

# Final Report of System Analysis - Global Health Mentorship Program (GHMe)

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# 1 Executive Summary

The Global Health Mentorships Program (GHMe) strives to offer mentoring and development opportunities to Student or Young Professionals (SYP) interested in global health. The program operates hierarchically, with a director overseeing various functional responsibilities, middle-level roles such as researchers, content writers, and website editors, and the pairing of Mentors and SYP at the lower level.

Roles within the program interact throughout its processes, notably during selection and program duration, with the program facilitator playing a pivotal role in both processes. The SYP experience is significantly influenced by cultural barriers, affecting stages from application to program completion. Challenges such as communication lapses, cultural differences, and time zone disparities hinder smooth interactions.

The program's collaborative model emphasizes knowledge exchange, matching experienced Mentors with SYP for professional growth. Mentors, with 5-10 years of expertise in global health, generously share knowledge, while SYP seek network building and skill development under their guidance. Program facilitators monitor pairs' progress, ensuring a supportive environment for mentoring relationships.

To enhance effectiveness, program evaluators analyze data from pre-survey to exit survey, contributing insights for program improvement. Challenges plague the current system, notably flaws in the algorithm used for SYP selection, a surge in applications impacting the matching process, and limited team size amidst increasing demand. Communication breakdowns, delayed application periods, and low post-program survey completion rates further impede program efficacy.

Addressing these challenges is crucial to streamline the selection process, ensure timely communication, and boost survey participation for comprehensive feedback collection. Detailed documentation for each role's activities is necessary for process clarity and improvement. Overcoming these obstacles will bolster the GHMe program, fostering an environment conducive to global health knowledge development and exchange.

There are some recommendations for the GHMe team. Firstly, a structured team with monthly updated organizational charts is advised. Utilizing Slack for communication, integrating Google tools, and employing Lucidchart and Jira for documentation and workflow streamline the process. Detailed activity documentation per role through the time aims to balance workloads.

A revised selection process, New System 1, incorporates a five-month process with application fees for SYP. This aims to enhance commitment and increase funds for program enhancements. A re calibrated matching algorithm (New Algorithm) assigning higher weightage to language and time zones aims to alleviate communication issues and availability problems.

Another critical recommendation, New System 2 for Program Facilitators (PF), involves monthly monitoring, a commitment letter for participants, and FAQs addressing communication issues. Addressing internal GHMe issues before seeking external collaborations is emphasized to ensure a robust foundation.

For implementation, the plan spans phases in 2023, including system development, documentation, and preparation for the 2024 program. The phased approach integrates the new systems, adjusts the selection process, and validates the algorithm for readiness.

The roadmap's intent is to fortify GHMe's global health initiatives by harmonizing efforts, optimizing communication, refining the selection process, and addressing internal concerns. This collective strategy aims to enhance the program's impact and effectiveness for upcoming cohorts.

## 2 Description of Current System

### 2.1 Brief narrative description

The Global Health Mentorships Program (GHMe) aims to provide mentoring and development opportunities to Student or Young Professionals (SYP) interested in global health, with the help of more experienced volunteers as Mentors. The program is organized hierarchically, with a director at the top managing several functional responsibilities, at the middle level, such as researchers, content writers, program assessors, website editors etc. Mentors and SYP are paired at the bottom level.

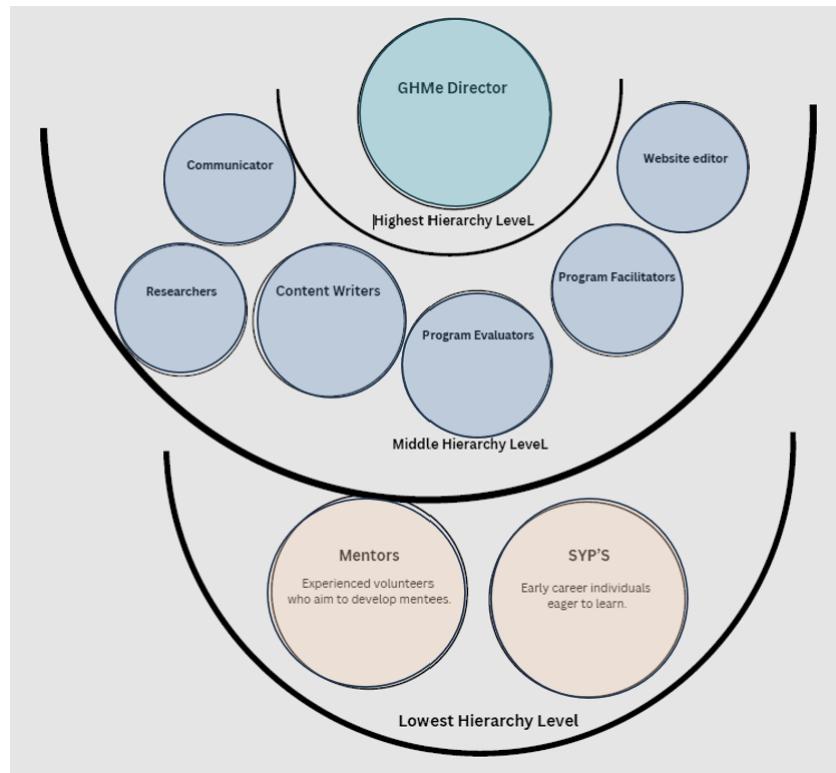


Figure 1: Relationship Model - Hierarchy level of the GHMe

All these roles interact throughout the different processes involved in the program, such as the selection period and throughout the program itself. It can be observed that the role of the **program facilitator** is pivotal in both processes.

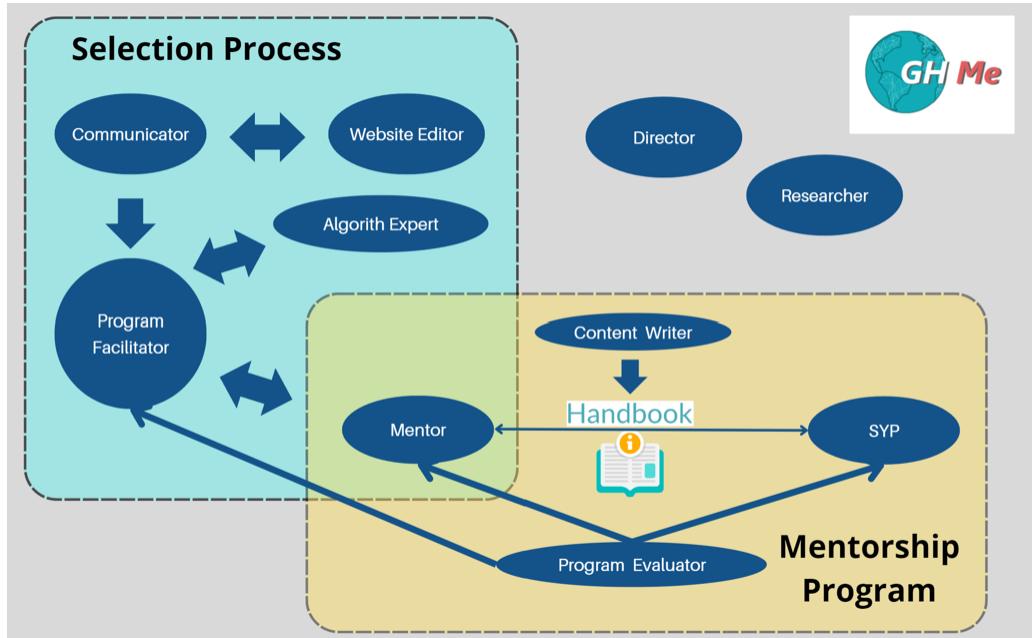


Figure 2: Relationship Model - Interaction of roles of the GHMe

The SYP experience is significantly influenced by various cultural barriers, factors, and challenges. These hurdles can manifest at different stages of the program, starting from the application phase, throughout their stay in the program, and even emerging upon completion. The provided model exemplifies an instance during the application process, showcasing what typically occurs throughout the program's duration. The cultural model emphasizes the pressures and anxieties that SYPs experience when applying to the competitive program, in addition to impacts like encouragement and support networks. Communication lapses lead to confusion, while differences in language, culture and time zones also create barriers.

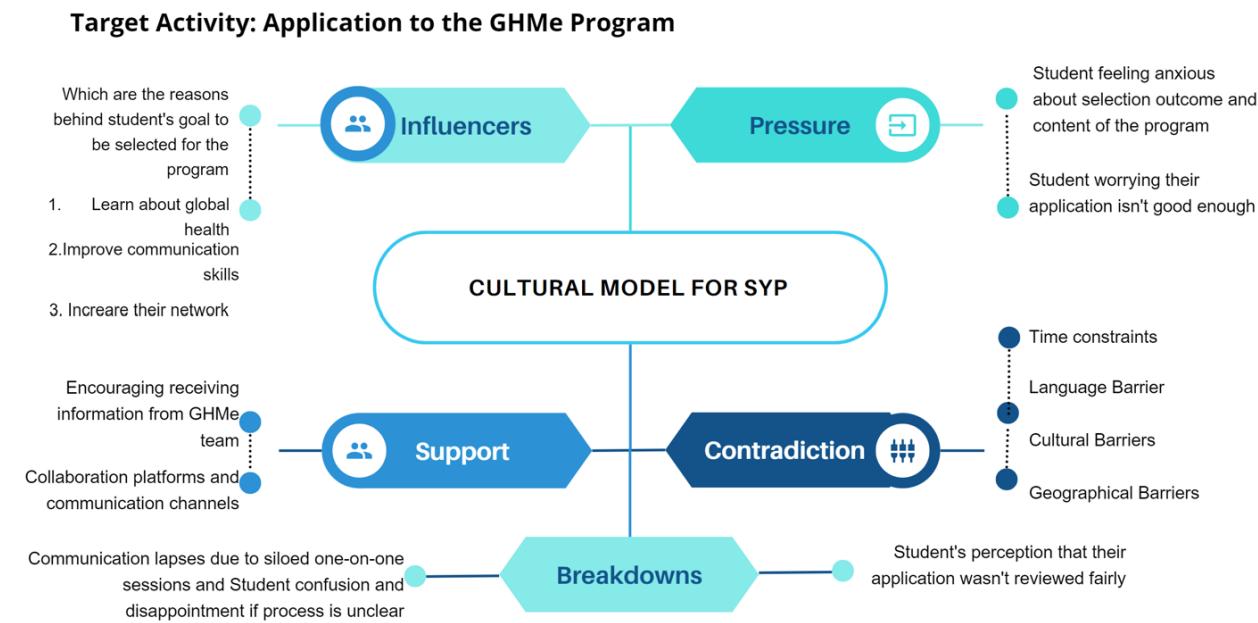


Figure 3: Cultural Model - SYP in the process of Application to the GHMe

The collaboration model illustrates a mentoring program designed to foster the growth and development of SYP through knowledge exchange. At its essence, the program entails matching experienced mentors with SYP, providing them with a chance for professional growth. This collaborative model focuses on SYP and offers various benefits.



