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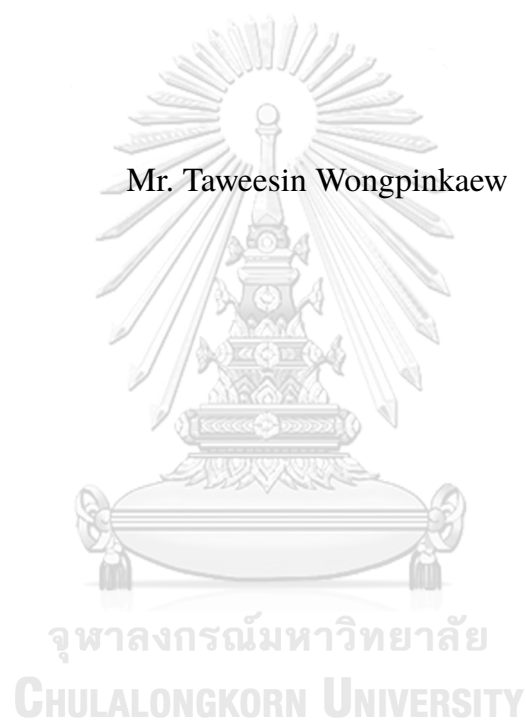
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MED-ASA SMART TASK-VOLUNTEER MATCHING SYSTEM



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for the Degree of Master of Science Program in Computer Science

Department of Computer Engineering

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ในบริบทของการดูแลรักษาทางการแพทย์ อาสาสมัครมีบทบาทสำคัญในการช่วยให้ผู้ป่วยมีประสบการณ์การที่ดีและลดต้นทุนการดำเนินงานของทางโรงพยาบาล แต่อย่างไรก็ตามกระบวนการจัดการจิตอาสาที่ยังไม่มีประสิทธิภาพมากพอ วิทยานิพนธ์ได้สำรวจปัญหาของระบบการจัดการจิตอาสาในปัจจุบันและเสนอแนวทางแก้ไขที่เป็นไปได้ด้วยระบบไอทีและกระบวนการใหม่ ระบบนี้ได้รับการทดสอบเป็นระยะเวลา 2 เดือนในระหว่างการระบาดของ COVID-19 ในประเทศไทย และใช้ SUS กับการสัมภาษณ์เชิงลึก เพื่อวัดความสามารถในการใช้งานและประสิทธิภาพของระบบ นอกจากนี้ยังมีการวัดเวลาที่อาสาสมัครใช้ในการดำเนินการตามกระบวนการใหม่ จากผลลัพธ์ของการทดสอบนั้นแสดงให้เห็นว่ากระบวนการที่ได้นำเสนอประสบความสำเร็จ นอกจากนี้การวิจัยยังสร้างผลกระทบในการต่อสู้กับ COVID-19 ของประเทศไทย

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In the context of healthcare, volunteers play an important role in improving the patient's experience and lowering the operational cost. However, the process which facilitate their management is reported to be problematic. In this thesis, the problems of the current system is explored, and a potential solution of a new IT system is outlined. The system was tested for a duration of 2 month during the COVID-19 outbreak in Thailand. SUS and an in-depth interview was conducted in order to gauge the usability and the effectiveness the system. The time it takes for the volunteers to go through with the process was also measured to determined the system's benefits. Results show that the digitization process is a success. Furthermore, the research made an impact in Thailand's fight against COVID-19.

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Chapter I

INTRODUCTION

Many aspect of the problems which the thesis solved are explored in this section. Readers will be informed about the origin of the problems and the thesis's scope.

1.1 Volunteering In Thailand

Volunteering plays an important role in society. It can benefit the overall economy in crisis situations, while developing volunteers as people [1] [2]. In a Thai context, volunteers have played a crucial role in the success of many major crises such as the Tham Luang event and the Thai flood relief of 2011 [3] [4]. Thus, many organizations see the benefits and impacts of volunteers.

