matrix(day$sur2)
sur3 <- as.matrix(day$sur3)
sur4 <- as.matrix(day$sur4)
sur5 <- as.matrix(day$sur5)


# Convert matrix to an igraph object

g1 <- graph.edgelist(sur1, directed = TRUE) + vertices(day$iso1$Sender_Final_ID) #Graph edgelist + Add
g2 <- graph.edgelist(sur2, directed = TRUE) + vertices(day$iso2$Sender_Final_ID) #Graph edgelist + Add
g3 <- graph.edgelist(sur3, directed = TRUE) + vertices(day$iso3$Sender_Final_ID) #Graph edgelist + Add
g4 <- graph.edgelist(sur4, directed = TRUE) + vertices(day$iso4$Sender_Final_ID) #Graph edgelist + Add
g5 <- graph.edgelist(sur5, directed = TRUE) + vertices(day$iso5$Sender_Final_ID) #Graph edgelist + Add




#Capture Roles, Nights & Colors

temp_att <- temp_att %>%
  mutate(
        role1    = ifelse((!(is.na(role2)))    & (night2 == night), role2,    role1),
        night1   = ifelse((!(is.na(night2)))   & (night2 == night), night2,   night1),
        role_col = ifelse((!(is.na(role_col2))) & (night2 == night), role_col2, role_col)
        )

#Add staff Role Attribute

V(g1)$role  <- temp_att$role1[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$role  <- temp_att$role1[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$role  <- temp_att$role1[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$role  <- temp_att$role1[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$role  <- temp_att$role1[match(V(g5)$name, temp_att$Final_ID)]

#Add role colors

V(g1)$color <- temp_att$role_col[match(V(g1)$name, temp_att$Final_ID)]
```

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```r
V(g2)$color <- temp_att$role_col[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$color <- temp_att$role_col[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$color <- temp_att$role_col[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$color <- temp_att$role_col[match(V(g5)$name, temp_att$Final_ID)]


#Add Edge weights - Match by edgelist rows Send/ Receive rows & temp_night Send/Receive rows. filter by

w <- left_join(rename(as_data_frame(as_edgelist(g1)), Sender_Final_ID =V1, Receiver_Final_ID = V2), tem
                        filter(survnum == 1) #Match Weights
g1 <-  set_edge_attr(g1, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g2)), Sender_Final_ID =V1, Receiver_Final_ID = V2), tem
                        filter(survnum == 2) #Match weights
g2 <-  set_edge_attr(g2, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g3)), Sender_Final_ID =V1, Receiver_Final_ID = V2), tem
                        filter(survnum == 3) #Match weights
g3 <-  set_edge_attr(g3, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g4)), Sender_Final_ID =V1, Receiver_Final_ID = V2), tem
                        filter(survnum == 4) #Match weights
g4 <-  set_edge_attr(g4, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g5)), Sender_Final_ID =V1, Receiver_Final_ID = V2), tem
                        filter(survnum == 5) #Match weights
g5 <-  set_edge_attr(g5, "weight", value = w$sn2) #Add edge attribute

#Set graphs to list
graphs <- list(g1 = g1,g2 = g2, g3 = g3,g4 = g4, g5 = g5)




rm(g1); rm(g2); rm(g3); rm(g4); rm(g5)
rm(sur1);rm(sur2);rm(sur3);rm(sur4);rm(sur5)
rm(temp_att); rm(temp_night); rm(w)
```

Create List

```r
tuesday <- list(edgelists = day, graphs = graphs)
rm(day); rm(graphs)
```

Wednesday

```r
temp_night <- temp            %>% filter(night == "wednesday")
temp_att   <- staff_youth_att %>% mutate(night =  "wednesday")

#Surv_1
surv_1 <- temp_night %>%
  filter(survnum == 1) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates1 <- surv_1 %>%
```

```r
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_1 <- surv_1 %>%
  select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 2
surv_2 <- temp_night %>%
  filter(survnum == 2) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates2 <- surv_2 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_2 <- surv_2 %>%
  select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 3
surv_3 <- temp_night %>%
  filter(survnum == 3) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates3 <- surv_3 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_3 <- surv_3 %>%
  select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 4
surv_4 <- temp_night %>%
  filter(survnum == 4) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates4 <- surv_4 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_4 <- surv_4 %>%
  select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 5
surv_5 <- temp_night %>%
  filter(survnum == 5) %>%
```

```r
    mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates5 <- surv_5 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_5 <- surv_5 %>%
   select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

day <- list(sur1 = surv_1,
            sur2 = surv_2,
            sur3 = surv_3,
            sur4 = surv_4,
            sur5 = surv_5,
            iso1 = isolates1,
            iso2 = isolates2,
            iso3 = isolates3,
            iso4 = isolates4,
            iso5 = isolates5)

rm(surv_1);rm(surv_2);rm(surv_3);rm(surv_4);rm(surv_5)
rm(isolates1);rm(isolates2);rm(isolates3);rm(isolates4);rm(isolates5)
```

General Graphs

```r
#Convert to Matrices

sur1 <- as.matrix(day$sur1)
sur2 <- as.matrix(day$sur2)
sur3 <- as.matrix(day$sur3)
sur4 <- as.matrix(day$sur4)
sur5 <- as.matrix(day$sur5)


# Convert matrix to an igraph object

g1 <- graph.edgelist(sur1, directed = TRUE) + vertices(day$iso1$Sender_Final_ID) #Graph edgelist + Add
g2 <- graph.edgelist(sur2, directed = TRUE) + vertices(day$iso2$Sender_Final_ID) #Graph edgelist + Add
g3 <- graph.edgelist(sur3, directed = TRUE) + vertices(day$iso3$Sender_Final_ID) #Graph edgelist + Add
g4 <- graph.edgelist(sur4, directed = TRUE) + vertices(day$iso4$Sender_Final_ID) #Graph edgelist + Add
g5 <- graph.edgelist(sur5, directed = TRUE) + vertices(day$iso5$Sender_Final_ID) #Graph edgelist + Add


#Capture Roles, Nights & Colors

temp_att <- temp_att %>%
  mutate(
        role1    = ifelse((!(is.na(role2)))     & (night2 == night), role2,    role1),
        night1   = ifelse((!(is.na(night2)))    & (night2 == night), night2,   night1),
        role_col = ifelse((!(is.na(role_col2))) & (night2 == night), role_col2, role_col)
```

```
        )

#Add staff Role Attribute

V(g1)$role  <- temp_att$role1[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$role  <- temp_att$role1[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$role  <- temp_att$role1[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$role  <- temp_att$role1[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$role  <- temp_att$role1[match(V(g5)$name, temp_att$Final_ID)]

#Add role colors

V(g1)$color <- temp_att$role_col[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$color <- temp_att$role_col[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$color <- temp_att$role_col[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$color <- temp_att$role_col[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$color <- temp_att$role_col[match(V(g5)$name, temp_att$Final_ID)]


#Add Edge weights - Match by edgelist rows Send/ Receive rows & temp_night Send/Receive rows. filter by

w <- left_join(rename(as_data_frame(as_edgelist(g1)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                filter(survnum == 1) #Match Weights
g1 <-  set_edge_attr(g1, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g2)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                filter(survnum == 2) #Match weights
g2 <-  set_edge_attr(g2, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g3)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                filter(survnum == 3) #Match weights
g3 <-  set_edge_attr(g3, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g4)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                filter(survnum == 4) #Match weights
g4 <-  set_edge_attr(g4, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g5)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                filter(survnum == 5) #Match weights
g5 <-  set_edge_attr(g5, "weight", value = w$sn2) #Add edge attribute

#Set graphs to list
graphs <- list(g1 = g1,g2 = g2, g3 = g3,g4 = g4, g5 = g5)




rm(g1); rm(g2); rm(g3); rm(g4); rm(g5)
rm(sur1);rm(sur2);rm(sur3);rm(sur4);rm(sur5)
rm(temp_att); rm(temp_night); rm(w)
```

Create List

```r
wednesday <- list(edgelists = day, graphs = graphs)
rm(day); rm(graphs)
```

Thursday

```r
temp_night <- temp              %>% filter(night == "thursday")
temp_att   <- staff_youth_att %>% mutate(night =  "thursday")

#Surv_1
surv_1 <- temp_night %>%
  filter(survnum == 1) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates1 <- surv_1 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_1 <- surv_1 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 2
surv_2 <- temp_night %>%
  filter(survnum == 2) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates2 <- surv_2 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_2 <- surv_2 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 3
surv_3 <- temp_night %>%
  filter(survnum == 3) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates3 <- surv_3 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_3 <- surv_3 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 4
surv_4 <- temp_night %>%
  filter(survnum == 4) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
```

```r
#Getting isolates
isolates4 <- surv_4 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_4 <- surv_4 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 5
surv_5 <- temp_night %>%
  filter(survnum == 5) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates5 <- surv_5 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_5 <- surv_5 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

day <- list(sur1 = surv_1,
            sur2 = surv_2,
            sur3 = surv_3,
            sur4 = surv_4,
            sur5 = surv_5,
            iso1 = isolates1,
            iso2 = isolates2,
            iso3 = isolates3,
            iso4 = isolates4,
            iso5 = isolates5)

rm(surv_1);rm(surv_2);rm(surv_3);rm(surv_4);rm(surv_5)
rm(isolates1);rm(isolates2);rm(isolates3);rm(isolates4);rm(isolates5)
```

General Graphs

```r
#Convert to Matrices

sur1 <- as.matrix(day$sur1)
sur2 <- as.matrix(day$sur2)
sur3 <- as.matrix(day$sur3)
sur4 <- as.matrix(day$sur4)
sur5 <- as.matrix(day$sur5)


# Convert matrix to an igraph object

g1 <- graph.edgelist(sur1, directed = TRUE) + vertices(day$iso1$Sender_Final_ID) #Graph edgelist + Add
g2 <- graph.edgelist(sur2, directed = TRUE) + vertices(day$iso2$Sender_Final_ID) #Graph edgelist + Add
g3 <- graph.edgelist(sur3, directed = TRUE) + vertices(day$iso3$Sender_Final_ID) #Graph edgelist + Add
```

```r
g4 <- graph.edgelist(sur4, directed = TRUE) + vertices(day$iso4$Sender_Final_ID) #Graph edgelist + Add
g5 <- graph.edgelist(sur5, directed = TRUE) + vertices(day$iso5$Sender_Final_ID) #Graph edgelist + Add




#Capture Roles, Nights & Colors

temp_att <- temp_att %>%
  mutate(
         role1    = ifelse((!(is.na(role2)))    & (night2 == night), role2,    role1),
         night1   = ifelse((!(is.na(night2)))   & (night2 == night), night2,   night1),
         role_col = ifelse((!(is.na(role_col2))) & (night2 == night), role_col2, role_col)
         )

#Add staff Role Attribute

V(g1)$role  <- temp_att$role1[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$role  <- temp_att$role1[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$role  <- temp_att$role1[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$role  <- temp_att$role1[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$role  <- temp_att$role1[match(V(g5)$name, temp_att$Final_ID)]

#Add role colors

V(g1)$color <- temp_att$role_col[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$color <- temp_att$role_col[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$color <- temp_att$role_col[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$color <- temp_att$role_col[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$color <- temp_att$role_col[match(V(g5)$name, temp_att$Final_ID)]


#Add Edge weights - Match by edgelist rows Send/ Receive rows & temp_night Send/Receive rows. filter by

w <- left_join(rename(as_data_frame(as_edgelist(g1)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                              filter(survnum == 1) #Match Weights
g1 <-  set_edge_attr(g1, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g2)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                              filter(survnum == 2) #Match weights
g2 <-  set_edge_attr(g2, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g3)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                              filter(survnum == 3) #Match weights
g3 <-  set_edge_attr(g3, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g4)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                              filter(survnum == 4) #Match weights
g4 <-  set_edge_attr(g4, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g5)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                              filter(survnum == 5) #Match weights
g5 <-  set_edge_attr(g5, "weight", value = w$sn2) #Add edge attribute
```

```r
#Set graphs to list
graphs <- list(g1 = g1,g2 = g2, g3 = g3,g4 = g4, g5 = g5)




rm(g1); rm(g2); rm(g3); rm(g4); rm(g5)
rm(sur1);rm(sur2);rm(sur3);rm(sur4);rm(sur5)
rm(temp_att); rm(temp_night); rm(w)
```