Figure 4: Collaboration Model(Role centered) - SYP

The mentoring relationships also aims to guide the growth and development of SYP through collaborative knowledge sharing. Mentors, being experts of at least 5-10 years in global health field, generously contribute their time to share knowledge, while the SYP look to develop their networks and skill sets under the guidance of these mentors. The program involves program facilitators who actively guide the mentor-SYP groups. Program facilitators play a crucial role in tracking the development of the pairs and sharing possibilities for growth. Their involvement ensures a structured and supportive environment for the mentoring relationships to flourish.

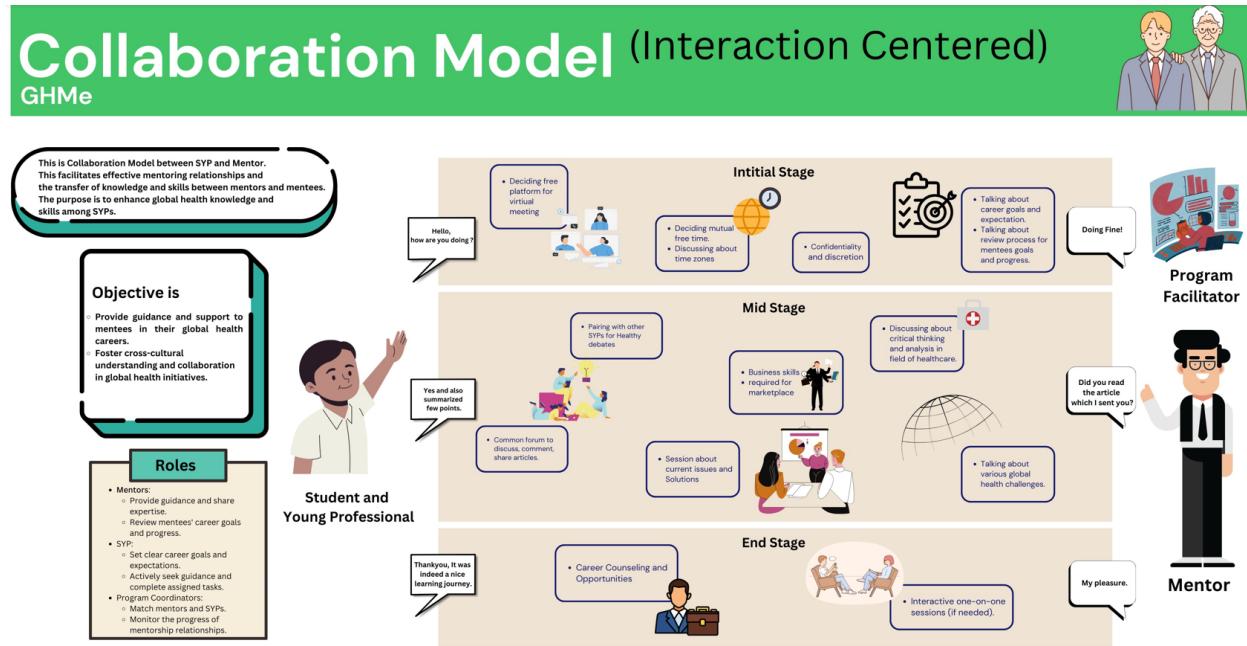


Figure 5: Collaboration Model - Mentorship (Interaction Centered)

To support the program's effectiveness, program evaluators analyze data since the beginning of the program (Pre-survey) until the final of the program (Exit Survey) and provide insights to enhance its overall performance. Additionally, content writers contribute by developing resources like the Handbook that align with the program's objectives.

The relationship between mentors and SYP is highly valued by the latter, who are eager to learn and benefit from the expertise shared by their mentors. The success of the program is contingent on the active participation of all stakeholders, from mentors and SYP to program facilitators, program evaluators and other roles involved in the GHMe team, working collaboratively towards the common goal of nurturing knowledge in the field of global health.

## 2.2 Representation of current system

The initiation of the program involves the application period for both mentors and SYP (early-career individuals interested in global health). Content generation and updates are managed by communicators, who create two application questionnaires – one for SYP and another for mentors. The program launches the application process on social media, making global announcements and accepting applications from around the world.

The SYP selection process occurs in two phases:

In phase 1, facilitators review and select SYP applications based on eligibility criteria. Unselected SYP receive email notifications during this phase. Simultaneously, mentor applications undergo review and selection by the executive team, with selected mentors notified accordingly. The mentors and SYP finalized in phase 1

then proceed to the matching process. The matching process involves an algorithm created by an algorithm expert, matching mentors with SYP based on compatibility in six factors (language, time zone, same city, personality, global Health priority area, program objective). Each mentor receives a list of assigned SYP generated through the matching algorithm.

Moving to phase 2 of the SYP selection process, mentors receive applications from the assigned SYP and choose 3 to 4 individuals to be part of their mentored group. Notifications are sent to both selected and unselected SYP in this phase. Once mentors and SYP have accepted their participation, the program officially commences. Content writers provide a handbook outlining rules and regulations, while program facilitators introduce the program cycle, offer guidance on engagement strategies, and conduct meetings with the executive team. Facilitators then set up the first meeting between SYP and mentors, during which they discuss logistics such as meeting frequency, time availability, and communication platform to use during the program.

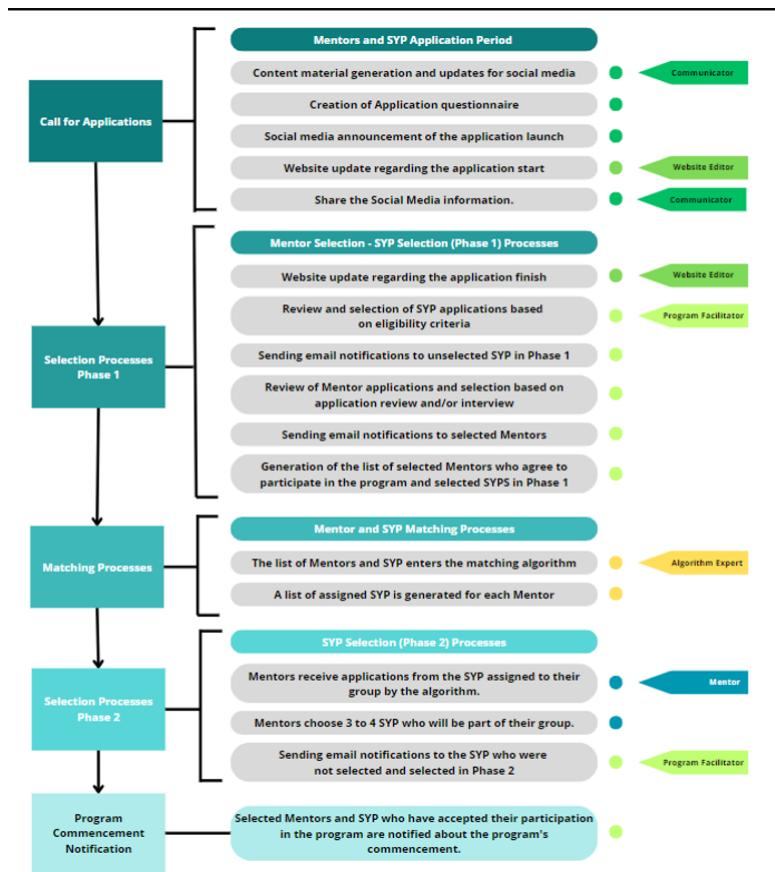


Figure 6: Sequence Model - Global Health Mentorships (GHMe) Selection Process

The mentorship process spans approximately 5 months, during which mentors and SYP engage in discussions about opportunities, ongoing research in the healthcare industry, network building, and professional skills development. The main tasks and general process flow for the GHMe program interactions are shown in the flow model. This covers tasks including creating program materials, assisting with mentor/mentee onboarding, organizing introductions, giving advice, getting input, and assessing the program. This outlines every crucial step involved in managing the mentorship relationships. Facilitators monitor ongoing activities, gather feedback on group progress, and discuss milestones to be achieved. At the conclusion of the mentorship period, both SYP and mentors provide feedback through an exit survey.

Program evaluators play a critical role in analyzing the entire process. They aim to make the program more activity-based and interesting based on feedback analysis, providing insights to enhance overall performance

for upcoming programs. This continuous improvement cycle ensures that the GHMe mentoring program remains dynamic, adaptive, and impactful for all participants involved.