In Thailand, there are numerous public organizations that conduct and manage volunteering activities. In a healthcare setting, hospitals employ volunteers to accomplish mundane tasks within the hospital and improves the user experience for patients. Some hospital classify their volunteers as an elite volunteer and the general volunteer, based on their training. According to the their definition elite volunteers are the volunteers which passed the training session. However, in this thesis the focus would be on normal volunteer, since the only differences are the training regime. The workflow is illustrated in 1.1.

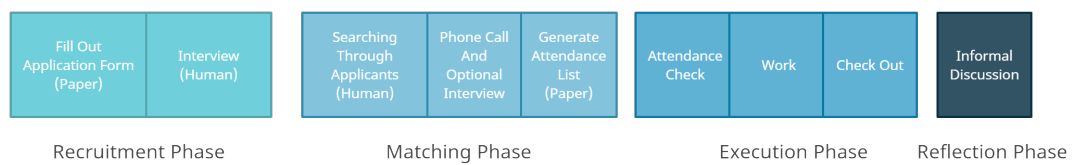


Figure 1.1: The on-site volunteer management workflow

1. **Recruitment:** Volunteers register by filling in a paper form. A face to face interview is then conduct to gauge their attitude and personality. After that, the result is recorded onto paper and stored in a cabinet.

2. **Matching:** When there is a demand for an on-site task, suitable candidates are looked up based on the required task's hard-skill and soft-skill requirements. A list of candidate is then generated and an inquiry is made through phone call. In this step, medical personnel may need to conduct a quick interview again to double check. After all the candidates has been confirmed, an attendance sheet is made and printed out.
3. **Execution:** During the task, volunteer would signed their name on the attendance sheet and proceed with the task. When the task is finished, the volunteer would checked out and return home.
4. **Reflection:** An informal review between the medical personnel involves then take place in a form of group discussion, unfortunately the result of the review is not systematically recorded.

Volunteers who does not have the time to commit to an on-site activity could donate items to a department in the hospital. Items such as chairs, alcohol gel, and cosmetic for desairology are commonly donated. Normally each department have their own inventory systems and methods in managing donated items. The process is separated into 4 steps as displayed in figure 1.2.

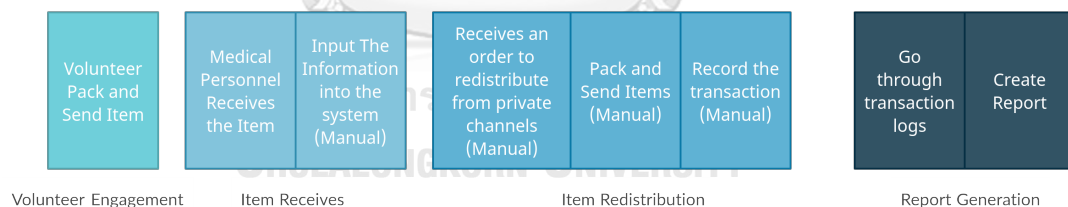


Figure 1.2: The workflow for item donation

1. **Volunteer Engagement:** Volunteers can mail the items straight to the department without the needs to contact the hospital.
2. **Item Receives:** The Medical personnel eventually receives the items, and may recorded it on paper or an excel file.
3. **Item Redistribution:** If there is a need to distribute the items to other local hospital or other facility, however the book keeping process is not strictly followed.

4. **Report Generation:** Periodically, they would make a report from the excel file, but their records are not accurate since some transaction may be missing or approximated.

It could be observed that majority of the process flow are done manually. This raise the question of why hospitals do not adopt a technological approach in automating the volunteer management processes.

1.2 Technology in Health-Care

In the past few years, the Thai government saw the benefits of applying an IT system to its healthcare sector and has been spending a fair amount of its efforts on leveraging an information system and e-health in healthcare sectors [5]. However, the development and adoption of information systems are still inadequate [6]. Many launched projects have failed within the industry due to sociotechnical challenges [7] [8]. For Thailand, the lack of user acceptance in a medical information system arises from factors such as a lack in perceived effectiveness of the system, usability, and support from IT staff [9].