Create List

```r
thursday <- list(edgelists = day, graphs = graphs)
rm(day); rm(graphs)
```

Plot Graphs

```r
#Set chart image
par(mfrow=c(4,5))

#Monday Graphs

  my_sn_g(monday$graphs$g1,       title = "Monday - Week 1")   ; my_leg(att = role, colors = color) #Soc
  my_sn_g(monday$graphs$g2,       title = "Monday - Week 3")   ; my_leg(att = role, colors = color) #Soc
  my_sn_g(monday$graphs$g3,       title = "Monday - Week 6")   ; my_leg(att = role, colors = color) #Soc
  my_sn_g(monday$graphs$g4,       title = "Monday - Week 9")   ; my_leg(att = role, colors = color) #Soc
  my_sn_g(monday$graphs$g5,       title = "Monday - Week 11")  ; my_leg(att = role, colors = color) #Soc

#Tuesday Graphs

  my_sn_g(tuesday$graphs$g1,      title = "Tuesday - Week 1")   ; my_leg(att = role, colors = color) #Soc
  my_sn_g(tuesday$graphs$g2,      title = "Tuesday - Week 3")   ; my_leg(att = role, colors = color) #Soc
  my_sn_g(tuesday$graphs$g3,      title = "Tuesday - Week 6")   ; my_leg(att = role, colors = color) #Soc
  my_sn_g(tuesday$graphs$g4,      title = "Tuesday - Week 9")   ; my_leg(att = role, colors = color) #Soc
  my_sn_g(tuesday$graphs$g5,      title = "Tuesday - Week 11")  ; my_leg(att = role, colors = color) #Soc

#Wednesday Graphs

  my_sn_g(wednesday$graphs$g1,    title = "Wednesday - Week 1")   ; my_leg(att = role, colors = color) #S
  my_sn_g(wednesday$graphs$g2,    title = "Wednesday - Week 3")   ; my_leg(att = role, colors = color) #S
  my_sn_g(wednesday$graphs$g3,    title = "Wednesday - Week 6")   ; my_leg(att = role, colors = color) #S
  my_sn_g(wednesday$graphs$g4,    title = "Wednesday - Week 9")   ; my_leg(att = role, colors = color) #S
  my_sn_g(wednesday$graphs$g5,    title = "Wednesday - Week 11")  ; my_leg(att = role, colors = color) #S


  my_sn_g(thursday$graphs$g1,     title = "Thursday - Week 1")   ; my_leg(att = role, colors = color) #So
  my_sn_g(thursday$graphs$g2,     title = "Thursday - Week 3")   ; my_leg(att = role, colors = color) #So
  my_sn_g(thursday$graphs$g3,     title = "Thursday - Week 6")   ; my_leg(att = role, colors = color) #So
  my_sn_g(thursday$graphs$g4,     title = "Thursday - Week 9")   ; my_leg(att = role, colors = color) #So
  my_sn_g(thursday$graphs$g5,     title = "Thursday - Week 11")  ; my_leg(att = role, colors = color) #So
```
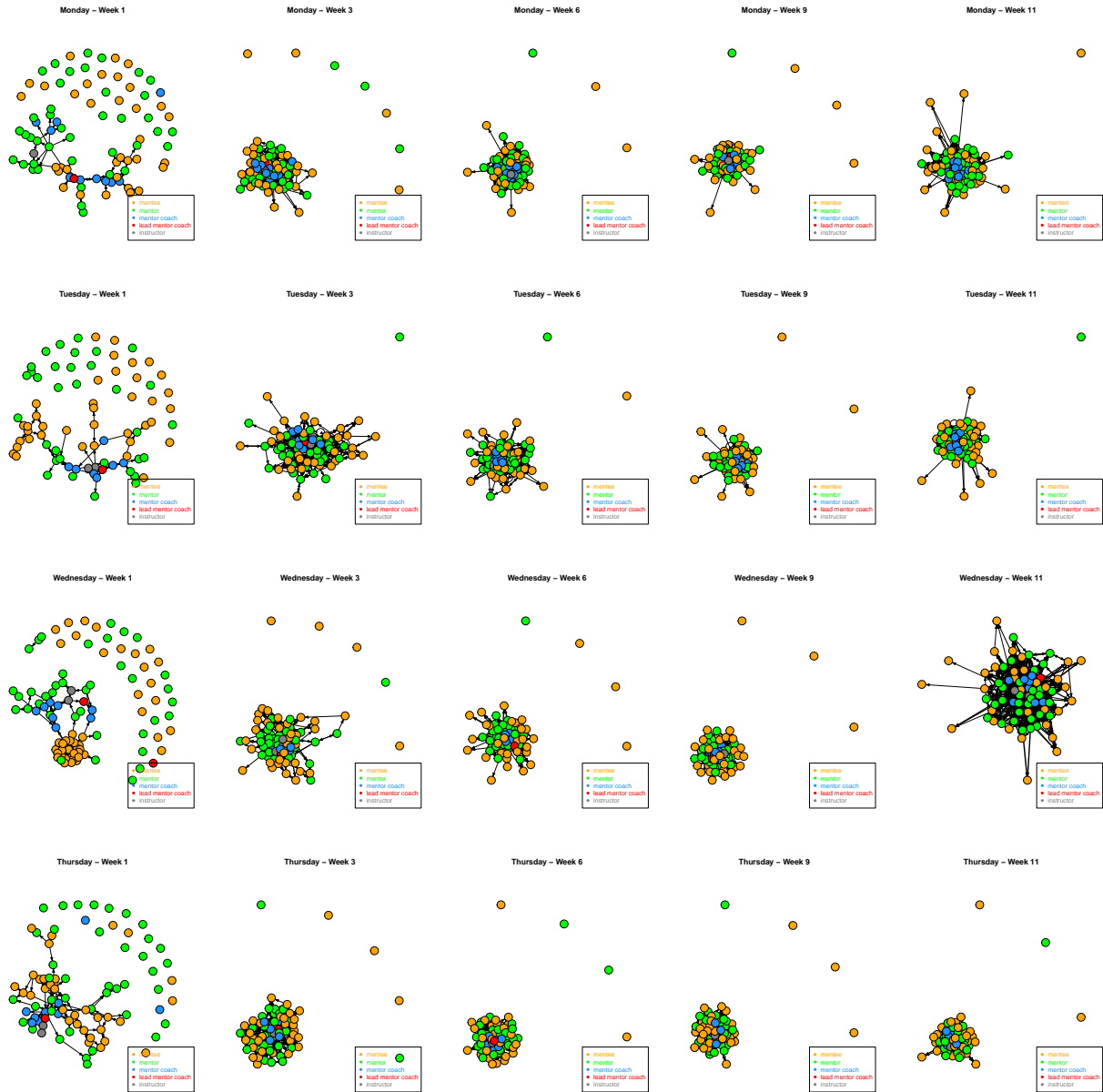
```
#Plot With purrr::walk()
  #walk(.x = monday$graphs, .f = my_sn_g, title = "Monday");my_leg(role, color)
  #walk(.x = tuesday$graphs, .f = my_sn_g, title = "Tuesday");my_leg(role, color)
  #walk(.x =wednesday$graphs, .f = my_sn_g, title = "Wednesday");my_leg(role, color)
  #walk(.x = thursday$graphs, .f = my_sn_g, title = "Thursday");my_leg(role, color)
```

Create Semester List

```
S16 <- list(monday = monday, tuesday = tuesday, wednesday = wednesday, thursday = thursday)
rm(monday);rm(tuesday);rm(wednesday);rm(thursday)
rm(temp)
```

F16

```
temp <- elmk %>% filter(semester == "F16")

mon <- temp %>% filter(night == "monday")
tue <- temp %>% filter(night == "tuesday")
wed <- temp %>% filter(night == "wednesday")
thu <- temp %>% filter(night == "thursday")

sem <- list(mon = mon,
            tue = tue,
            wed = wed,
            thu = thu)

rm(mon);rm(tue);rm(wed);rm(thu)
```

Summary

```
sem$mon <- group_by(sem$mon, survnum)
sem$tue <- group_by(sem$tue, survnum)
sem$wed <- group_by(sem$wed, survnum)
sem$thu <- group_by(sem$thu, survnum)

summarize(sem$mon, day = "mon", n = length(unique(Sender_Final_ID)), tie_count = sum(sn1, na.rm = TRUE)
```

```
## # A tibble: 5 x 5
##   survnum day       n tie_count tie_prop
##     <int> <chr> <int>     <int>    <dbl>
## 1       1 mon      63        73    0.383
## 2       2 mon      60       482    2.53
## 3       3 mon      60       705    3.70
## 4       4 mon      58       794    4.16
## 5       5 mon      58       842    4.41
```

```
summarize(sem$tue, day = "tue", n = length(unique(Sender_Final_ID)), tie_count = sum(sn1, na.rm = TRUE)
```

```
## # A tibble: 5 x 5
##   survnum day       n tie_count tie_prop
##     <int> <chr> <int>     <int>    <dbl>
## 1       1 tue      64        76    0.394
## 2       2 tue      61       319    1.65
## 3       3 tue      61       623    3.23
## 4       4 tue      60       804    4.17
## 5       5 tue      60       912    4.73
```

```
summarize(sem$wed, day = "wed", n = length(unique(Sender_Final_ID)), tie_count = sum(sn1, na.rm = TRUE)
```

```
## # A tibble: 5 x 5
##   survnum day       n tie_count tie_prop
##     <int> <chr> <int>     <int>    <dbl>
## 1       1 wed      66        93    0.466
## 2       2 wed      64       382    1.91
## 3       3 wed      62       632    3.17
## 4       4 wed      62       808    4.05
## 5       5 wed      60       716    3.59
```

```r
summarize(sem$thu, day = "thu", n = length(unique(Sender_Final_ID)), tie_count = sum(sn1, na.rm = TRUE)
```

```
## # A tibble: 5 x 5
##   survnum day      n tie_count tie_prop
##     <int> <chr> <int>    <int>    <dbl>
## 1       1 thu     64       96    0.474
## 2       2 thu     62      535    2.64
## 3       3 thu     62      814    4.02
## 4       4 thu     61      909    4.49
## 5       5 thu     58      902    4.45
```

```r
sem$mon <- ungroup(sem$mon)
sem$tue <- ungroup(sem$tue)
sem$wed <- ungroup(sem$wed)
sem$thu <- ungroup(sem$thu)


rm(sem)
```