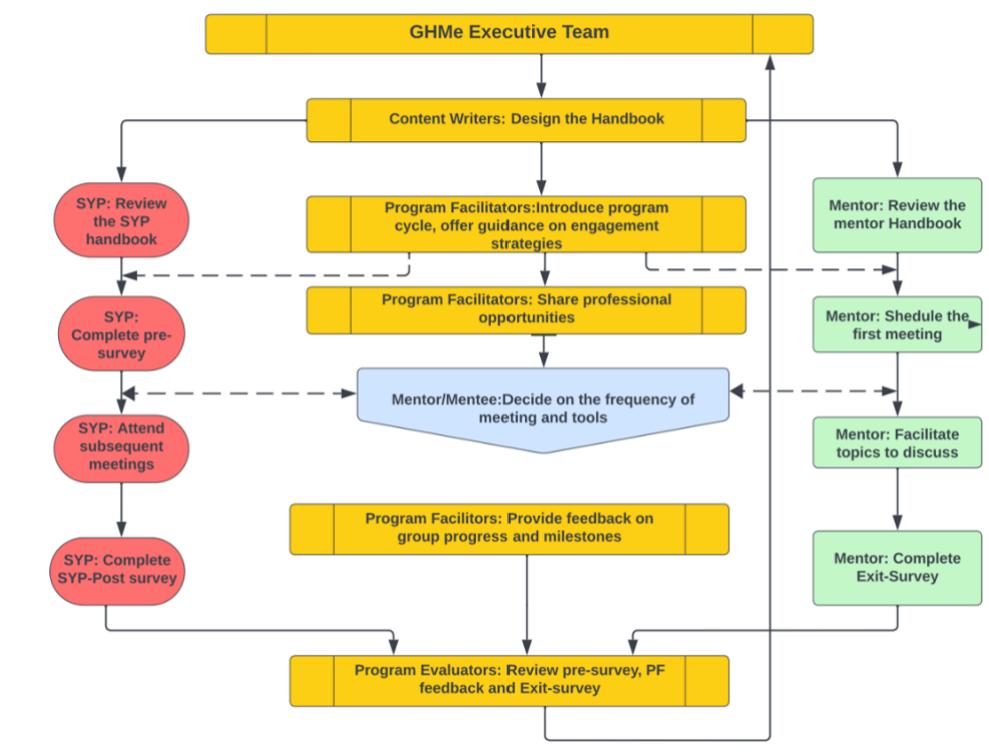


Figure 7: Flow Model - Global Health Mentorships (GHMe) Program

## 2.3 Challenges in current system

The current system of the GHMe mentoring program faces several challenges, primarily in developing the selection process. This process involves various steps, one relevant part in this process involves the current algorithm method with a different weighing mechanism per factor, making it increasingly complex.

### 2.3.1 First challenge

Despite having an algorithm that considers these factors to generate the total score that will be used to rank many SYP for a specific mentor like level of English knowledge (language), time zone differences, and interest in the global health area, as it demonstrates in the table:

Weighting Mechanism	Percentage from Total Score
Language	10%
Time zone	5%
Same city	10%
Personality	15%
Global Health priority area	30%
Program objective	30%

It still highlights certain issues faced by both mentors and SYP, as reflected in our team's affinity diagram. This diagram analyzed qualitative and quantitative data from the exit survey of mentors and sysps from the last cohort in 2021.



Figure 8: Affinity Diagram - Global Health Mentorships (GHMe)

Additionally, the decision point model is an analysis that evaluates the performance of the GHMe program demonstrating that there is critical feedback in connections, expertise, and time commitment aspects. The decision point model showcases comments from SYP indicating that due to these mentioned reasons, the program did not meet their expectations.

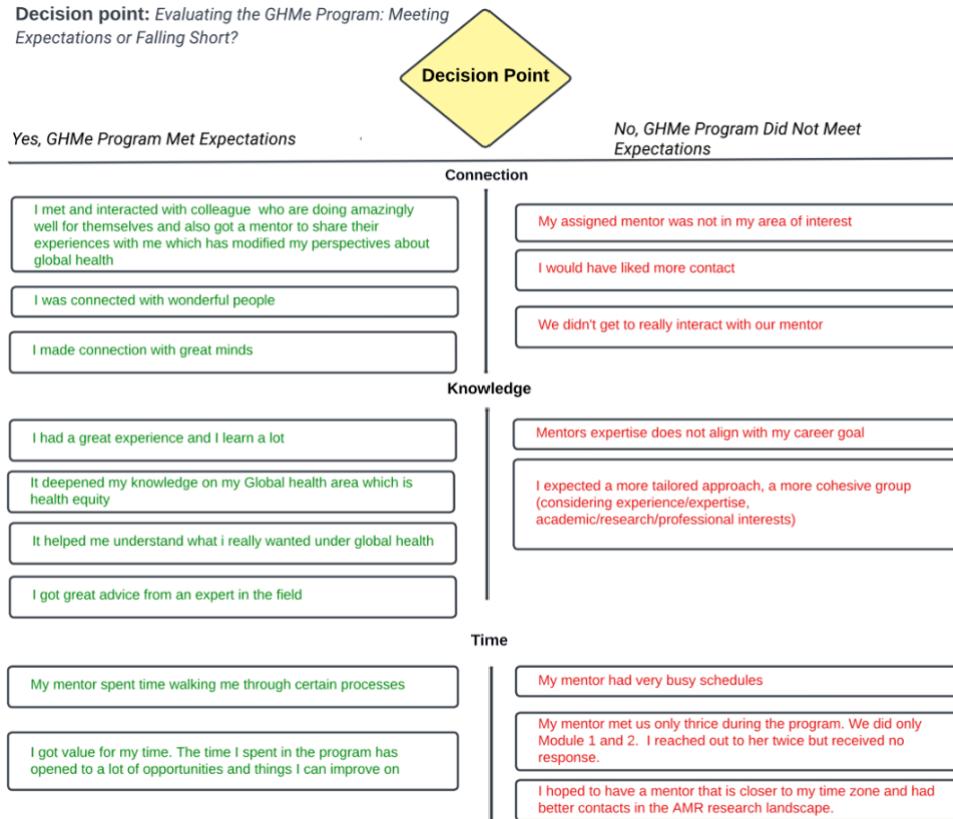


Figure 9: Decision Model - Expectationf of the GHMe

Therefore, it's evident that the current algorithm being utilized has a flaw in how the weights assigned to each factor are established.

### 2.3.2 Second challenge

Another difficulty is compounded by the growing number of SYP (early-career individuals) applications received each year. The surge in applications results in a prolonged review and shortlisting period, impacting the efficiency of the overall matching process.

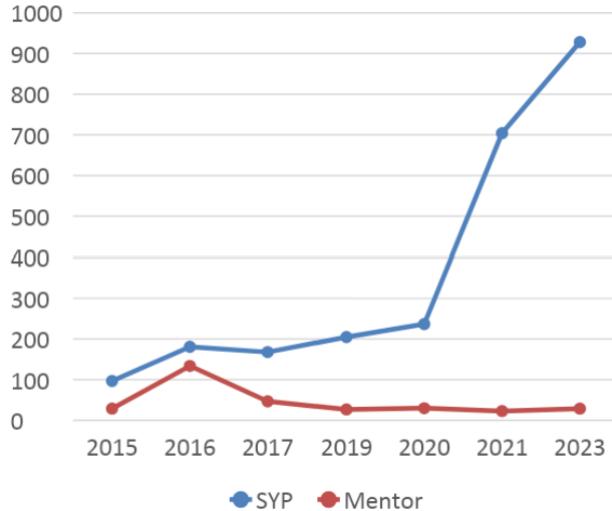


Figure 10: Number of applications through the time

### 2.3.3 Third challenge

One notable challenge is the limited number of GHMe team members, coupled with constant staff turnover, excluding the leaders. This dynamic creates a lack of clarity in identifying active team members and determining their current status within the organization. The stagnation in team size while dealing with a rising number of applications further exacerbates the strain on the selection process.

### 2.3.4 Fourth challenge

Another issue they face relates to the dependency of the program facilitators' quantity on the number of selected SYP and mentors within the GHMe team. This means that the decision-making process currently involves determining the number of program facilitators needed first. For instance, in the last cohort, they decided to hire 8 program facilitators, thereby limiting the total number of mentors to 32 and SYP to 128. Consequently, as the number of applications continues to increase, more applicants are unable to participate in the program due to the restricted selection. This occurs because the program's leader decides on the number of assistant program facilitators required first, followed by determining the quantity of mentors and SYP accepted into the program. With a growing number of applicants for both SYP and mentors, a larger number of individuals end up being unable to join the program.

### 2.3.5 Fifth challenge

Another vulnerability in the current system arises from the heavy reliance on a solitary individual within the communications team, particularly during the mentorship program application phases. This overreliance poses a risk to the smooth execution of the program, especially during critical stages when communication is pivotal for successful mentor-SYP pairings.

### **2.3.6 Sixth challenge**

Additionally, the existing communication structure within the team lacks clarity and consistency. The lack of communication between team members adds to the challenges faced by the program. This breakdown in communication can hinder the seamless flow of information and coordination, potentially impacting the overall effectiveness of the mentorship program. Some coordinators express that team members supporting them may initially demonstrate commitment, but this diminishes over time largely due to lack of communication and clarity in identifying and assigning activities.

### **2.3.7 Seventh challenge**

Not only is there a lack of commitment among GHMe team members, as mentioned in the previous challenge, but there is also a lack of commitment among the participants (mentors and SYP). Currently, the communication setup results in no GHMe team member being informed if a mentor or SYP leaves the program until the completion of the exit survey evaluation at the program's conclusion. This lack of timely communication has repercussions on the overall impression of commitment within the mentoring group. It's noticeable that immediate action is not taken when these situations occur, impacting the perception of commitment among other group members.

### **2.3.8 Eighth challenge**

One pressing issue involves the delayed commencement of the mentorship program application period. This delay is attributed to internal communication issues within the program's teams, highlighting a critical need for improved communication protocols and coordination among team members. Timely initiation of the application period is crucial for the program's overall timeline and the satisfaction of both mentors and SYP.

### **2.3.9 Ninth challenge**

Another challenge the program faces is suboptimal completion rates of post-program surveys, with an average completion rate hovering around 30%. This suggests a gap in the program's ability to effectively gather post-program feedback and insights from participants. Low survey completion rates can limit the program's capacity to assess its impact comprehensively and may hinder the identification of areas for improvement. Addressing this challenge requires a targeted approach to enhance the survey process, encourage participation, and extract valuable feedback to refine the program's structure and effectiveness.