1.3 Problem Statement

Many parts of the system are still being done manually. This ultimately results in many inefficiencies within the recruitment and the management process. The problems is classified into four problems.

1. **Lack of Scalability:** Many hospitals utilized face to face interview in order to see whether or not a person is fit for being a volunteer. As a result, the amount of volunteers that could be recruited is dependent on the amount of people that are available at the given time. Volunteers are also limited to the hospital opening hours.
2. **Inconsistency in Standards:** Everyone has a different standards when conducting a face to face interview. Some hospital solves the inconsistency by having only one to two people conducting the interview, but this methods does not scale well. Additionally, if these people retired, then their knowledge and skill will leave the hospital as well.

3. **Unable to Audit:** Since volunteer's performance data are not being systematically kept, hospitals do not know if an individual volunteer is effective for the task. Furthermore, the item donation operation is a data intensive task. It is beneficial if the hospital can keep track of where the donated items are from, how many items they have left, and how many items they are using up on a daily basis. It is a difficult task for the current process to answer these questions in a timely manner, hence making it difficult for hospitals to properly manage their logistic. Volunteers will also benefit from having their volunteering activities stored as an achievement, or as a way to improve themselves.
4. **Scattered Information:** Information regarding volunteering activities in the hospitals are scattered across the different hospital's facility. A better coordination can be made if the system is unified, and information regarding volunteering activities could be efficiently shared. Volunteers will also benefit from the simplicity, which arises from interacting with only one system.

However, from previous sections, majority of the failure arises from sociotechnical challenges. Therefore, it is not enough to design a system which has the correct function, but it should have the correct implementation as well.

1.4 Thesis Questions

1. How can the volunteer management process be improved, such that it reduces the need for human interventions and improves the overall performance?
2. How to design the proposed process such that it will not hinder the current process?

1.5 Scope of Work

- Analyse and gather the requirements on the cause of the inefficiency within the system.
- Design a system which will produce a more efficient result, without sacrificing usability.

- Implement the designed system.
- Deploy and test the system for feedback and result.

1.6 Research Implication

Apart from the direct benefit in the health-care industry, the research's system design and implementation step could be extends to many other human resources management domain. It will serve as a basic on what the system need to achieves and what challenges are there when designing such system. This knowledge will greatly reduce the risk of a product-market fit failure, and providing an overall idea on how to build such system.

The process of how the design was conceived in order to achieves the result could be used a guideline for those who are keen in building a system for effectively solve complex problems. The research does not only tackle the problem of what to build, but it also tackle the problem of how it should be build and deliver by taking the human factor into account.

Chapter II

BACKGROUND

Necessary background knowledge are listed in this chapter. This will build the necessary information in the design decision and methodology uses in designing and implementing the system.

2.1 Service Design

Service design is a process of designing a "service". A "service" in this definition is not limited to an intangible product like a consult service, or customer service. Service can be in a form of a product such as a software or an accessory, since one can argue that the product is the avatar of a service. Thus process design is focused on the whole pipeline of designing and deliver/deploying a "service", as well as providing a systematic methods of encapsulating findings [10]. Numerous case studies have shown that service design improved services in numerous private industries [11].

Service design borrow its toolkit from various field such as design thinking [12], design, marketing and arguably software engineering. Similarly to design thinking, service design follows an iterative approach similar to the 5 step of design thinking in order to come up with a solution that best deliver the service. This is done through user research such as in-depth interviewing or shadowing. The step is similar to the Empathy step from design thinking. A common artifact from this stage would be a user persona or a user journey of the current system. These artifacts will then be used to create an idea through divergence-convergence thinking or co-creative workshop with stakeholders in a familiar process of ideate in design thinking. The idea could then be displayed as a to-be user journey mapping, a service design blue print, or a stakeholder map. The artifacts from this stage will then be used for high/low fidelity prototyping of the solution. Finally the prototype will be tested and the feedback will be used to refined the process or artifacts.