Monday

```r
temp_night <- temp           %>% filter(night == "monday")
temp_att   <- staff_youth_att %>% mutate(night =  "monday")

#Surv_1
surv_1 <- temp_night %>%
  filter(survnum == 1) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates1 <- surv_1 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_1 <- surv_1 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 2
surv_2 <- temp_night %>%
  filter(survnum == 2) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates2 <- surv_2 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_2 <- surv_2 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 3
surv_3 <- temp_night %>%
  filter(survnum == 3) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
```

```r
#Getting isolates
isolates3 <- surv_3 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_3 <- surv_3 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 4
surv_4 <- temp_night %>%
  filter(survnum == 4) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates4 <- surv_4 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_4 <- surv_4 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 5
surv_5 <- temp_night %>%
  filter(survnum == 5) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates5 <- surv_5 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_5 <- surv_5 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

day <- list(sur1 = surv_1,
            sur2 = surv_2,
            sur3 = surv_3,
            sur4 = surv_4,
            sur5 = surv_5,
            iso1 = isolates1,
            iso2 = isolates2,
            iso3 = isolates3,
            iso4 = isolates4,
            iso5 = isolates5)

rm(surv_1);rm(surv_2);rm(surv_3);rm(surv_4);rm(surv_5)
rm(isolates1);rm(isolates2);rm(isolates3);rm(isolates4);rm(isolates5)
```

General Graphs

```r
#Convert to Matrices

sur1 <- as.matrix(day$sur1)
sur2 <- as.matrix(day$sur2)
sur3 <- as.matrix(day$sur3)
sur4 <- as.matrix(day$sur4)
sur5 <- as.matrix(day$sur5)


# Convert matrix to an igraph object

g1 <- graph.edgelist(sur1, directed = TRUE) + vertices(day$iso1$Sender_Final_ID) #Graph edgelist + Add
g2 <- graph.edgelist(sur2, directed = TRUE) + vertices(day$iso2$Sender_Final_ID) #Graph edgelist + Add
g3 <- graph.edgelist(sur3, directed = TRUE) + vertices(day$iso3$Sender_Final_ID) #Graph edgelist + Add
g4 <- graph.edgelist(sur4, directed = TRUE) + vertices(day$iso4$Sender_Final_ID) #Graph edgelist + Add
g5 <- graph.edgelist(sur5, directed = TRUE) + vertices(day$iso5$Sender_Final_ID) #Graph edgelist + Add




#Capture Roles, Nights & Colors

temp_att <- temp_att %>%
  mutate(
        role1    = ifelse((!(is.na(role2)))    & (night2 == night), role2,    role1),
        night1   = ifelse((!(is.na(night2)))   & (night2 == night), night2,   night1),
        role_col = ifelse((!(is.na(role_col2))) & (night2 == night), role_col2, role_col)
        )

#Add staff Role Attribute

V(g1)$role  <- temp_att$role1[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$role  <- temp_att$role1[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$role  <- temp_att$role1[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$role  <- temp_att$role1[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$role  <- temp_att$role1[match(V(g5)$name, temp_att$Final_ID)]

#Add role colors

V(g1)$color <- temp_att$role_col[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$color <- temp_att$role_col[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$color <- temp_att$role_col[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$color <- temp_att$role_col[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$color <- temp_att$role_col[match(V(g5)$name, temp_att$Final_ID)]


#Add Edge weights - Match by edgelist rows Send/ Receive rows & temp_night Send/Receive rows. filter by

w <- left_join(rename(as_data_frame(as_edgelist(g1)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                            filter(survnum == 1) #Match Weights
g1 <-  set_edge_attr(g1, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g2)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
```

```
                                    filter(survnum == 2) #Match weights
g2 <-  set_edge_attr(g2, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g3)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                    filter(survnum == 3) #Match weights
g3 <-  set_edge_attr(g3, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g4)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                    filter(survnum == 4) #Match weights
g4 <-  set_edge_attr(g4, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g5)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                    filter(survnum == 5) #Match weights
g5 <-  set_edge_attr(g5, "weight", value = w$sn2) #Add edge attribute

#Set graphs to list
graphs <- list(g1 = g1,g2 = g2, g3 = g3,g4 = g4, g5 = g5)




rm(g1); rm(g2); rm(g3); rm(g4); rm(g5)
rm(sur1);rm(sur2);rm(sur3);rm(sur4);rm(sur5)
rm(temp_att); rm(temp_night); rm(w)
```

Create List

```
monday <- list(edgelists = day, graphs = graphs)
rm(day);rm(graphs)
```

Tuesday

```
temp_night <- temp            %>% filter(night == "tuesday")
temp_att   <- staff_youth_att %>% mutate(night =  "tuesday")


#Surv_1
surv_1 <- temp_night %>%
  filter(survnum == 1) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates1 <- surv_1 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_1 <- surv_1 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 2
surv_2 <- temp_night %>%
  filter(survnum == 2) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
```

```r
#Getting isolates
isolates2 <- surv_2 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_2 <- surv_2 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 3
surv_3 <- temp_night %>%
  filter(survnum == 3) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates3 <- surv_3 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_3 <- surv_3 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 4
surv_4 <- temp_night %>%
  filter(survnum == 4) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates4 <- surv_4 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_4 <- surv_4 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 5
surv_5 <- temp_night %>%
  filter(survnum == 5) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates5 <- surv_5 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_5 <- surv_5 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

day <- list(sur1 = surv_1,
```

```
              sur2 = surv_2,
              sur3 = surv_3,
              sur4 = surv_4,
              sur5 = surv_5,
              iso1 = isolates1,
              iso2 = isolates2,
              iso3 = isolates3,
              iso4 = isolates4,
              iso5 = isolates5)

rm(surv_1);rm(surv_2);rm(surv_3);rm(surv_4);rm(surv_5)
rm(isolates1);rm(isolates2);rm(isolates3);rm(isolates4);rm(isolates5)
```

General Graphs

```
#Convert to Matrices

sur1 <- as.matrix(day$sur1)
sur2 <- as.matrix(day$sur2)
sur3 <- as.matrix(day$sur3)
sur4 <- as.matrix(day$sur4)
sur5 <- as.matrix(day$sur5)


# Convert matrix to an igraph object

g1 <- graph.edgelist(sur1, directed = TRUE) + vertices(day$iso1$Sender_Final_ID) #Graph edgelist + Add
g2 <- graph.edgelist(sur2, directed = TRUE) + vertices(day$iso2$Sender_Final_ID) #Graph edgelist + Add
g3 <- graph.edgelist(sur3, directed = TRUE) + vertices(day$iso3$Sender_Final_ID) #Graph edgelist + Add
g4 <- graph.edgelist(sur4, directed = TRUE) + vertices(day$iso4$Sender_Final_ID) #Graph edgelist + Add
g5 <- graph.edgelist(sur5, directed = TRUE) + vertices(day$iso5$Sender_Final_ID) #Graph edgelist + Add




#Capture Roles, Nights & Colors

temp_att <- temp_att %>%
  mutate(
        role1    = ifelse((!(is.na(role2)))    & (night2 == night), role2,    role1),
        night1   = ifelse((!(is.na(night2)))   & (night2 == night), night2,   night1),
        role_col = ifelse((!(is.na(role_col2))) & (night2 == night), role_col2, role_col)
        )

#Add staff Role Attribute

V(g1)$role  <- temp_att$role1[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$role  <- temp_att$role1[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$role  <- temp_att$role1[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$role  <- temp_att$role1[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$role  <- temp_att$role1[match(V(g5)$name, temp_att$Final_ID)]

#Add role colors
```

```r
V(g1)$color <- temp_att$role_col[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$color <- temp_att$role_col[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$color <- temp_att$role_col[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$color <- temp_att$role_col[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$color <- temp_att$role_col[match(V(g5)$name, temp_att$Final_ID)]


#Add Edge weights - Match by edgelist rows Send/ Receive rows & temp_night Send/Receive rows. filter by

w <- left_join(rename(as_data_frame(as_edgelist(g1)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 1) #Match Weights
g1 <-  set_edge_attr(g1, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g2)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 2) #Match weights
g2 <-  set_edge_attr(g2, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g3)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 3) #Match weights
g3 <-  set_edge_attr(g3, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g4)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 4) #Match weights
g4 <-  set_edge_attr(g4, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g5)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 5) #Match weights
g5 <-  set_edge_attr(g5, "weight", value = w$sn2) #Add edge attribute

#Set graphs to list
graphs <- list(g1 = g1,g2 = g2, g3 = g3,g4 = g4, g5 = g5)




rm(g1); rm(g2); rm(g3); rm(g4); rm(g5)
rm(sur1);rm(sur2);rm(sur3);rm(sur4);rm(sur5)
rm(temp_att); rm(temp_night); rm(w)
```

Create List

```r
tuesday <- list(edgelists = day, graphs = graphs)
rm(day); rm(graphs)
```

Wednesday

```r
temp_night <- temp            %>% filter(night == "wednesday")
temp_att   <- staff_youth_att %>% mutate(night =  "wednesday")

#Surv_1
surv_1 <- temp_night %>%
  filter(survnum == 1) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
```

```r
isolates1 <- surv_1 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_1 <- surv_1 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 2
surv_2 <- temp_night %>%
  filter(survnum == 2) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates2 <- surv_2 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_2 <- surv_2 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 3
surv_3 <- temp_night %>%
  filter(survnum == 3) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates3 <- surv_3 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_3 <- surv_3 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 4
surv_4 <- temp_night %>%
  filter(survnum == 4) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates4 <- surv_4 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_4 <- surv_4 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 5
surv_5 <- temp_night %>%
```

```r
  filter(survnum == 5) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates5 <- surv_5 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_5 <- surv_5 %>%
   select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

day <- list(sur1 = surv_1,
            sur2 = surv_2,
            sur3 = surv_3,
            sur4 = surv_4,
            sur5 = surv_5,
            iso1 = isolates1,
            iso2 = isolates2,
            iso3 = isolates3,
            iso4 = isolates4,
            iso5 = isolates5)

rm(surv_1);rm(surv_2);rm(surv_3);rm(surv_4);rm(surv_5)
rm(isolates1);rm(isolates2);rm(isolates3);rm(isolates4);rm(isolates5)
```