### **2.3.10 Tenth challenge**

None of the roles have detailed documentation regarding the activities they perform, including process details and time duration.

### 3 Recommendations for New System

#### 3.1 Developed the team structure

Based on the interview conducted with the GHMe team, this organizational chart of the currently active team members was developed. It is recommended to appoint a team member responsible for ensuring the monthly update of this chart. This measure aims not only to enhance their communication mechanisms but also to establish better control over the security of access to information managed by the GHMe team.

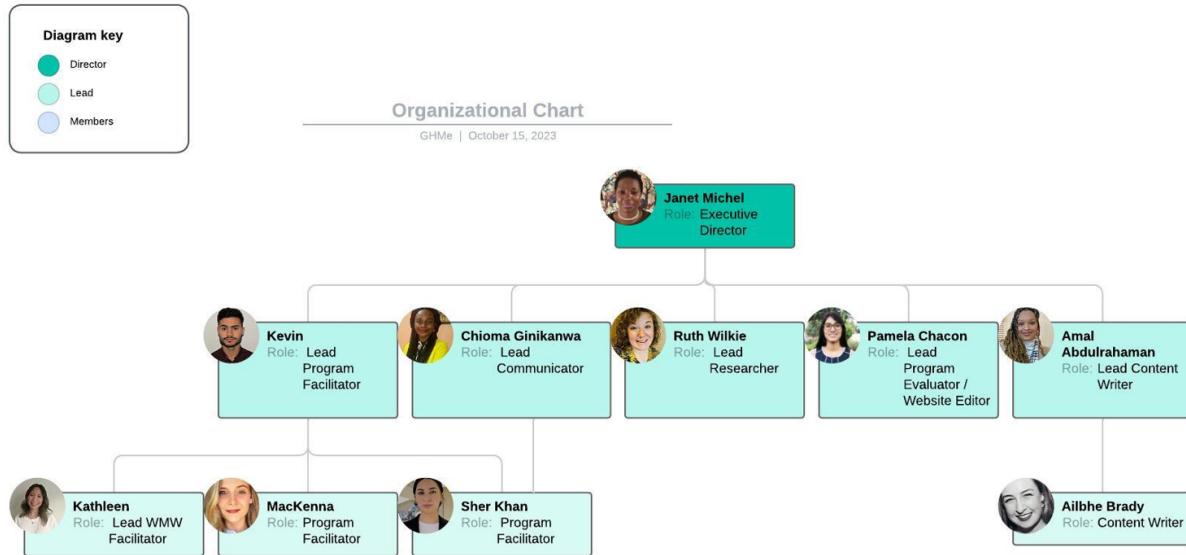


Figure 11: Organizational chart of the GHMe team

#### 3.2 Communication channel and tools for GHMe Team

All team communications should be conducted via Slack as the official means of communication. This approach ensures that all members focus on checking this channel daily for any pending activities. Slack allows integration with Google Calendar and Google Drive, enabling access to information using specific email accounts created for the GHMe team. Additionally, it is suggested to utilize Jira to streamline the execution process of activities over time. As many processes involve interaction among multiple roles, using this platform will facilitate activity execution. Finally, for the creation of official documentation, the tool Lucidchart could prove useful in generating various process models involving each role.

### 3.3 Documentation

Each lead should develop a document, that should include their activities in a timeline. All these documents should be integrated them to understand the amount of work per time for all roles. An example is provided below of what an activity description might look like for the Program Evaluator role over a 12-month cycle. This would help identify the months with heavier workloads for this role. The aim is to create a similar diagram for each role and subsequently integrate them to determine critical months for all GHMe team members. It's necessary to assign a role responsible for monitoring that other roles comply with this documentation and can integrate this overall scheme.



Figure 12: Timeline activities for the Program Evaluator Role

### 3.4 New System 1 - Selection

Selection Process will take at least 5 months before the GHMe Program starts, this can be the process:

1. Application Fee (**1 month**): SYP should pay 3-5 \$ to apply for the GHMe Program
2. Mentor Selection (**2 weeks**): Team members review Mentor applications
3. Matching Algorithm (Phase 1) (**2 weeks**): All SYP applicants pass through the matching algorithm to reduce the number of applicants
4. Review and selection of SYP (**1 month**): Team members review SYP Applications
5. Matching Algorithm (Phase 2) (**2 weeks**): SYP applicants pass through the matching algorithm to group with a mentor
6. SYP Selection (**1 week**): Final list of groups are formed of Mentor or SYP
7. Coordinate Program Facilitator Applicants (**1.5 months**): New Program Facilitators are trained, the number of new program facilitators will be based on the number of groups needed

Due to the results of the last exit survey in 2021, where 99.98% of the total 65 SYP responded that they could afford to pay between 1 to 5 euros for the GHMe program, the establishment of this New System 1 - Selection is justified.

The generated funds would be divided, allocating 80% to the team members and 20% to digital technologies such as Website, Premium Slack, Jira, and Lucidchart.

This system aims to address the commitment issues observed among the GHMe team members, mentors, and SYP. Additionally, it enables a more strategic approach by first evaluating the number of SYP and mentors applying, followed by determining the required quantity of program facilitators. This approach would create opportunities for a larger number of SYP. Simultaneously, it proposes a measurable training period for new assistant program facilitators.

### 3.5 New Matching Algorithm

Considering the factors identified as present problems according to the analysis of the 2021 SYP and mentor exit surveys, there is a suggestion to assign a higher percentage weight to these factors in the total score. This adjustment aims to enhance the selection algorithm. Crucially, this algorithm requires periodic evaluation at the end of each GHMe program cycle. It's essential to analyze feedback from all team members, including SYP and mentors, and make decisions on whether further adjustments are needed or if the last proposed algorithm can be replicated for the subsequent cohort. The algorithm necessitates ongoing evaluation at the conclusion of each mentoring program cohort.

It's suggested to assign a higher percentage to time because it stands out as one of the primary issues faced by SYP and mentors. Time zone differences and other factors often lead to a lack of availability for scheduling meetings. Hence, this issue is being tackled from two perspectives. Firstly, through the new system 1 - selection, which aims to enhance commitment from SYP and mentors by requiring payment for the application. Secondly, by seeking to minimize time zone differences, there will be greater ease in scheduling meetings. In addition, it's decided to increase the weighting on language as it has been reported as a communication problem between SYP and mentors and to increase the same city because increasing the networks is the principal aim for the SYP.

Weighting Mechanism	Percentage from Total Score
Language	20%

Weighting Mechanism	Percentage from Total Score
Time zone	35%
Same city	15%
Personality	10%
Global Health priority area	15%
Program objective	10%

### 3.6 New System 2 - Program Facilitators (PF)

The first point of this system is to establish a monitoring framework for the program facilitator lead, enabling monthly monitoring of each team. Each team comprises an assistant program facilitator, a mentor, and four SYP. By conducting monthly monitoring, potential communication issues or program abandonment can be identified promptly, allowing for timely solutions. This approach prevents the GHMe team from only discovering problems at the program's end, showcasing strong team support for each group. If the number of groups increases and the lead of program facilitators cannot handle this monthly monitoring alone, it's suggested to assign an additional coordinator for program facilitators, distributing the workload evenly to avoid overburdening an individual. The role of the program facilitator lead is crucial, and frequent meetings with the program director are recommended to observe and talk about their activities, especially during critical periods.

The second point addresses the observation that many SYP and mentors request activities not included in the program, such as in-person meetings (please review the affinity diagram chart for details). It's suggested that both parties sign a commitment letter once they reach the final selection phase, containing essential program information and emphasizing the required time commitment.

The third point involves establishing a set of frequently asked questions (FAQs) regarding communication issues between SYP and mentors. These FAQs should be available on the platform used by SYP and mentors for the program. This setup ensures that if any questions or issues arise, individuals will know the procedures to follow or whom to contact to seek solutions.

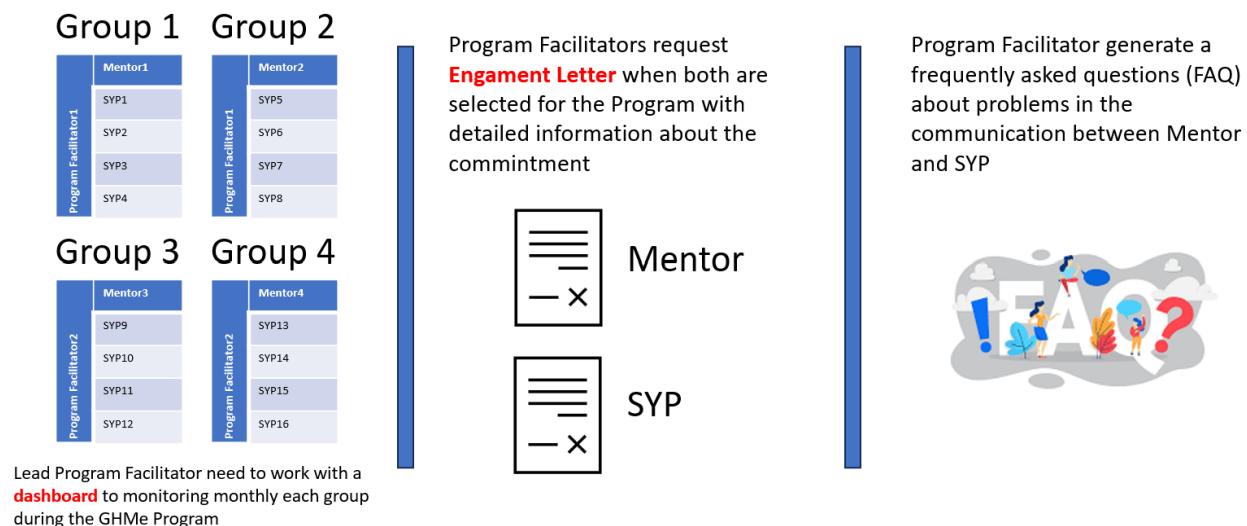


Figure 13: New system for Program Facilitators

Given all the changes needed for the program to enhance its structure, organization of GHMe team members, and overall effectiveness, there's a suggestion to prioritize immediate resolution of internal GHMe issues. Once the new team structure and organization are consolidated, collaborations with other institutions can

be implemented. It's evident that the program in the last year has entered a different phase where action needs to be taken before complications arise further. This is noticeable due to the increase in applications and the loss of commitment from some GHMe team members.