2.1.1 Persona

Persona is an artifact which is commonly used in UI/UX design process. The goal of the persona is to create a shared understanding for everyone in the team about who are the users of the system [13]. Although there are no strict rule of how to create a persona, but the general agreement in the artifact is that it has to be specific enough to be a real person. A persona can include an imaginary name, occupation, age, skills, hobbies, likes, dislikes, goals, and their favorite catch phrase.

2.1.2 User Journey Map

User Journey Map is an artifact similar to User Story Map [14] commonly used in Software Engineering. A User Journey Map display information about how a user interacts with the service as a whole or a detailed version of a service eg: Opening a bank account or waiting at the bank. Normally the map would display a list of step which a user need to do in order to achieve his goals. Additionally, a mood board might be displayed for each step as well in order for the team to identify which step will be the most problematic or generate the most friction.

2.1.3 Service Design Blueprint

Service Design Blueprint is similar to a user journey map in terms of displaying the steps a user need to take before accomplishing a goal. However, the blueprint provided a more heuristic and general view of the service. The blueprint normally list the stakeholder and all the background tasks involves with each touch point. The blueprint allows the team to understand how all the stakeholders plays a part in delivering the service to the user, and identifying the risk that might be involves.

2.2 Recommender System

A recommender system is a system which recommends an "item" to a user based on the similarity between their profiles. In this fields there are notably four types of recommender system: Content-based, Collaborative Filtering, Knowledge-Based, and Hybrid.

2.2.1 Similarity

Similarity is a measurement of how two different object resemble each others in terms of features. There are numerous methods to measure similarity, each has its own advantage and disadvantage.

2.2.1.1 Euclidean Distance

The simplest way to measure similarity is to take the Euclidean Distance between two items.

$$Sim(u, v) = d(u, v) = \sqrt{\sum_{k=1}^n (u_k - v_k)^2} \quad (2.1)$$

Euclidean Distance plot items in a n dimensional euclidean space, and find the distance between those two points. The closer they are to each other, the more similar the two items is. This method is best use all of the features are in the same unit.

2.2.1.2 Cosine Similarity

For some data set it is better to view items as an n-dimensional space vector. The similarity between the two items would be calculated from the cosine of the angle which the two vectors form.

$$Sim(u, v) = \cos(u, v) = \frac{(u \cdot v)}{\|u\| \|v\|} \quad (2.2)$$

One of the advantage of using cosine similarity is that the value is bounded between 1 and -1.

2.2.2 Content-Based Recommendation

A content-based recommendation will recommend items which satisfied the user's preference. The user's preference can be generated from, their behaviour online or asking them to input them explicitly, while the item's profile can be generated via text mining techniques from the item description or explicitly state by owner of the item. Common content-based recommendation techniques include finding similarity measures between user and

item.

$$Score(U, I) = s(U, I) \quad (2.3)$$

The drawback of content-based recommendation system is that it may be over specialized.

2.2.3 Collaborative-Filtering Recommendation

Collaborative Filtering techniques is derived from the interactions between users and items. This is commonly expressed in a form of user-item matrix R . Several techniques which exploits the data includes, neighbourhood based methods(e.g., Item-Item, User-User), and model based methods (e.g., Matrix Factorization). The neighbourhood items are mostly calculated by Pearson correlation between the user-item interaction history

2.2.3.1 Item-Item Similarity

Item-Item Similarity generate ranking score for user u and item t , r_{u_t} by calculating the weighted average of N nearest items neighbours $Q_t(u)$ of item t for user u which the user u have rated in the past.

$$r_{u_t} = \frac{\sum_{j \in Q_t(u)} Sim(j, t) \cdot r_{u_j}}{\sum_{j \in Q_t(u)} |Sim(j, t)|} \quad (2.4)$$