General Graphs

```r
#Convert to Matrices

sur1 <- as.matrix(day$sur1)
sur2 <- as.matrix(day$sur2)
sur3 <- as.matrix(day$sur3)
sur4 <- as.matrix(day$sur4)
sur5 <- as.matrix(day$sur5)


# Convert matrix to an igraph object

g1 <- graph.edgelist(sur1, directed = TRUE) + vertices(day$iso1$Sender_Final_ID) #Graph edgelist + Add
g2 <- graph.edgelist(sur2, directed = TRUE) + vertices(day$iso2$Sender_Final_ID) #Graph edgelist + Add
g3 <- graph.edgelist(sur3, directed = TRUE) + vertices(day$iso3$Sender_Final_ID) #Graph edgelist + Add
g4 <- graph.edgelist(sur4, directed = TRUE) + vertices(day$iso4$Sender_Final_ID) #Graph edgelist + Add
g5 <- graph.edgelist(sur5, directed = TRUE) + vertices(day$iso5$Sender_Final_ID) #Graph edgelist + Add




#Capture Roles, Nights & Colors

temp_att <- temp_att %>%
  mutate(
        role1    = ifelse((!(is.na(role2)))    & (night2 == night), role2,    role1),
        night1   = ifelse((!(is.na(night2)))   & (night2 == night), night2,   night1),
```

```r
        role_col = ifelse((!(is.na(role_col2))) & (night2 == night), role_col2, role_col)
        )

#Add staff Role Attribute

V(g1)$role  <- temp_att$role1[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$role  <- temp_att$role1[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$role  <- temp_att$role1[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$role  <- temp_att$role1[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$role  <- temp_att$role1[match(V(g5)$name, temp_att$Final_ID)]

#Add role colors

V(g1)$color <- temp_att$role_col[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$color <- temp_att$role_col[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$color <- temp_att$role_col[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$color <- temp_att$role_col[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$color <- temp_att$role_col[match(V(g5)$name, temp_att$Final_ID)]


#Add Edge weights - Match by edgelist rows Send/ Receive rows & temp_night Send/Receive rows. filter by

w <- left_join(rename(as_data_frame(as_edgelist(g1)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                          filter(survnum == 1) #Match Weights
g1 <-  set_edge_attr(g1, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g2)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                          filter(survnum == 2) #Match weights
g2 <-  set_edge_attr(g2, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g3)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                          filter(survnum == 3) #Match weights
g3 <-  set_edge_attr(g3, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g4)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                          filter(survnum == 4) #Match weights
g4 <-  set_edge_attr(g4, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g5)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                          filter(survnum == 5) #Match weights
g5 <-  set_edge_attr(g5, "weight", value = w$sn2) #Add edge attribute

#Set graphs to list
graphs <- list(g1 = g1,g2 = g2, g3 = g3,g4 = g4, g5 = g5)




rm(g1); rm(g2); rm(g3); rm(g4); rm(g5)
rm(sur1);rm(sur2);rm(sur3);rm(sur4);rm(sur5)
rm(temp_att); rm(temp_night); rm(w)
```

Create List

```r
wednesday <- list(edgelists = day, graphs = graphs)
rm(day); rm(graphs)
```

Thursday

```r
temp_night <- temp            %>% filter(night == "thursday")
temp_att   <- staff_youth_att %>% mutate(night =  "thursday")

#Surv_1
surv_1 <- temp_night %>%
  filter(survnum == 1) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates1 <- surv_1 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_1 <- surv_1 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 2
surv_2 <- temp_night %>%
  filter(survnum == 2) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates2 <- surv_2 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_2 <- surv_2 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 3
surv_3 <- temp_night %>%
  filter(survnum == 3) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates3 <- surv_3 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_3 <- surv_3 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 4
surv_4 <- temp_night %>%
  filter(survnum == 4) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
```

```r
#Getting isolates
isolates4 <- surv_4 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_4 <- surv_4 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 5
surv_5 <- temp_night %>%
  filter(survnum == 5) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates5 <- surv_5 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_5 <- surv_5 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

day <- list(sur1 = surv_1,
            sur2 = surv_2,
            sur3 = surv_3,
            sur4 = surv_4,
            sur5 = surv_5,
            iso1 = isolates1,
            iso2 = isolates2,
            iso3 = isolates3,
            iso4 = isolates4,
            iso5 = isolates5)

rm(surv_1);rm(surv_2);rm(surv_3);rm(surv_4);rm(surv_5)
rm(isolates1);rm(isolates2);rm(isolates3);rm(isolates4);rm(isolates5)
```

General Graphs

```r
#Convert to Matrices

sur1 <- as.matrix(day$sur1)
sur2 <- as.matrix(day$sur2)
sur3 <- as.matrix(day$sur3)
sur4 <- as.matrix(day$sur4)
sur5 <- as.matrix(day$sur5)


# Convert matrix to an igraph object

g1 <- graph.edgelist(sur1, directed = TRUE) + vertices(day$iso1$Sender_Final_ID) #Graph edgelist + Add
g2 <- graph.edgelist(sur2, directed = TRUE) + vertices(day$iso2$Sender_Final_ID) #Graph edgelist + Add
g3 <- graph.edgelist(sur3, directed = TRUE) + vertices(day$iso3$Sender_Final_ID) #Graph edgelist + Add
```

```r
g4 <- graph.edgelist(sur4, directed = TRUE) + vertices(day$iso4$Sender_Final_ID) #Graph edgelist + Add
g5 <- graph.edgelist(sur5, directed = TRUE) + vertices(day$iso5$Sender_Final_ID) #Graph edgelist + Add



#Capture Roles, Nights & Colors

temp_att <- temp_att %>%
  mutate(
        role1    = ifelse((!(is.na(role2)))    & (night2 == night), role2,    role1),
        night1   = ifelse((!(is.na(night2)))   & (night2 == night), night2,   night1),
        role_col = ifelse((!(is.na(role_col2))) & (night2 == night), role_col2, role_col)
        )

#Add staff Role Attribute

V(g1)$role  <- temp_att$role1[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$role  <- temp_att$role1[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$role  <- temp_att$role1[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$role  <- temp_att$role1[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$role  <- temp_att$role1[match(V(g5)$name, temp_att$Final_ID)]

#Add role colors

V(g1)$color <- temp_att$role_col[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$color <- temp_att$role_col[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$color <- temp_att$role_col[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$color <- temp_att$role_col[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$color <- temp_att$role_col[match(V(g5)$name, temp_att$Final_ID)]


#Add Edge weights - Match by edgelist rows Send/ Receive rows & temp_night Send/Receive rows. filter by

w <- left_join(rename(as_data_frame(as_edgelist(g1)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 1) #Match Weights
g1 <-  set_edge_attr(g1, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g2)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 2) #Match weights
g2 <-  set_edge_attr(g2, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g3)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 3) #Match weights
g3 <-  set_edge_attr(g3, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g4)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 4) #Match weights
g4 <-  set_edge_attr(g4, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g5)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                        filter(survnum == 5) #Match weights
g5 <-  set_edge_attr(g5, "weight", value = w$sn2) #Add edge attribute
```

```
#Set graphs to list
graphs <- list(g1 = g1,g2 = g2, g3 = g3,g4 = g4, g5 = g5)




rm(g1); rm(g2); rm(g3); rm(g4); rm(g5)
rm(sur1);rm(sur2);rm(sur3);rm(sur4);rm(sur5)
rm(temp_att); rm(temp_night); rm(w)
```

Create List

```
thursday <- list(edgelists = day, graphs = graphs)
rm(day); rm(graphs)
```


Plot Graphs

```
#Set chart image
par(mfrow=c(4,5))

#Monday Graphs

   my_sn_g(monday$graphs$g1,      title = "Monday - Week 1")  ; my_leg(att = role, colors = color) #Soc
   my_sn_g(monday$graphs$g2,      title = "Monday - Week 3")  ; my_leg(att = role, colors = color) #Soc
   my_sn_g(monday$graphs$g3,      title = "Monday - Week 6")  ; my_leg(att = role, colors = color) #Soc
   my_sn_g(monday$graphs$g4,      title = "Monday - Week 9")  ; my_leg(att = role, colors = color) #Soc
   my_sn_g(monday$graphs$g5,      title = "Monday - Week 11") ; my_leg(att = role, colors = color) #Soc

#Tuesday Graphs

   my_sn_g(tuesday$graphs$g1,     title = "Tuesday - Week 1")  ; my_leg(att = role, colors = color) #Soc
   my_sn_g(tuesday$graphs$g2,     title = "Tuesday - Week 3")  ; my_leg(att = role, colors = color) #Soc
   my_sn_g(tuesday$graphs$g3,     title = "Tuesday - Week 6")  ; my_leg(att = role, colors = color) #Soc
   my_sn_g(tuesday$graphs$g4,     title = "Tuesday - Week 9")  ; my_leg(att = role, colors = color) #Soc
   my_sn_g(tuesday$graphs$g5,     title = "Tuesday - Week 11") ; my_leg(att = role, colors = color) #Soc

#Wednesday Graphs

   my_sn_g(wednesday$graphs$g1,   title = "Wednesday - Week 1")  ; my_leg(att = role, colors = color) #S
   my_sn_g(wednesday$graphs$g2,   title = "Wednesday - Week 3")  ; my_leg(att = role, colors = color) #S
   my_sn_g(wednesday$graphs$g3,   title = "Wednesday - Week 6")  ; my_leg(att = role, colors = color) #S
   my_sn_g(wednesday$graphs$g4,   title = "Wednesday - Week 9")  ; my_leg(att = role, colors = color) #S
   my_sn_g(wednesday$graphs$g5,   title = "Wednesday - Week 11") ; my_leg(att = role, colors = color) #S


   my_sn_g(thursday$graphs$g1,    title = "Thursday - Week 1")  ; my_leg(att = role, colors = color) #So
   my_sn_g(thursday$graphs$g2,    title = "Thursday - Week 3")  ; my_leg(att = role, colors = color) #So
   my_sn_g(thursday$graphs$g3,    title = "Thursday - Week 6")  ; my_leg(att = role, colors = color) #So
   my_sn_g(thursday$graphs$g4,    title = "Thursday - Week 9")  ; my_leg(att = role, colors = color) #So
   my_sn_g(thursday$graphs$g5,    title = "Thursday - Week 11") ; my_leg(att = role, colors = color) #So
```

```
#Plot With purrr::walk()
  #walk(.x = monday$graphs, .f = my_sn_g, title = "Monday");my_leg(role, color)
  #walk(.x = tuesday$graphs, .f = my_sn_g, title = "Tuesday");my_leg(role, color)
  #walk(.x =wednesday$graphs, .f = my_sn_g, title = "Wednesday");my_leg(role, color)
  #walk(.x = thursday$graphs, .f = my_sn_g, title = "Thursday");my_leg(role, color)
```

Create Semester List

```
F16 <- list(monday = monday, tuesday = tuesday, wednesday = wednesday, thursday = thursday)
rm(monday);rm(tuesday);rm(wednesday);rm(thursday)
rm(temp)
```

S17

```
temp <- elmk %>% filter(semester == "S17")

mon <- temp %>% filter(night == "monday")
tue <- temp %>% filter(night == "tuesday")
wed <- temp %>% filter(night == "wednesday")
thu <- temp %>% filter(night == "thursday")

sem <- list(mon = mon,
            tue = tue,
            wed = wed,
            thu = thu)

rm(mon);rm(tue);rm(wed);rm(thu)
```