## 4 Implementation Plan for New System

This proposal outlines the implementation plan for Global Health Me (GHMe) to introduce a comprehensive system in 2023, integrating New System 1 (excluding fees), a novel algorithm, and New Systems 2 and 3. The aim is to ensure a well-structured approach for seamless integration and readiness for the 2024 program.

### 4.1 2023 Implementation Plan:

#### 4.1.1 Implementation Phases

- New System 1 (Excluding Fee): Collaborate with a Program Developer to establish foundational infrastructure.
- New Algorithm Integration: Simultaneous implementation with a Program Developer to enhance technological capabilities.
- New Systems 2 and Documentation: Engage a Program Facilitator and other roles to diversify operational capabilities.

#### 4.1.2 GHMe Team Activities

- Documentation and Timeline: Team leads will document activities and create timelines for synchronized progress.
- Capacity Determination: Assess team capacities and coordinate member applications for optimal workforce allocation.

### 4.2 Preparation for the 2024 Program

#### 4.2.1 Initiating Selection Process (May 2024)

- Commencement for 2024 Program (October 1, 2024): Initiate the selection process from May 1, 2024, aligning with the program's start date.

#### 4.2.2 Integration and Verification

- Implementing New System 1 with Fees: Integrate New System 1 with fees to enhance operational efficiency.
- Algorithm Verification: Ensure the alignment of the implemented algorithm with evolving operational needs.

This proposal outlines GHMe's strategic roadmap for 2023-2024, emphasizing a meticulous plan for system integration and readiness for the 2024 program. Through coordinated efforts, synchronized team activities, and proactive planning, GHMe will enhance its global health initiatives, showcasing a commitment to innovation and operational enhancement.

## 5 Client Appendix

### 5.1 Reference Material

As reference material, the handbooks for SYP and mentors of GHMe were reviewed, allowing for a deeper understanding of the program's specifics.

# Mentor Handbook

5th Edition

2021

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# SYP

# Handbook

5th Edition

2021



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## 5.2 Glossary of Terms

Term	Description
GHMe	Global Health Mentorships Program
SYP	Student or Young Professionals
GH	Global Health
PF	Program Facilitators
PE	Program Evaluators

## 5.3 Script for Data Cleaning

### 5.3.1 Mentor Dataset

```
# Upload dataset
data_mentor <- read_csv(
  "C:/Users/PAMELA/OneDrive/UNC Master/CHIP490.311.FA23 SA/
  GHMentorshipProgramM-MentorImprove_DATA_LABELS_2023-11-03_1929.csv")
```

#### 5.3.1.1 Uploading dataset

**5.3.1.2 Understanding Mentor Data Repetition within Categorical Groups (SYP)** Description: In this context, “Data with Repetitions per each SYP” refers to a dataset where each unique Mentor (identified as the ‘record\_id’ variable) is associated with multiple SYP (identified as the ‘syp’ variable) entries. This structure empowers in-depth analysis and insights specific to each mentor’s feedback across different SYP categories. Recognizing and harnessing these data repetitions is vital for meaningful data analysis and informed decision-making, allowing you to gain valuable insights into mentor interactions with various SYP aspects.

#### 5.3.1.2.1 Data Transformation: Reshape

##### 1. Column Selection:

- Objective: Extract a subset of relevant columns from the original dataset.

Description: This step creates a new data frame, “data\_mentor\_1,” by selecting columns 1 to 41 from the original “data\_mentor” data frame. It focuses on extracting a subset of columns from the source data.

##### 2. Wide to Long Format Transformation:

- Objective: Convert the data from wide format to long format to facilitate further analysis.
- Description: Using the gather function, the data frame “data\_mentor\_1” is transformed into a new data frame, “data\_mentor\_1\_long.” In this step, the columns are melted into two new columns, “syp” and “value,” with “record\_id” retained as a key identifier.

##### 3. Column Splitting:

- Objective: Split the “syp” column into separate “syp” and “number” columns for improved data organization.
- Description: This step utilizes the separate function to divide the “syp” column into two distinct columns, “syp” and “number,” using the “\_” separator. The original “syp” column is preserved with the “remove = FALSE” argument.

#### 4. Long to Wide Format Transformation:

- Objective: Convert the data back from long format to wide format for analysis or visualization.
- Description: By employing the spread function, the “data\_mentor\_1\_long” data frame is restructured into a new data frame, “data\_mentor\_1\_wide.” In this format, the “number” values become new columns, and the corresponding “value” values are distributed across these new columns.

```
# Step 1: Select Relevant Columns
data_mentor_1 <- data_mentor[, 1:41]

# Step 2: Transform from Wide to Long Format
data_mentor_1_long <- gather(data_mentor_1, key = "syp", value = "value", -record_id)

# Step 3: Split "syp" Column into "syp" and "number"
data_mentor_1_long <- data_mentor_1_long %>%
  separate(syp, into = c("syp", "number"), sep = "_", remove = FALSE)

# Step 4: Transform from Long to Wide Format
data_mentor_1_wide <- spread(data_mentor_1_long, key = number, value = value)
```

#### 5.3.1.2.2 Data Transformation: Filtering

- Objective: Filter the data to retain rows with complete information in specified columns.
- Description: In this step, the “data\_mentor\_1\_wide” data frame is filtered to preserve only the rows in which there are no NA values in columns 3 to 12, ensuring that complete data is maintained. This series of data transformations and filtering is conducted to prepare the dataset for further analysis and to ensure that it contains complete and relevant information.

```
# Filter Data to Keep Rows with Complete Information
data_mentor_final <- data_mentor_1_wide %>% filter(!rowSums(is.na(.)[c(3:12)]) > 0))
```

#### 5.3.1.2.3 Data Transformation: Variable Labeling

- Objective: Enhance data interpretability by adding human-readable labels to specific variables without altering their names.
- Description: This process involves associating a named vector of variable labels with the dataset data\_mentor\_final. Each label corresponds to a variable’s purpose, making the data more understandable for analysis and documentation.

```

# Create a named vector of variable labels
variable_labels <- c(
  "record_id" = "Key Identifier",
  "syp" = "SYP Number",
  "6" = "What method do you regularly used to communicate with SYP ?",
  "7" = "Has the method changed during the program? If so, why?",
  "9" = "Were there any other factors that you think played a significant //  
role in how your relationship developed?",
  "10" = "What were the most significant factors hindering positive relationship //  
development between you and SYP",
  "11" = "I perceived my partnered SYP to be genuinely interested in my area of //  
expertise.",
  "19" = "Please briefly describe what you believe are the most significant //  
factors for SYP to achieve these objectives?",
  "20" = "What were the key challenges that had to be overcome?",
  "23" = "From the SYP experience, do you have any recommendation for the //  
GHMentorships Program?",
  "21" = "Please briefly describe what skills and experiences you believe are //  
crucial to support SYP in achieving their objectives?",
  "22" = "Do you have specific plans to continue your relationship with SYP #1 //  
after the program has ended? . Please state the reason why"
)
# Add variable labels to the dataset
attr(data_mentor_final, "variable.labels") <- variable_labels

```

#### 5.3.1.2.4 Data Export:

- Objective: Export multiple data frames to separate sheets in an Excel file
- Description: In this script, we aim to export multiple data frames, each representing different variables, to an Excel file. Each data frame will be sorted by the variable column and saved as a separate sheet in the Excel file.

```

variable_names <- c(
  "10",
  "11",
  "19",
  "20",
  "21",
  "23",
  "6",
  "7",
  "9"
)

data_frames <- list()

# Loop through each variable in the 'variable_names' list
for (variable in variable_names) {

  # Extract specific columns from 'data_mentor_final'
  df <- data_mentor_final[c("record_id", "syp", variable)]
}

```

```

# Modify column names to include variable labels
colnames(df)[3] <- paste(variable, variable_labels[variable], sep = ": ")

# Sort the data frame by the variable column
df <- df[order(df[, 3]), ]

# Store the sorted data frame in the 'data_frames' list
data_frames[[variable]] <- df
}

```

**5.3.1.3 Understanding Mentor Feedback about the Program** Description: This dataset consists of feedback from mentors participating in the program. Each row represents the feedback of one mentor, allowing for a detailed analysis of their insights and interactions with various aspects of the program. This structured data enables in-depth analysis and informed decision-making, providing valuable insights into mentor interactions with various program aspects.