2.2.3.2 User-User Similarity

Item-Item Similarity generate ranking score for user u and item j , r_{u_j} by calculating the weighted average of N nearest users neighbours $P_u(j)$ of user u which have rated item j in the past. Let μ_x denote the average ranking which user x gives to items.

$$r_{u_j} = \frac{\sum_{v \in P_u(j)} Sim(u, v) \cdot (r_{v_j} - \mu_v)}{\sum_{v \in P_u(j)} |Sim(u, v)|} \quad (2.5)$$

2.2.4 Knowledge-Based Recommendation

Knowledge-based recommendation system make recommendation according to the user's explicit requirements input. Hence, it is a preferred methods for a specialized product recommendation or when there are not enough user data to make construct a user profile, or performs collaborative filtering techniques. Knowledge-based recommendation can be separate into 2 categories: Case-based and Constraint-based.

2.2.4.1 Case-Based

Case-Based recommendation system recommend items, which are similar to the item which the user input. Let \vec{X} be a vector consisting of d user input attribute (x_1, \dots, x_d) and \vec{T} be a vector of the target item consisting of d attributes (t_1, \dots, t_d) . Generally the ranking score would be calculated by a closed-form utility function $f(\vec{X}, \vec{T})$, which is set by a domain expert.

$$f(\vec{X}, \vec{T}) = \frac{\sum_{s=1}^d w_s \cdot \text{Sim}(x_s, t_s)}{\sum_{s=1}^d w_s} \quad (2.6)$$

w_s is the weight of each attribute that is normally set by a domain expert.

2.2.4.2 Constraint-Based

Constraint-Based recommendation system make recommendation on a set of rules or hard requirements provided by the user. Generally the input parameters may differs from the item attributes in terms of naming, thus the system must implement mapping between user input and item attributes, as well as any indirect rules that could be related to the user's input. Generating a list of candidate items would be to run the constraint filter on all the items. The ranking is therefore heavily relies on domain expert. Let \vec{V} be an item vector consisting of d attributes $(v_1 \dots v_d)$. The ranking on the filtered items can be generate by a utility function $U(\vec{V})$.

$$U(\vec{V}) = \sum_{j=1}^d w_j \cdot f_j(v_j) \quad (2.7)$$

w_j is a weight for each attributes, and $f_j(\cdot)$ is a function which takes an attribute and return a numerical value. Both of these parameters are determined by a domain expert.

2.2.5 Hybrid Recommender

A Hybrid Recommender system is a recommender system which combines multiple aspect of recommender model. This suggest that the drawbacks from using only one type of recommender system could be mitigated. For instance an Item-Item Similarity Content-Collaborative Filtering recommender can change the notion of item-item similarity by comparing the item's profile against one another instead of their user-item interactions histories. There are no limitation or formal regulations on how one could combine recommender systems. Common ensemble methods in machine learning could also be used to perform a hybrid recommender system such as stacking or boosting [15]. An example of hybrid recommender system will be shown in the Literature Review section.

2.2.6 Metrics

2.2.6.1 Accuracy

Accuracy determine how well the recommender can predict which items will the user be interested. Accuracy could be view as a user's rating (numeric), which is a numeric scale, or it could be view as whether or not the user bought the item (binary). The overall accuracy of the system which utilized the user's rating could be calculated by the root mean square error (RMSE) or mean absolute error (MAE) between the predicted rating of item i for user u \hat{r}_{u_i} and the actual rating of item i for user u r_{u_i} for all item set T .

$$RMSE = \sqrt{\frac{1}{T} \sum_{(u,i) \in T} (\hat{r}_{u_i} - r_{u_i})^2} \quad (2.8)$$

$$MAE = \sqrt{\frac{1}{T} \sum_{(u,i) \in T} |\hat{r}_{u_i} - r_{u_i}|} \quad (2.9)$$