Summary

```
sem$mon <- group_by(sem$mon, survnum)
sem$tue <- group_by(sem$tue, survnum)
sem$wed <- group_by(sem$wed, survnum)
sem$thu <- group_by(sem$thu, survnum)

summarize(sem$mon, day = "mon", n = length(unique(Sender_Final_ID)), tie_count = sum(sn1, na.rm = TRUE)
```

```
## # A tibble: 5 x 5
##   survnum day       n tie_count tie_prop
##     <int> <chr> <int>     <int>    <dbl>
## 1       1 mon      66       149    0.702
## 2       2 mon      65       451    2.12
## 3       3 mon      63       664    3.13
## 4       4 mon      62       797    3.75
## 5       5 mon      61       839    3.95
```

```
summarize(sem$tue, day = "tue", n = length(unique(Sender_Final_ID)), tie_count = sum(sn1, na.rm = TRUE)
```

```
## # A tibble: 5 x 5
##   survnum day       n tie_count tie_prop
##     <int> <chr> <int>     <int>    <dbl>
## 1       1 tue      65        86    0.409
## 2       2 tue      64       466    2.22
## 3       3 tue      63       768    3.66
## 4       4 tue      62       841    4.00
## 5       5 tue      62      1006    4.79
```

```
summarize(sem$wed, day = "wed", n = length(unique(Sender_Final_ID)), tie_count = sum(sn1, na.rm = TRUE)
```

```
## # A tibble: 5 x 5
##   survnum day       n tie_count tie_prop
##     <int> <chr> <int>     <int>    <dbl>
## 1       1 wed      64       139    0.685
## 2       2 wed      64       432    2.13
## 3       3 wed      62       648    3.19
## 4       4 wed      62       846    4.17
## 5       5 wed      62       932    4.59
```

```r
summarize(sem$thu, day = "thu", n = length(unique(Sender_Final_ID)), tie_count = sum(sn1, na.rm = TRUE)
```

```
## # A tibble: 5 x 5
##   survnum day       n tie_count tie_prop
##     <int> <chr> <int>     <int>    <dbl>
## 1       1 thu      66        92    0.425
## 2       2 thu      65       440    2.03
## 3       3 thu      64       700    3.23
## 4       4 thu      63       867    4.01
## 5       5 thu      63       954    4.41
```

```r
sem$mon <- ungroup(sem$mon)
sem$tue <- ungroup(sem$tue)
sem$wed <- ungroup(sem$wed)
sem$thu <- ungroup(sem$thu)


rm(sem)
```

Monday

```r
temp_night <- temp            %>% filter(night == "monday")
temp_att   <- staff_youth_att %>% mutate(night =  "monday")

#Surv_1
surv_1 <- temp_night %>%
  filter(survnum == 1) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates1 <- surv_1 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_1 <- surv_1 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 2
surv_2 <- temp_night %>%
  filter(survnum == 2) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates2 <- surv_2 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_2 <- surv_2 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 3
surv_3 <- temp_night %>%
  filter(survnum == 3) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
```

```r
#Getting isolates
isolates3 <- surv_3 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_3 <- surv_3 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 4
surv_4 <- temp_night %>%
  filter(survnum == 4) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates4 <- surv_4 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_4 <- surv_4 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 5
surv_5 <- temp_night %>%
  filter(survnum == 5) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates5 <- surv_5 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_5 <- surv_5 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

day <- list(sur1 = surv_1,
            sur2 = surv_2,
            sur3 = surv_3,
            sur4 = surv_4,
            sur5 = surv_5,
            iso1 = isolates1,
            iso2 = isolates2,
            iso3 = isolates3,
            iso4 = isolates4,
            iso5 = isolates5)

rm(surv_1);rm(surv_2);rm(surv_3);rm(surv_4);rm(surv_5)
rm(isolates1);rm(isolates2);rm(isolates3);rm(isolates4);rm(isolates5)
```

General Graphs

```
#Convert to Matrices

sur1 <- as.matrix(day$sur1)
sur2 <- as.matrix(day$sur2)
sur3 <- as.matrix(day$sur3)
sur4 <- as.matrix(day$sur4)
sur5 <- as.matrix(day$sur5)


# Convert matrix to an igraph object

g1 <- graph.edgelist(sur1, directed = TRUE) + vertices(day$iso1$Sender_Final_ID) #Graph edgelist + Add
g2 <- graph.edgelist(sur2, directed = TRUE) + vertices(day$iso2$Sender_Final_ID) #Graph edgelist + Add
g3 <- graph.edgelist(sur3, directed = TRUE) + vertices(day$iso3$Sender_Final_ID) #Graph edgelist + Add
g4 <- graph.edgelist(sur4, directed = TRUE) + vertices(day$iso4$Sender_Final_ID) #Graph edgelist + Add
g5 <- graph.edgelist(sur5, directed = TRUE) + vertices(day$iso5$Sender_Final_ID) #Graph edgelist + Add




#Capture Roles, Nights & Colors

temp_att <- temp_att %>%
  mutate(
        role1    = ifelse((!(is.na(role2)))    & (night2 == night), role2,     role1),
        night1   = ifelse((!(is.na(night2)))   & (night2 == night), night2,    night1),
        role_col = ifelse((!(is.na(role_col2))) & (night2 == night), role_col2, role_col)
        )

#Add staff Role Attribute

V(g1)$role  <- temp_att$role1[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$role  <- temp_att$role1[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$role  <- temp_att$role1[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$role  <- temp_att$role1[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$role  <- temp_att$role1[match(V(g5)$name, temp_att$Final_ID)]

#Add role colors

V(g1)$color <- temp_att$role_col[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$color <- temp_att$role_col[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$color <- temp_att$role_col[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$color <- temp_att$role_col[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$color <- temp_att$role_col[match(V(g5)$name, temp_att$Final_ID)]


#Add Edge weights - Match by edgelist rows Send/ Receive rows & temp_night Send/Receive rows. filter by

w <- left_join(rename(as_data_frame(as_edgelist(g1)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                          filter(survnum == 1) #Match Weights
g1 <-  set_edge_attr(g1, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g2)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
```

```
                                      filter(survnum == 2) #Match weights
g2 <-  set_edge_attr(g2, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g3)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                      filter(survnum == 3) #Match weights
g3 <-  set_edge_attr(g3, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g4)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                      filter(survnum == 4) #Match weights
g4 <-  set_edge_attr(g4, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g5)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                      filter(survnum == 5) #Match weights
g5 <-  set_edge_attr(g5, "weight", value = w$sn2) #Add edge attribute

#Set graphs to list
graphs <- list(g1 = g1,g2 = g2, g3 = g3,g4 = g4, g5 = g5)




rm(g1); rm(g2); rm(g3); rm(g4); rm(g5)
rm(sur1);rm(sur2);rm(sur3);rm(sur4);rm(sur5)
rm(temp_att); rm(temp_night); rm(w)
```

Create List

```
monday <- list(edgelists = day, graphs = graphs)
rm(day);rm(graphs)
```

Tuesday

```
temp_night <- temp           %>% filter(night == "tuesday")
temp_att   <- staff_youth_att %>% mutate(night =  "tuesday")

#Surv_1
surv_1 <- temp_night %>%
  filter(survnum == 1) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates1 <- surv_1 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_1 <- surv_1 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 2
surv_2 <- temp_night %>%
  filter(survnum == 2) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates2 <- surv_2 %>%
```

```r
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_2 <- surv_2 %>%
  select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 3
surv_3 <- temp_night %>%
  filter(survnum == 3) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates3 <- surv_3 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_3 <- surv_3 %>%
  select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 4
surv_4 <- temp_night %>%
  filter(survnum == 4) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates4 <- surv_4 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_4 <- surv_4 %>%
  select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 5
surv_5 <- temp_night %>%
  filter(survnum == 5) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates5 <- surv_5 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_5 <- surv_5 %>%
  select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

day <- list(sur1 = surv_1,
            sur2 = surv_2,
            sur3 = surv_3,
```

```
            sur4 = surv_4,
            sur5 = surv_5,
            iso1 = isolates1,
            iso2 = isolates2,
            iso3 = isolates3,
            iso4 = isolates4,
            iso5 = isolates5)

rm(surv_1);rm(surv_2);rm(surv_3);rm(surv_4);rm(surv_5)
rm(isolates1);rm(isolates2);rm(isolates3);rm(isolates4);rm(isolates5)
```

General Graphs

```
#Convert to Matrices

sur1 <- as.matrix(day$sur1)
sur2 <- as.matrix(day$sur2)
sur3 <- as.matrix(day$sur3)
sur4 <- as.matrix(day$sur4)
sur5 <- as.matrix(day$sur5)


# Convert matrix to an igraph object

g1 <- graph.edgelist(sur1, directed = TRUE) + vertices(day$iso1$Sender_Final_ID) #Graph edgelist + Add
g2 <- graph.edgelist(sur2, directed = TRUE) + vertices(day$iso2$Sender_Final_ID) #Graph edgelist + Add
g3 <- graph.edgelist(sur3, directed = TRUE) + vertices(day$iso3$Sender_Final_ID) #Graph edgelist + Add
g4 <- graph.edgelist(sur4, directed = TRUE) + vertices(day$iso4$Sender_Final_ID) #Graph edgelist + Add
g5 <- graph.edgelist(sur5, directed = TRUE) + vertices(day$iso5$Sender_Final_ID) #Graph edgelist + Add




#Capture Roles, Nights & Colors

temp_att <- temp_att %>%
  mutate(
        role1    = ifelse((!(is.na(role2)))    & (night2 == night), role2,    role1),
        night1   = ifelse((!(is.na(night2)))   & (night2 == night), night2,   night1),
        role_col = ifelse((!(is.na(role_col2))) & (night2 == night), role_col2, role_col)
        )

#Add staff Role Attribute

V(g1)$role  <- temp_att$role1[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$role  <- temp_att$role1[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$role  <- temp_att$role1[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$role  <- temp_att$role1[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$role  <- temp_att$role1[match(V(g5)$name, temp_att$Final_ID)]

#Add role colors

V(g1)$color <- temp_att$role_col[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$color <- temp_att$role_col[match(V(g2)$name, temp_att$Final_ID)]
```

```r
V(g3)$color <- temp_att$role_col[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$color <- temp_att$role_col[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$color <- temp_att$role_col[match(V(g5)$name, temp_att$Final_ID)]


#Add Edge weights - Match by edgelist rows Send/ Receive rows & temp_night Send/Receive rows. filter by

w <- left_join(rename(as_data_frame(as_edgelist(g1)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                 filter(survnum == 1) #Match Weights
g1 <-  set_edge_attr(g1, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g2)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                 filter(survnum == 2) #Match weights
g2 <-  set_edge_attr(g2, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g3)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                 filter(survnum == 3) #Match weights
g3 <-  set_edge_attr(g3, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g4)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                 filter(survnum == 4) #Match weights
g4 <-  set_edge_attr(g4, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g5)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                                 filter(survnum == 5) #Match weights
g5 <-  set_edge_attr(g5, "weight", value = w$sn2) #Add edge attribute

#Set graphs to list
graphs <- list(g1 = g1,g2 = g2, g3 = g3,g4 = g4, g5 = g5)




rm(g1); rm(g2); rm(g3); rm(g4); rm(g5)
rm(sur1);rm(sur2);rm(sur3);rm(sur4);rm(sur5)
rm(temp_att); rm(temp_night); rm(w)
```