#### 5.3.1.3.1 Data Transformation: Filtering

- Objective: Filter the data to retain rows with complete information in specified columns.
- Description: In this step, the “data\_mentor\_1\_wide” data frame is filtered to preserve only the rows in which there are no NA values in columns 3 to 12, ensuring that complete data is maintained. This series of data transformations and filtering is conducted to prepare the dataset for further analysis and to ensure that it contains complete and relevant information.

```

# Step 1: Select Relevant Columns
data_mentor_2 <- data_mentor[, c(1, 42, 43, 44, 45, 46, 47, 48, 49)]

# Filter Data to Keep Rows with Information
data_mentor_final2 <- data_mentor_2 %>%
  filter(!rowSums(is.na(.[, 2:9])) == 8)

```

#### 5.3.1.3.2 Data Transformation: Variable Labeling

- Objective: Enhance data interpretability by adding human-readable labels to specific variables without altering their names.
- Description: This process involves associating a named vector of variable labels with the dataset data\_mentor\_final2. Each label corresponds to a variable's purpose, making the data more understandable for analysis and documentation.

```

# Create a named vector of variable labels
variable_labels <- c(
  "record_id" = "Key Identifier",
  "syp_g_8" = "Are there any specific take-aways for you from the relationships // with SYP?",
  "syp_g_9" = "If SYPs were to work on a specific project during the program, // do you think that could facilitate Mentors' role and improve the overall // effectiveness of the program? Why?",
  "syp_g_10" = "Do you think being involved in the SYP selection process would // have rendered better matches with your SYPs? Why?",
  "syp_g_11" = "Do you believe the introduction of support activities //"
)

```

```

(e.g. seminars, online discussion groups, etc) would have facilitated your role as a mentor? Why?",  

"syp_g_12" = "Did the GHMe program meet your expectations?",  

"syp_g_13" = "If no, why?",  

"syp_g_14" = "What are the areas in which GHMe program should improve?",  

"syp_g_15" = "Based on your experience, would you recommend to other //  

colleagues the participation in the program?"  

)  
  

# Add variable labels to the dataset  

attr(data_mentor_final2, "variable.labels") <- variable_labels

```

### 5.3.1.3.3 Data Export:

- Objective: Export multiple data frames to separate sheets in an Excel file
- Description: In this script, we aim to export multiple data frames, each representing different variables, to an Excel file. Each data frame will be sorted by the variable column and saved as a separate sheet in the Excel file.

```

variable_names <- c(  

  "syp_g_8",  

  "syp_g_9",  

  "syp_g_10",  

  "syp_g_11",  

  "syp_g_12",  

  "syp_g_13",  

  "syp_g_14",  

  "syp_g_15"  

)  
  

for (variable in variable_names) {  

  # Extract specific columns from 'data_mentor_final2'  

  df2 <- data_mentor_final2[, c("record_id", variable)]  
  

  # Modify column names to include variable labels  

  colnames(df2) <- c("record_id", paste(variable_labels[variable], sep = ": "))  
  

  # Sort the data frame by the variable column  

  df2 <- df2[order(df2[, 2]), ]  
  

  # Store the sorted data frame in the 'data_frames' list  

  data_frames[[variable]] <- df2
}  
  

# Export data frames to an Excel file  

write_xlsx(data_frames, path = "data_mentor.xlsx")

```

### 5.3.2 Student and Young Professional (SYP) Dataset

```
# Upload dataset
```

```
data_syp <- read_csv("C:/Users/PAMELA/OneDrive/UNC Master/CHIP490.311.FA23 SA  
/GHMentorshipProgramS-SYPImprove_DATA_LABELS_2023-11-03_1929.csv")
```

### 5.3.2.1 Uploading dataset

#### 5.3.2.1.1 Data Transformation: Filtering

- Objective: Filter the data to retain rows with complete information in specified columns.
- Description: In this step, the “data\_syp” data frame is filtered to preserve only the rows in which there are no NA values in selected columns, ensuring that complete data is maintained. This filtering is conducted to prepare the dataset for further analysis and to ensure that it contains complete and relevant information.

```
# Step 1: Select Relevant Columns  
data_syp<- data_syp[, c(1, 6:44, 73:91)]  
  
# Filter Data to Keep Rows with Information  
data_syp <- data_syp %>%  
  filter(!rowSums(is.na(.[, 2:23])) == 22)
```

#### 5.3.2.1.2 Data Transformation: Variable Labeling

- Objective: Enhance data interpretability by adding human-readable labels to specific variables without altering their names.
- Description: This process involves associating a named vector of variable labels with the dataset data\_syp. Each label corresponds to a variable’s purpose, making the data more understandable for analysis and documentation.

```
# Create a named vector with variable labels  
variable_labels <- c(  
  "record_id" = "Key Identifier",  
  "m_2" = "How would you rate the rapport between you and your mentor?",  
  "reason" = "Give a reason why you chose this option.",  
  "m_3" = "How frequently have you been in contact with your mentor since the start of the program?",  
  "m_4" = "On average how long was each interaction with your mentor?",  
  "m_5" = "On average, how many hours did you spend preparing for each discussion with your mentor?",  
  "m_6" = "What method do you regularly use to communicate with your mentor?",  
  "m_7" = "Has the method changed during the program if so, why?",  
  "m_8" = "You and your mentor's geographic proximity",  
  "m_9" = "You and your mentor's time zones",  
  "m_10" = "Your mentor's personality",  
  "m_11" = "Your mentor's global health interest areas",  
  "m_12" = "Your mentor's mentoring skill",  
  "m_13" = "Your mentor's previous professional experience",  
  "m_14" = "Were there any other factors contributing that you think played a //  
significant role in how your relationship developed?",  
  "m_15" = "What were the most significant factors hindering a positive relationship //  
between you and your Mentor?",  
  "m_16" = "Did you perceive your partnered mentor to be genuinely interested in //  
your area of interest.",
```

```

"m_16_explain" = "Why did you select this option",
"m_person_1" = "Temperament",
"m_person_2" = "Communication preferences",
"m_person_3" = "Personality preferences",
"m_person_4" = "Way of thinking",
"m_person_5" = "Energy levels",
"m_18___1" = "Please select all objectives that you prefer at the end of the program. //  

(choice=Support with better understanding and defining my skills and competencies in my GH focus areas)",
"m_18___2" = "Please select all objectives that you prefer at the end of the program. //  

(choice=Support with extending my network through personal recommendations)",
"m_18___3" = "Please select all objectives that you prefer at the end of the program. //  

(choice=Support with ideas for taking my career to the next level)",
"m_18___4" = "Please select all objectives that you prefer at the end of the program. //  

(choice=Support with familiarizing myself with possible career paths within GH)",
"m_18___5" = "Please select all objectives that you prefer at the end of the program. //  

(choice=Support with expanding my knowledge in my GH focus areas)",
"m_18___6" = "Please select all objectives that you prefer at the end of the program. //  

(choice=Support with acquiring specific skills in my GH focus areas)",
"m_18___7" = "Please select all objectives that you prefer at the end of the program. //  

(choice=Support with early job search without having previous)",
"m_18___8" = "Please select all objectives that you prefer at the end of the program. //  

(choice=Support with personal development and motivation)",
"m_18___9" = "Please select all objectives that you prefer at the end of the program. //  

(choice=Support with understanding PhD or job application requirements in my GH focus areas)",
"m_18___10" = "Please select all objectives that you prefer at the end of the program. //  

(choice=Support with general networking tips and advice)",
"m_18___11" = "Please select all objectives that you prefer at the end of the program. //  

(choice=Share problem-focused knowledge and ideas in my GH focus areas)",
"m_18___12" = "Please select all objectives that you prefer at the end of the program. //  

(choice=Support with self-presentation and preparing for my first job interview)",
"m_18___13" = "Please select all objectives that you prefer at the end of the program. //  

(choice=Other)",
"m_18_specify" = "Specify",
"m_19" = "How many of those objectives did you achieve?",
"m_20" = "What facilitated the achievement of these objectives?",
"m_21" = "What were the key challenges that had to be overcome?",
"p_1" = "Do you think Module 1 in achieving your goals?",
"module_1" = "Can you explain why you chose this option for Module 1?",
"p_2" = "Do you think Module 2 in achieving your goals?",
"module_2" = "Can you explain why you chose this option for Module 2?",
"p_3" = "Do you think Module 3 in achieving your goals?",
"module_3" = "Can you explain why you chose this option for Module 3?",
"p_4" = "Do you think Module 4 in achieving your goals?",
"module_4" = "Can you explain why you chose this option for Module 4?",
"p_5" = "Do you think Module 5 in achieving your goals?",
"module_5" = "Can you explain why you chose this option for Module 5?",
"p_6" = "Do you have specific plans to continue your relationship with your //  

Mentor after the program has ended?",
"p_7" = "Do you have any specific takeaways for you from the relationship //  

with your mentor?",
"p_8" = "If you were to work on a specific project during the program, do you //  

think that could improve the overall effectiveness of the program? Why?",
"p_9" = "Do you believe the introduction of support activities (e.g. seminars, //

```

```

online discussion groups, etc.) would have improved your experience? Why?",  

"p_10" = "Did the GHMe program meet your expectations?",  

"p_11" = "Explain why you chose that option",  

"p_12" = "What are the areas in which GHMe program should improve?",  

"p_13" = "Based on your experience, would you recommend to other colleagues the //  

participation in the program?",  

"p_14" = "If we were to charge a fee for participating in the mentoring program, //  

which of the following amounts would you find reasonable?"  

)  
  

# Add variable labels to the dataset  

attr(data_syp, "variable.labels") <- variable_labels

```

### 5.3.2.1.3 Data Export: Qualitative data

- Objective: Export multiple data frames to separate sheets in an Excel file
- Description: In this script, we aim to export multiple data frames, each representing different variables, to an Excel file. Each data frame will be sorted by the variable column and saved as a separate sheet in the Excel file.

```

variable_names_syp <- c(  

  "reason",  

  "m_6",  

  "m_7",  

  "m_14",  

  "m_15",  

  "m_16_explain",  

  "m_18_specify",  

  "m_20",  

  "m_21",  

  "module_1",  

  "module_2",  

  "module_3",  

  "module_4",  

  "module_5",  

  "p_6",  

  "p_7",  

  "p_8",  

  "p_9",  

  "p_11",  

  "p_12"  

)  
  

data_frames_syp <- list()  
  

for (variable in variable_names_syp) {  

  # Extract specific columns from 'data_syp'  

  df3 <- data_syp[, c("record_id", variable)]  
  

  # Modify column names to include variable labels  

  colnames(df3) <- c("record_id", paste(variable_labels[variable], sep = ":"))
}

```

```

# Sort the data frame by the variable column
df3 <- df3[order(df3[, 2]), ]

# Store the sorted data frame in the 'data_frames_syp' list
data_frames_syp[[variable]] <- df3
}

# Export data frames to an Excel file
write_xlsx(data_frames_syp, path = "data_syp.xlsx")

# Export complete data to an Excel file
write_xlsx(data_syp, path = "data_syp_all.xlsx")

```

#### 5.3.2.1.4 Data Analysis: Quantitative data Mentorship Feedback

Description: This table summarizes critical insights, evaluations, and responses provided by SYP, offering valuable information about the effectiveness of the mentorship relationships and areas for potential improvement. It serves as a valuable reference point for analyzing and understanding the feedback gathered from those engaged in the mentorship program, helping to enhance the quality of the mentorship experience and outcomes.

```

data_syp %>%
  select(
    m_2,
    m_3,
    m_4,
    m_5,
    m_8,
    m_9,
    m_10,
    m_11,
    m_12,
    m_13,
    m_16,
    m_person_1,
    m_person_2,
    m_person_3,
    m_person_4,
    m_person_5,
    m_18___1,
    m_18___2,
    m_18___3,
    m_18___4,
    m_18___5,
    m_18___6,
    m_18___7,
    m_18___8,
    m_18___9,
    m_18___10,
    m_18___11,
    m_18___12,
    m_18___13,
    m_19
  )

```

```
) %>%  
tbl_summary(label = variable_labels)
```

#### Handbook Feedback

Description: It is a documentation or summary of feedback and evaluations related to a handbook or manual. This table presents essential responses provided by SYP of the handbook, offering valuable information about the handbook's effectiveness and areas for improvement.

```
data_syp %>%  
  select(  
    p_1,p_2, p_3,p_4,p_5) %>%  
  tbl_summary(label = variable_labels)
```

#### GHMe Program Feedback

Description: It is a tabular representation of feedback and evaluation data collected from SYP of the GHMe program. This table summarizes key insights, assessments, and responses provided by program SYP, offering valuable information about the program's effectiveness and areas for improvement. It serves as a concise and structured reference point for analyzing and understanding the feedback received from SYP involved in the program.

```
data_syp %>%  
  select(  
    p_10,p_13, p_14) %>%  
  tbl_summary(label = variable_labels)
```

## 6 Team Appendix

### 6.1 Any models the team used for internal purposes

For managing the internal team workflow, we designed this process model to execute our activities. All files and documentation of the group was manage through Google drive and the online meetings were developed by Zoom platform.

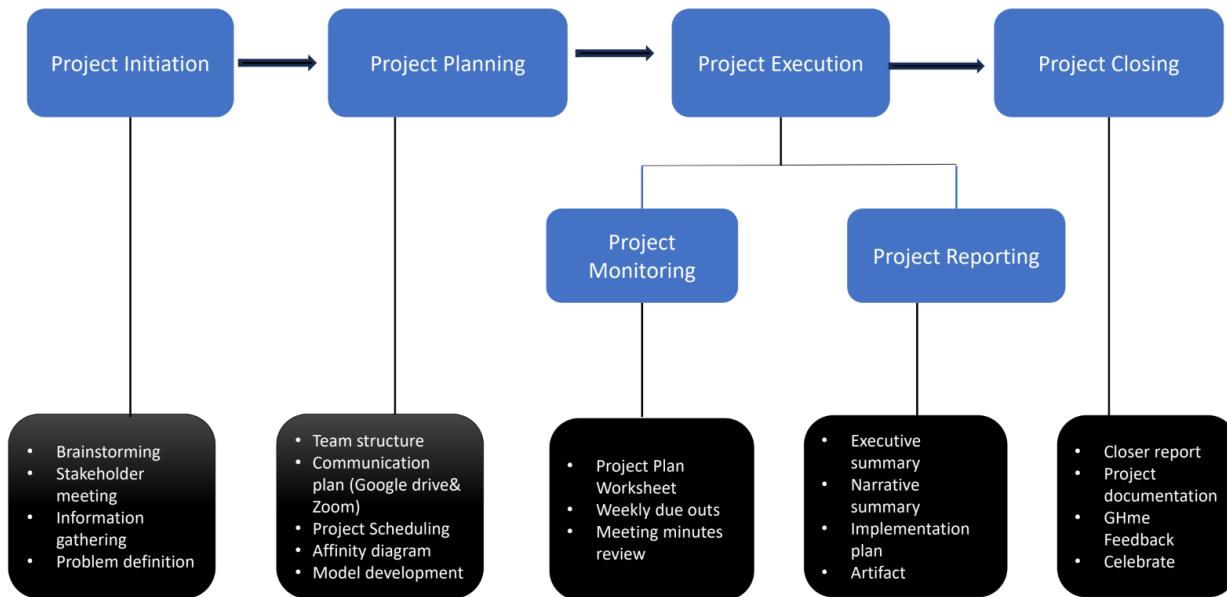


Figure 14: Internal Model for the group

Furthermore, for each group-assigned activity, a discussion session was held to comprehend its scope. Task allocation and division were conducted, and through consensus, the deadline for each team member to submit their work portion was established. This dynamic allowed us to meet the appropriate timelines for the overall execution of group activities, as depicted in the timeline diagram.

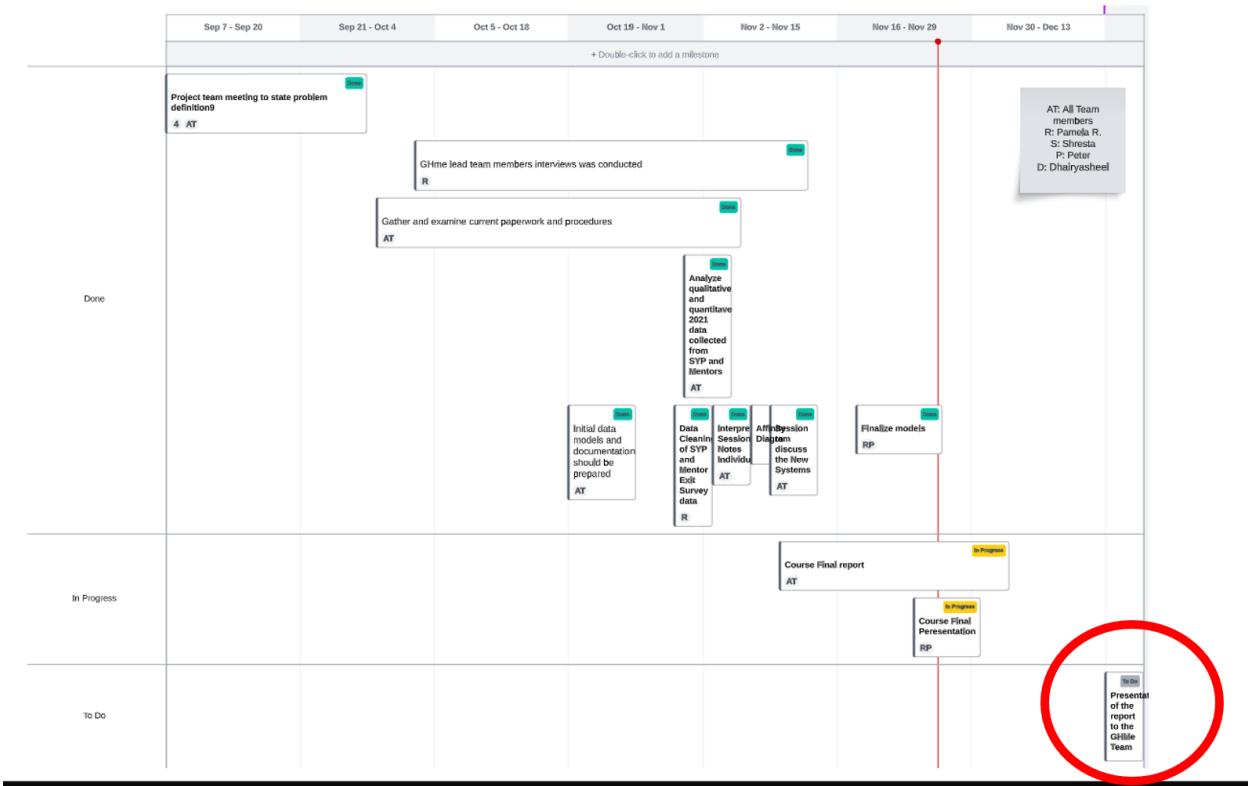


Figure 15: Timeline diagram for the group

## 6.2 Methodology to develop the affinity diagram virtually

1. The database report for the 2021 SYP and mentor exit survey was sent to all four team members. This report comprised an Excel file, wherein each feedback-related question was placed on a separate sheet. Within each sheet, there were only two columns: the first column held an identifier code for the respondent, while the second column contained the text of the corresponding question. The remaining rows consisted of respondents' answers arranged alphabetically based on the first letter of the response. This report format significantly eased individual review processes. The report was generated separately for SYP and mentor data and primarily contained qualitative data, while the analysis of quantitative data was previously presented in tables within the "Script for Data Cleaning" section of this report.
2. Each of the four team members read through all the information and proceeded to take notes on the identified problems within this Excel document format. It was essential for these notes to be in a digital format to facilitate the copy-and-paste process of the texts later on.

The screenshot shows a Microsoft Excel spreadsheet window titled "Notes\_template". The menu bar includes "File", "Edit", "View", "Insert", "Format", "Data", "Tools", and "Ext". The ribbon below the menu bar includes icons for search, back, forward, print, and zoom (100%), along with currency and percentage symbols and a decimal separator. The active cell is D5. The table has two columns, A and B, with 5 rows. Column A contains the numbers 1, 2, 3, 4, and 5. Column B contains the word "Note" in row 1 and is empty in rows 2 through 5.