Create List

```r
tuesday <- list(edgelists = day, graphs = graphs)
rm(day); rm(graphs)
```

Wednesday

```r
temp_night <- temp            %>% filter(night == "wednesday")
temp_att   <- staff_youth_att %>% mutate(night =  "wednesday")

#Surv_1
surv_1 <- temp_night %>%
  filter(survnum == 1) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates1 <- surv_1 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
```

```r
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_1 <- surv_1 %>%
  select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))


#Surv 2
surv_2 <- temp_night %>%
  filter(survnum == 2) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates2 <- surv_2 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_2 <- surv_2 %>%
  select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))


#Surv 3
surv_3 <- temp_night %>%
  filter(survnum == 3) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates3 <- surv_3 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_3 <- surv_3 %>%
  select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))


#Surv 4
surv_4 <- temp_night %>%
  filter(survnum == 4) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates4 <- surv_4 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_4 <- surv_4 %>%
  select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))


#Surv 5
surv_5 <- temp_night %>%
  filter(survnum == 5) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
```

```r
#Getting isolates
isolates5 <- surv_5 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_5 <- surv_5 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

day <- list(sur1 = surv_1,
            sur2 = surv_2,
            sur3 = surv_3,
            sur4 = surv_4,
            sur5 = surv_5,
            iso1 = isolates1,
            iso2 = isolates2,
            iso3 = isolates3,
            iso4 = isolates4,
            iso5 = isolates5)

rm(surv_1);rm(surv_2);rm(surv_3);rm(surv_4);rm(surv_5)
rm(isolates1);rm(isolates2);rm(isolates3);rm(isolates4);rm(isolates5)
```

General Graphs

```r
#Convert to Matrices

sur1 <- as.matrix(day$sur1)
sur2 <- as.matrix(day$sur2)
sur3 <- as.matrix(day$sur3)
sur4 <- as.matrix(day$sur4)
sur5 <- as.matrix(day$sur5)


# Convert matrix to an igraph object

g1 <- graph.edgelist(sur1, directed = TRUE) + vertices(day$iso1$Sender_Final_ID) #Graph edgelist + Add
g2 <- graph.edgelist(sur2, directed = TRUE) + vertices(day$iso2$Sender_Final_ID) #Graph edgelist + Add
g3 <- graph.edgelist(sur3, directed = TRUE) + vertices(day$iso3$Sender_Final_ID) #Graph edgelist + Add
g4 <- graph.edgelist(sur4, directed = TRUE) + vertices(day$iso4$Sender_Final_ID) #Graph edgelist + Add
g5 <- graph.edgelist(sur5, directed = TRUE) + vertices(day$iso5$Sender_Final_ID) #Graph edgelist + Add


#Capture Roles, Nights & Colors

temp_att <- temp_att %>%
  mutate(
        role1    = ifelse((!(is.na(role2)))    & (night2 == night), role2,    role1),
        night1   = ifelse((!(is.na(night2)))   & (night2 == night), night2,   night1),
        role_col = ifelse((!(is.na(role_col2))) & (night2 == night), role_col2, role_col)
        )
```

```r
#Add staff Role Attribute

V(g1)$role  <- temp_att$role1[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$role  <- temp_att$role1[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$role  <- temp_att$role1[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$role  <- temp_att$role1[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$role  <- temp_att$role1[match(V(g5)$name, temp_att$Final_ID)]

#Add role colors

V(g1)$color <- temp_att$role_col[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$color <- temp_att$role_col[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$color <- temp_att$role_col[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$color <- temp_att$role_col[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$color <- temp_att$role_col[match(V(g5)$name, temp_att$Final_ID)]


#Add Edge weights - Match by edgelist rows Send/ Receive rows & temp_night Send/Receive rows. filter by

w <- left_join(rename(as_data_frame(as_edgelist(g1)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                              filter(survnum == 1) #Match Weights
g1 <-  set_edge_attr(g1, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g2)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                              filter(survnum == 2) #Match weights
g2 <-  set_edge_attr(g2, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g3)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                              filter(survnum == 3) #Match weights
g3 <-  set_edge_attr(g3, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g4)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                              filter(survnum == 4) #Match weights
g4 <-  set_edge_attr(g4, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g5)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                              filter(survnum == 5) #Match weights
g5 <-  set_edge_attr(g5, "weight", value = w$sn2) #Add edge attribute

#Set graphs to list
graphs <- list(g1 = g1,g2 = g2, g3 = g3,g4 = g4, g5 = g5)




rm(g1); rm(g2); rm(g3); rm(g4); rm(g5)
rm(sur1);rm(sur2);rm(sur3);rm(sur4);rm(sur5)
rm(temp_att); rm(temp_night); rm(w)
```

Create List

```r
wednesday <- list(edgelists = day, graphs = graphs)
rm(day); rm(graphs)
```

Thursday

```r
temp_night <- temp              %>% filter(night == "thursday")
temp_att   <- staff_youth_att %>% mutate(night =  "thursday")

#Surv_1
surv_1 <- temp_night %>%
  filter(survnum == 1) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates1 <- surv_1 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_1 <- surv_1 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 2
surv_2 <- temp_night %>%
  filter(survnum == 2) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates2 <- surv_2 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_2 <- surv_2 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 3
surv_3 <- temp_night %>%
  filter(survnum == 3) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates3 <- surv_3 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_3 <- surv_3 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 4
surv_4 <- temp_night %>%
  filter(survnum == 4) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates4 <- surv_4 %>%
```

```
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_4 <- surv_4 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

#Surv 5
surv_5 <- temp_night %>%
  filter(survnum == 5) %>%
  mutate(Receiver_Final_ID = ifelse(is.na(sn1), NA, Receiver_Final_ID)) #%>%
#Getting isolates
isolates5 <- surv_5 %>%
  mutate(sn1 = ifelse(is.na(sn1), 0, sn1)) %>%
  group_by(Sender_Final_ID) %>%
  summarize(isolate = sum(sn1)) %>%
  filter(isolate < 1) %>%
  select(Sender_Final_ID)
surv_5 <- surv_5 %>%
    select(Sender_Final_ID, Receiver_Final_ID) %>% filter(!(is.na(Receiver_Final_ID)))

day <- list(sur1 = surv_1,
            sur2 = surv_2,
            sur3 = surv_3,
            sur4 = surv_4,
            sur5 = surv_5,
            iso1 = isolates1,
            iso2 = isolates2,
            iso3 = isolates3,
            iso4 = isolates4,
            iso5 = isolates5)

rm(surv_1);rm(surv_2);rm(surv_3);rm(surv_4);rm(surv_5)
rm(isolates1);rm(isolates2);rm(isolates3);rm(isolates4);rm(isolates5)
```

General Graphs

```
#Convert to Matrices

sur1 <- as.matrix(day$sur1)
sur2 <- as.matrix(day$sur2)
sur3 <- as.matrix(day$sur3)
sur4 <- as.matrix(day$sur4)
sur5 <- as.matrix(day$sur5)


# Convert matrix to an igraph object

g1 <- graph.edgelist(sur1, directed = TRUE) + vertices(day$iso1$Sender_Final_ID) #Graph edgelist + Add
g2 <- graph.edgelist(sur2, directed = TRUE) + vertices(day$iso2$Sender_Final_ID) #Graph edgelist + Add
g3 <- graph.edgelist(sur3, directed = TRUE) + vertices(day$iso3$Sender_Final_ID) #Graph edgelist + Add
g4 <- graph.edgelist(sur4, directed = TRUE) + vertices(day$iso4$Sender_Final_ID) #Graph edgelist + Add
g5 <- graph.edgelist(sur5, directed = TRUE) + vertices(day$iso5$Sender_Final_ID) #Graph edgelist + Add
```

```r
#Capture Roles, Nights & Colors

temp_att <- temp_att %>%
  mutate(
         role1    = ifelse((!(is.na(role2)))     & (night2 == night), role2,     role1),
         night1   = ifelse((!(is.na(night2)))    & (night2 == night), night2,    night1),
         role_col = ifelse((!(is.na(role_col2))) & (night2 == night), role_col2, role_col)
         )

#Add staff Role Attribute

V(g1)$role  <- temp_att$role1[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$role  <- temp_att$role1[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$role  <- temp_att$role1[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$role  <- temp_att$role1[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$role  <- temp_att$role1[match(V(g5)$name, temp_att$Final_ID)]

#Add role colors

V(g1)$color <- temp_att$role_col[match(V(g1)$name, temp_att$Final_ID)]
V(g2)$color <- temp_att$role_col[match(V(g2)$name, temp_att$Final_ID)]
V(g3)$color <- temp_att$role_col[match(V(g3)$name, temp_att$Final_ID)]
V(g4)$color <- temp_att$role_col[match(V(g4)$name, temp_att$Final_ID)]
V(g5)$color <- temp_att$role_col[match(V(g5)$name, temp_att$Final_ID)]


#Add Edge weights - Match by edgelist rows Send/ Receive rows & temp_night Send/Receive rows. filter by

w <- left_join(rename(as_data_frame(as_edgelist(g1)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                          filter(survnum == 1) #Match Weights
g1 <-  set_edge_attr(g1, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g2)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                          filter(survnum == 2) #Match weights
g2 <-  set_edge_attr(g2, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g3)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                          filter(survnum == 3) #Match weights
g3 <-  set_edge_attr(g3, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g4)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                          filter(survnum == 4) #Match weights
g4 <-  set_edge_attr(g4, "weight", value = w$sn2) #Add edge attribute

w <- left_join(rename(as_data_frame(as_edgelist(g5)), Sender_Final_ID =V1, Receiver_Final_ID = V2), temp
                          filter(survnum == 5) #Match weights
g5 <-  set_edge_attr(g5, "weight", value = w$sn2) #Add edge attribute

#Set graphs to list
graphs <- list(g1 = g1,g2 = g2, g3 = g3,g4 = g4, g5 = g5)
```

```r
rm(g1); rm(g2); rm(g3); rm(g4); rm(g5)
rm(sur1);rm(sur2);rm(sur3);rm(sur4);rm(sur5)
rm(temp_att); rm(temp_night); rm(w)
```

Create List

```r
thursday <- list(edgelists = day, graphs = graphs)
rm(day); rm(graphs)
```