	A	B
1		Note
2	1	
3	2	
4	3	
5		

Figure 16: Notes templates

3. We utilized the Google Jamboard program, accessible through our Google Drive folder, to create an affinity diagram.

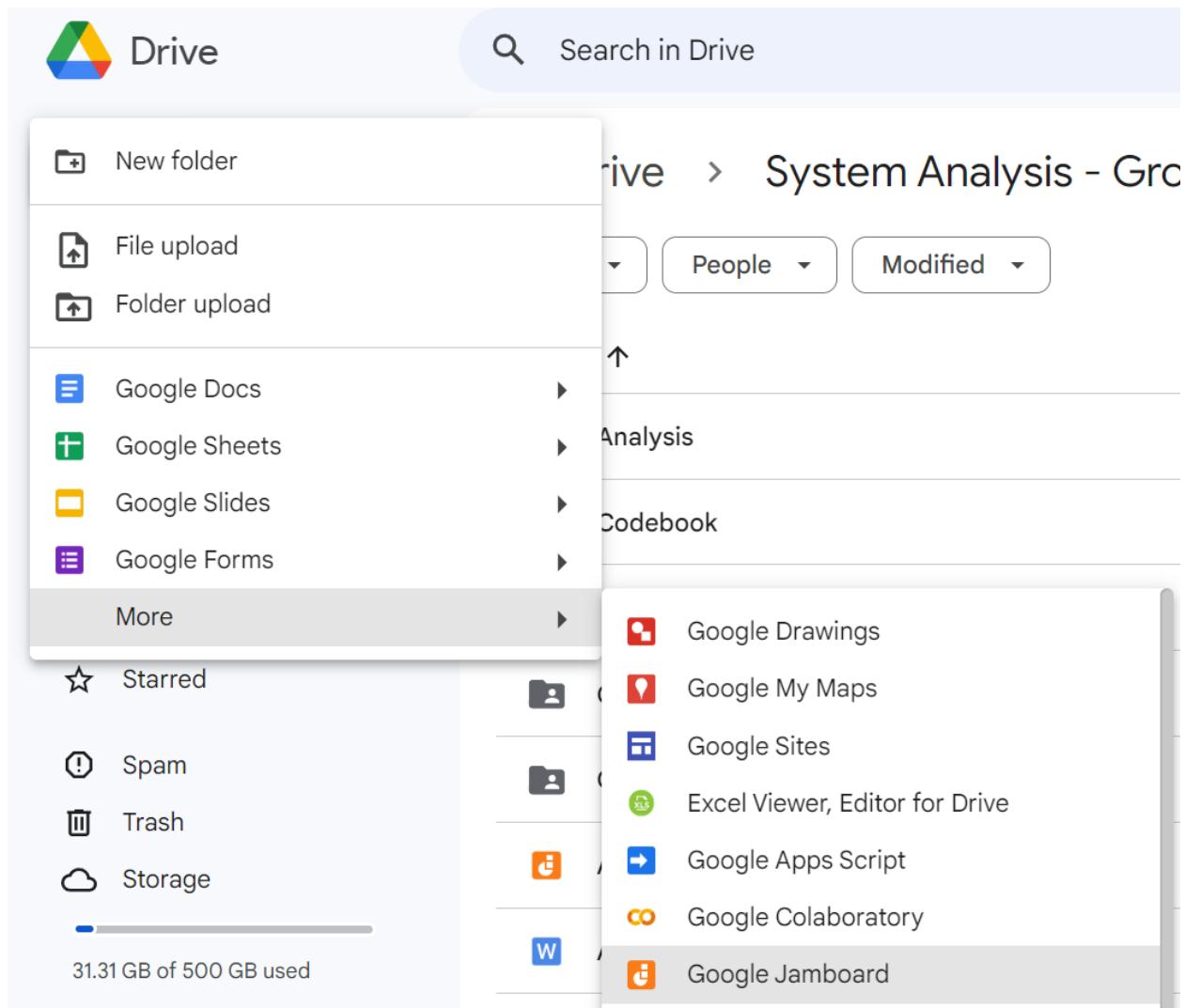


Figure 17: Jamboard File creation

4. In this file, we divided sections for each member, assigning a respective color and space to create notes. The procedure involved copying and pasting each individual note text created previously in the Excel document from step 2.



Figure 18: Divisions of Board per each Member

5. The process of copying and pasting individual notes took approximately 20 minutes. The board demonstrated our notes once all were transferred.

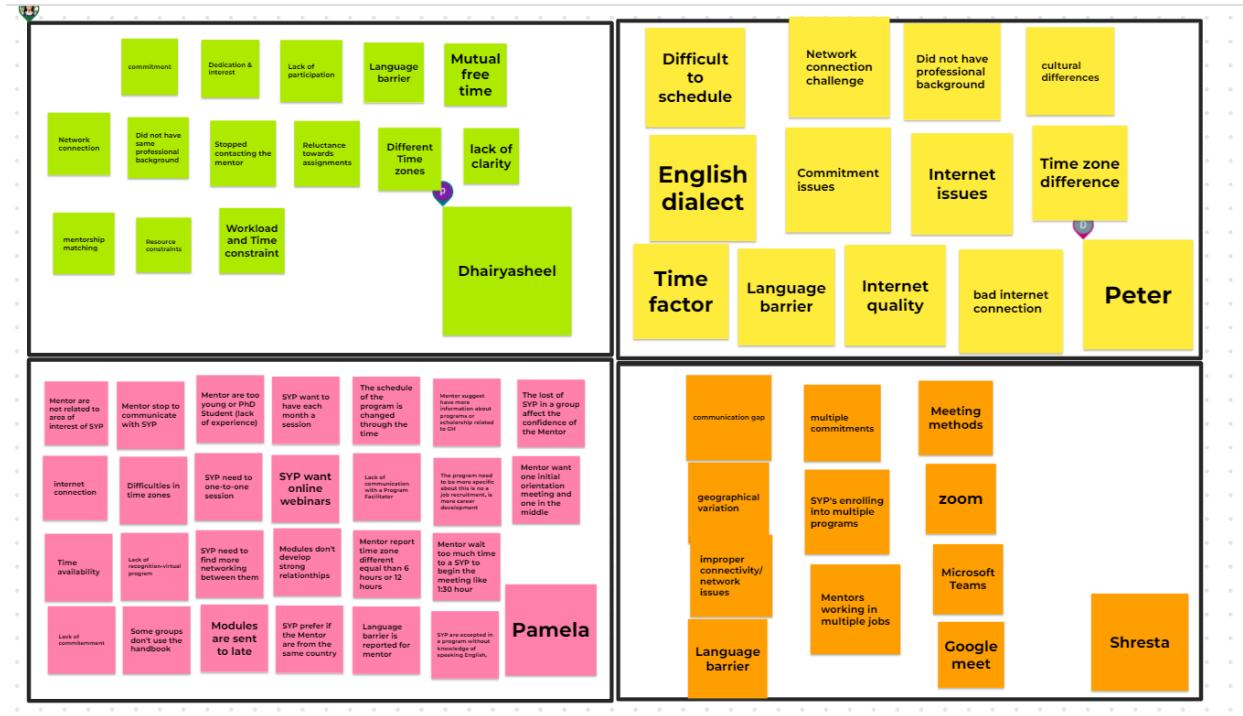


Figure 19: All individual notes together

6. The next step was to establish subtopics based on the primary issues observed from our notes. Each member took charge of one or two subtopics and assigned relevant notes to their section.

7. In this subsequent process, we analyzed all the notes on the board collectively as a team. Repetitive notes were removed, and unclear notes were clarified by their creators. It was crucial to have distinct colors for each team member. During this process, a new subtopic was validly created if the majority of the team considered it necessary.



Figure 20: Subtopics and individual notes

8. After reviewing all the subtopics as a team, we proceeded to decide on the name of the main topic.

9. Once all team members reviewed the final assignment of notes established in the diagram, we switched to the official colors of the affinity diagram: yellow for notes, light blue for subtopics, and pink for the main topic.



Figure 21: Affinity diagram

### 6.3 Any lingering issues or concerns you have about your proposed system

Despite our thorough analysis, the proposed system poses a significant execution challenge for GHMe team members as it involves numerous structural changes. Hence, when we presented the recommendation proposal, efforts have been made to explain how it contributes to solving the current problem. One intriguing aspect of these systems is their adaptability component concerning numerical percentages in financial management and the matching algorithm. This aspect remains subject to review and adjustment deemed necessary by the GHMe team members. While the proposed solution effectively addresses current needs, ensuring its implementation largely relies on the commitment level of each GHMe team member. To enhance the organizational system and effectively implement the proposed improvements, it's crucial to remember that the members are volunteers. Observing the current phase of GHMe, for sustained growth and expansion, a potential shift from the volunteer model to hiring services might be necessary in the medium term. Otherwise, the program might reach a point of stagnation instead of progressing.

### 6.4 Plans for presenting your proposal to the client

We're thrilled to present a proposal for enhancing the GHMe mentoring program, aiming to address some key challenges and elevate the overall experience for both mentors and SYP. Our collective focus is on refining the program's initiation phase, specifically tackling internal communication hurdles that have resulted in delays. By implementing streamlined communication protocols and fostering better coordination among team members, we're confident in optimizing the mentorship program's application period, ensuring it kicks off seamlessly. Additionally, we've honed in on the issue of suboptimal completion rates for post-program

surveys, hovering around 30%. Our proposal includes targeted strategies to boost survey engagement, gather valuable feedback, and enhance the program's assessment capabilities. We're excited to share our detailed plan during our upcoming meeting on December 17th, where we can delve into these proposed solutions and discuss how they align with the program's goals. Looking forward to collaborating and making the GHMe mentoring program an even more enriching experience.

## 6.5 Lessons learned

Reflecting on our team's performance, we have identified various strengths and weaknesses. Our strengths lie in effective communication, collective problem-solving, and leveraging diverse skill sets within the team. However, we admit the need for improved time management and a more organized approach to certain project phases. If allowed to have more time for this the project, we would allocate more time to conduct in-depth feasibility studies and risk assessments. Additionally, establishing more precise checkpoints would improve project management, ensuring a more systematic approach to deliverables.

This systems analysis project has been a valuable learning experience for the team. Our use of diverse internal models provided detailed views, though concerns regarding system scalability persist. Our presentation strategy stresses shared engagement with the client, and our team's evaluation stresses time management and structure improvement areas. We aim to implement these lessons in future projects, fostering a more holistic approach to systems analysis. This appendix broadly reflects on our team's internal processes, evaluations, and the lessons learned throughout this project.