Plot Graphs

```r
#Set chart image
par(mfrow=c(4,5))

#Monday Graphs

  my_sn_g(monday$graphs$g1,       title = "Monday - Week 1")  ; my_leg(att = role, colors = color) #Soc
  my_sn_g(monday$graphs$g2,       title = "Monday - Week 3")  ; my_leg(att = role, colors = color) #Soc
  my_sn_g(monday$graphs$g3,       title = "Monday - Week 6")  ; my_leg(att = role, colors = color) #Soc
  my_sn_g(monday$graphs$g4,       title = "Monday - Week 9")  ; my_leg(att = role, colors = color) #Soc
  my_sn_g(monday$graphs$g5,       title = "Monday - Week 11") ; my_leg(att = role, colors = color) #Soc

#Tuesday Graphs

  my_sn_g(tuesday$graphs$g1,      title = "Tuesday - Week 1")  ; my_leg(att = role, colors = color) #Soc
  my_sn_g(tuesday$graphs$g2,      title = "Tuesday - Week 3")  ; my_leg(att = role, colors = color) #Soc
  my_sn_g(tuesday$graphs$g3,      title = "Tuesday - Week 6")  ; my_leg(att = role, colors = color) #Soc
  my_sn_g(tuesday$graphs$g4,      title = "Tuesday - Week 9")  ; my_leg(att = role, colors = color) #Soc
  my_sn_g(tuesday$graphs$g5,      title = "Tuesday - Week 11") ; my_leg(att = role, colors = color) #Soc

#Wednesday Graphs

  my_sn_g(wednesday$graphs$g1,    title = "Wednesday - Week 1")  ; my_leg(att = role, colors = color) #S
  my_sn_g(wednesday$graphs$g2,    title = "Wednesday - Week 3")  ; my_leg(att = role, colors = color) #S
  my_sn_g(wednesday$graphs$g3,    title = "Wednesday - Week 6")  ; my_leg(att = role, colors = color) #S
  my_sn_g(wednesday$graphs$g4,    title = "Wednesday - Week 9")  ; my_leg(att = role, colors = color) #S
  my_sn_g(wednesday$graphs$g5,    title = "Wednesday - Week 11") ; my_leg(att = role, colors = color) #S


  my_sn_g(thursday$graphs$g1,     title = "Thursday - Week 1")  ; my_leg(att = role, colors = color) #So
  my_sn_g(thursday$graphs$g2,     title = "Thursday - Week 3")  ; my_leg(att = role, colors = color) #So
  my_sn_g(thursday$graphs$g3,     title = "Thursday - Week 6")  ; my_leg(att = role, colors = color) #So
  my_sn_g(thursday$graphs$g4,     title = "Thursday - Week 9")  ; my_leg(att = role, colors = color) #So
  my_sn_g(thursday$graphs$g5,     title = "Thursday - Week 11") ; my_leg(att = role, colors = color) #So
```
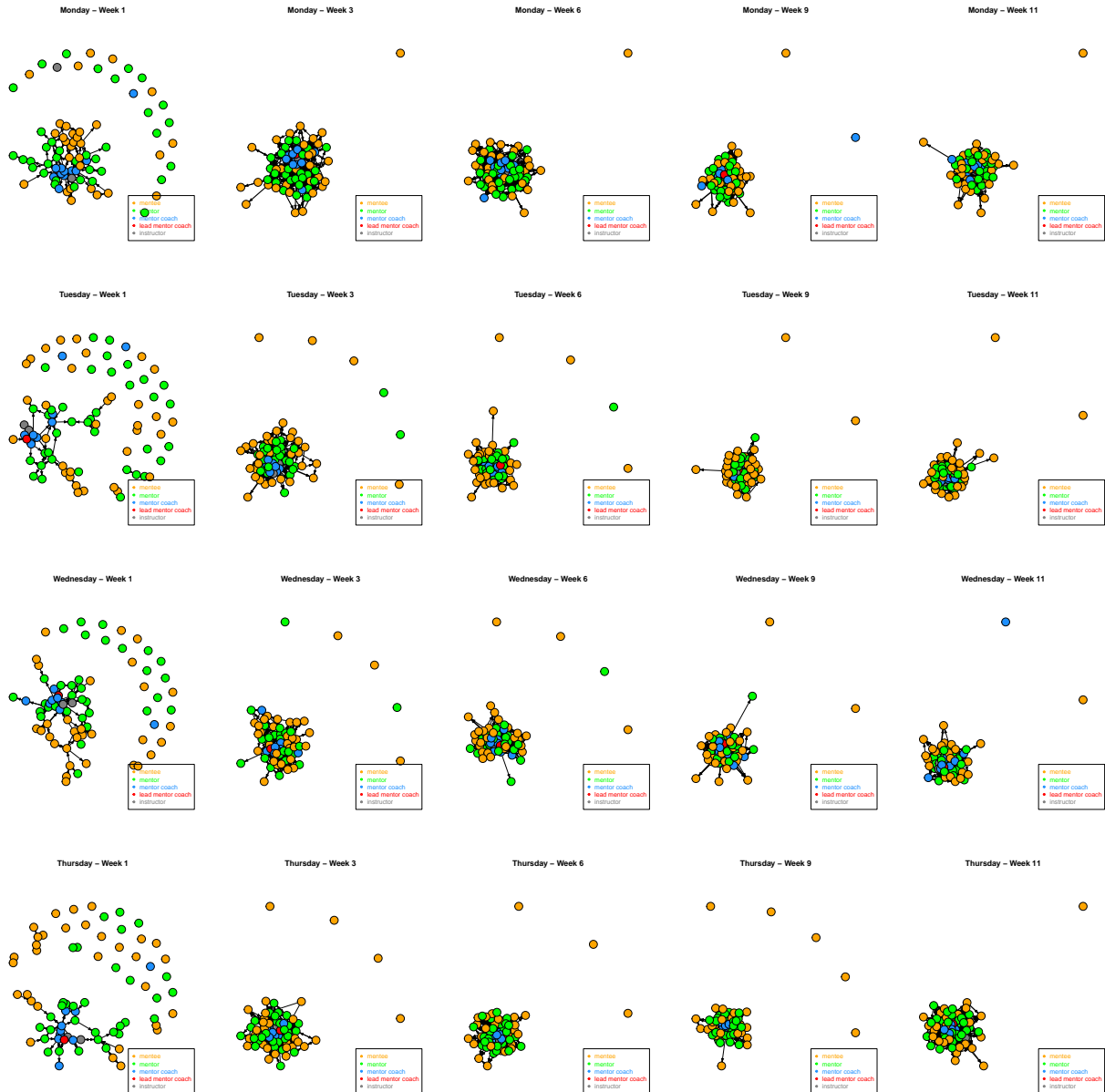
```
#Plot With purrr::walk()
  #walk(.x = monday$graphs, .f = my_sn_g, title = "Monday");my_leg(role, color)
  #walk(.x = tuesday$graphs, .f = my_sn_g, title = "Tuesday");my_leg(role, color)
  #walk(.x =wednesday$graphs, .f = my_sn_g, title = "Wednesday");my_leg(role, color)
  #walk(.x = thursday$graphs, .f = my_sn_g, title = "Thursday");my_leg(role, color)
```

Create Semester List

```
S17 <- list(monday = monday, tuesday = tuesday, wednesday = wednesday, thursday = thursday)
rm(monday);rm(tuesday);rm(wednesday);rm(thursday)
rm(temp)
```

Combine Semesters to list

```r
ALL <- list(F15 = F15, S16 = S16, F16 = F16, S17 = S17)
rm(F15);rm(S16);rm(F16);rm(S17)
```

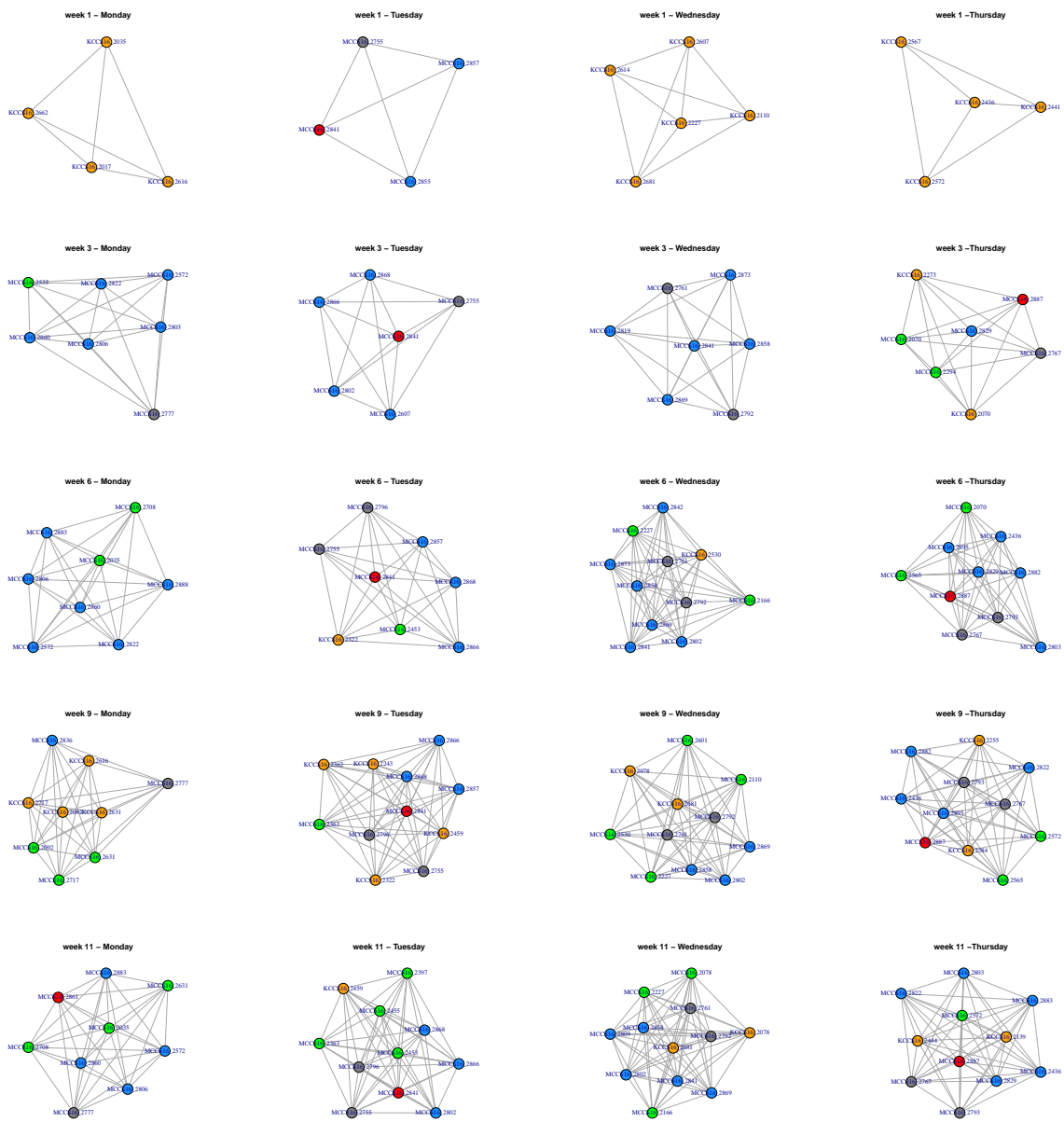## Save All Networks to permanant RData File

```r
saveRDS(ALL, file="T:/Research folders/CCWTG/Data/MERGEALL/ALL_NETWORKS.RDS")
```
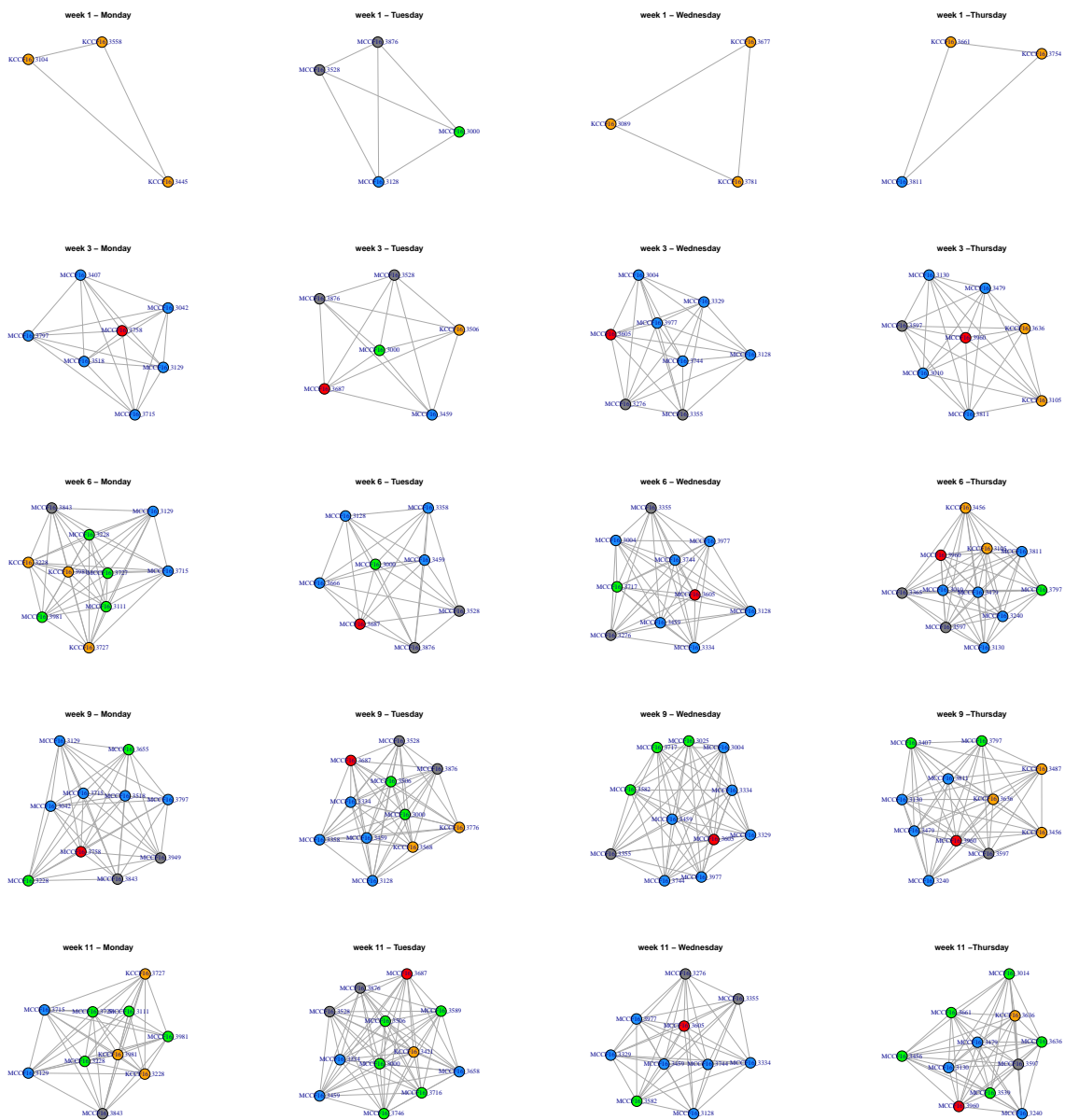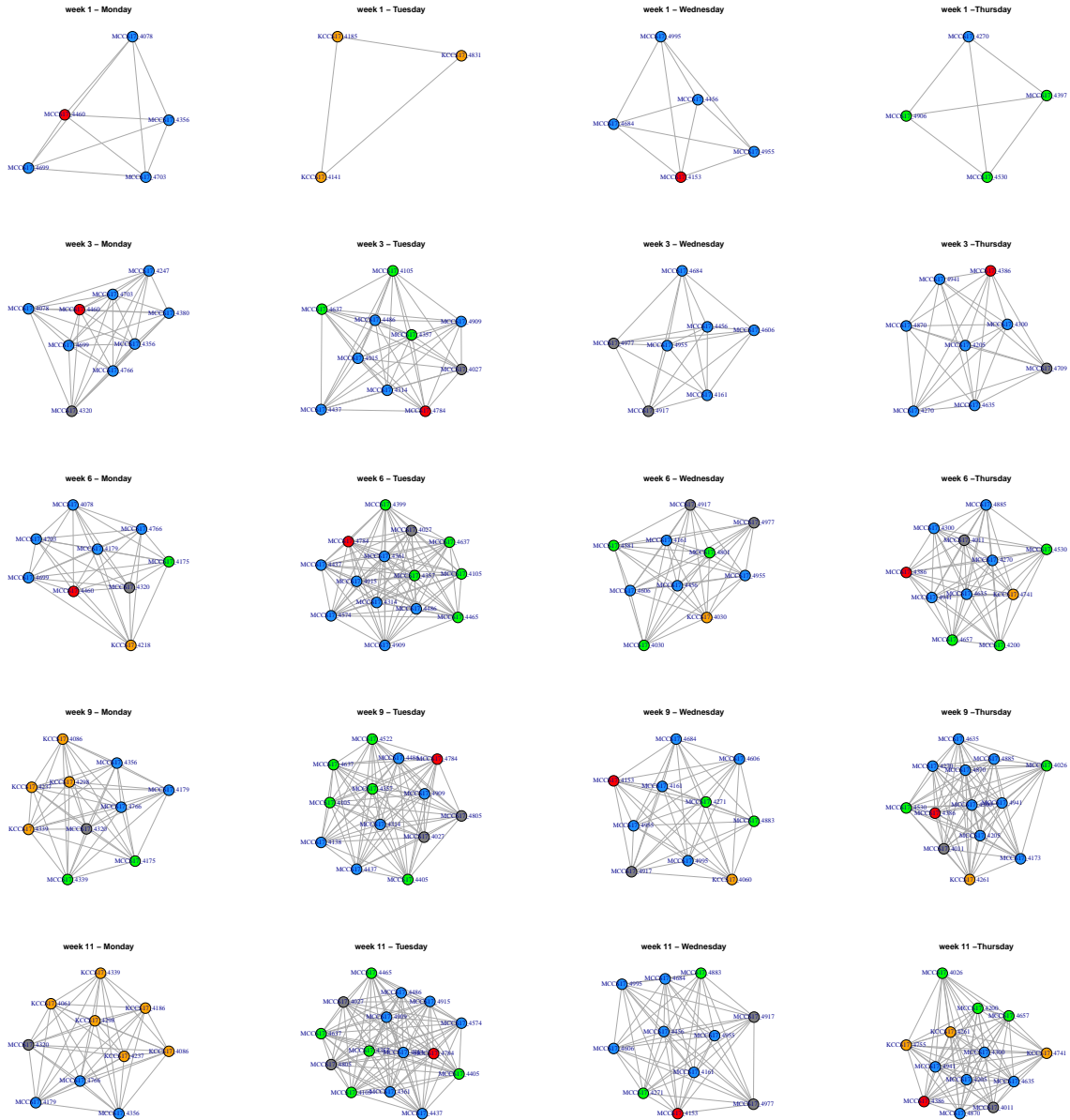
Examine Cliques

F15
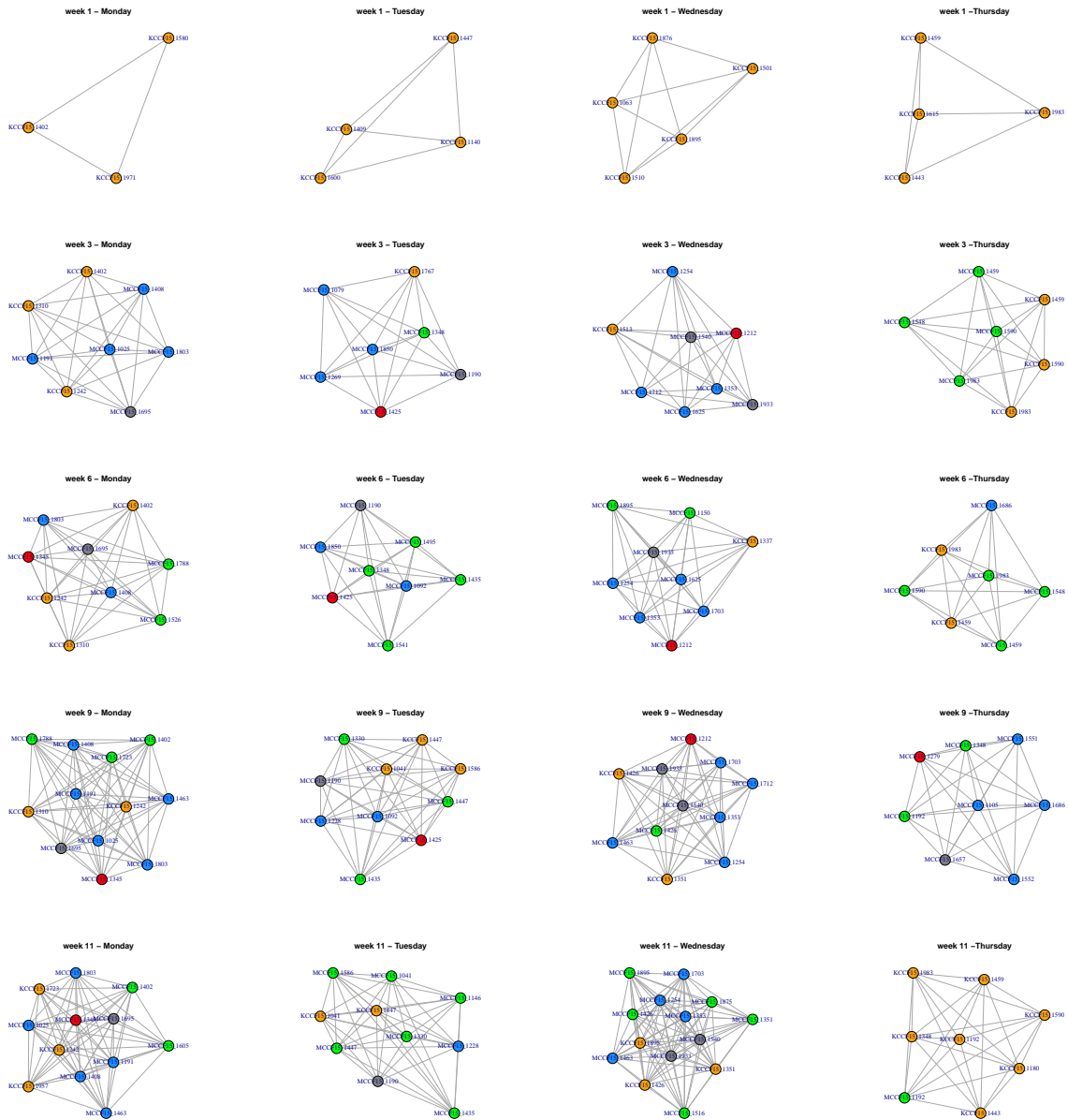
S17

Combine Cliques

```
cliques <- list(F15 = F15, S16 = S16, F16 = F16, S17 = S17)
rm(F15);rm(S16);rm(F16);rm(S17)
```