For data which are binary, the accuracy of the system could be measured through recall and precision. Recall and precision are solely calculated from the number of true positive (TP), the number of false positive (FP), the number of true negative (TN), and the number

of false negative (FN). The definition of true positive, false positive, and false negative is displayed in table 2.1

$$Recall = \frac{TP}{TP + FP} \quad (2.10)$$

$$Precision = \frac{TP}{TP + FN} \quad (2.11)$$

Table 2.1: TP, FP, TN, and FN in context of a recommender system's prediction

	Recommended	Not Recommended
Used	TP	FN
Not Used	FP	TN

2.2.6.2 Coverage

Other than accuracy of the system, the coverage of the system is another metric which could be evaluated. Coverage measures the proportion of items, which the system recommend to the user $|T_p|$ relative to the all possible items set $|T|$. This is known as item space coverage. Item space coverage could be measured in prediction coverage (PC) or weighted prediction coverage (WPC) [16]. The difference between prediction coverage and weighted prediction coverage is that weighted prediction coverage took in the utility $r(i)$ of an item to account when calculating the score. Therefore, system that misses high utility items will be heavily penalized.

$$PC = \frac{|T_p|}{|T|} \quad (2.12)$$

$$WPC = \frac{\sum_{(i \in T_p)} r(i)}{\sum_{j \in T} r(j)} \quad (2.13)$$

2.3 Psychometric

Psychometric is a field of Psychology, where the goal is to construct tools which can measure psychological phenomena. The field covers from the designing of such tools, and evaluating its validity and reliability with empirical data. The field relies on both psychological theory and statistical techniques in order to hypothesize the relationship between an observed psychological phenomenon and a latent psychological phenomenon [17].

Item Response Theory is used when designing a tool to measure a latent psychological phenomenon. Normally the tool is a questionnaire eg: The Big Five Personality Test [18], and the DISC. Normally these tools are made in an iterative fashion. Firstly, the researcher first researches the underlying theory of the metric which they are measuring. Second, the researcher decides on which approach they are going to take. Common approaches are using Likert scale [19], along with biometric data [20]. Third, the researcher designs the questions and answers. Fourth, the researcher tests the question, and lastly they evaluate the result through statistical means and refine the tools. Evaluating reliability can be achieved through statistical techniques such as the Cronbach Alpha [21], while the validity can be achieved through Structure Equation Modeling [22] [23].

2.4 System Usability Scale

System usability scale (SUS) is a tool for quantifying the usability of an item. The tool consists of 10 questions, which follow a 5-point Likert scale [24]. Users are prompted to answer the questions through choices ranging from strongly disagree (1) to strongly agree (5). For an odd-numbered question (q_{odd}), the higher the better, while for an even-numbered question (q_{even}), it is the opposite. The overall SUS score of the system could be calculated from the following equation.

$$Score = 2.5 \left(\sum_{i \in q_{odd}} Score(i) - \sum_{j \in q_{even}} Score(j) + 20 \right) \quad (2.14)$$

Although the score of the SUS suggests the usability of an item, but it does not pinpoint where the system fails. The full version of the SUS is displayed in the appendix.

Chapter III

LITERATURE REVIEW

Related literature in volunteer management system (How to implement the system itself), and recommender system (How should volunteer and task be matched) are reviewed in this chapter.

3.1 Volunteer Management System

Volunteer Management System and similar platform features and challenges are explored in this section. *SpONSOR* [25] project utilized service-oriented architecture in its construction. The platform includes 3 data models; volunteer, opportunity, and organization. The interaction between these data models is the following; an organization proposes an opportunity, then a volunteer applies for it, and the organization benefits from the volunteer. The volunteer models include general information and skill-sets, while the opportunity model includes the time, and the required skill set.

A conceptualized platform *iVolunteer* introduces 3 main features that current volunteer management system lack. [26] *iVolunteer* introduces a volunteer portfolio mechanism, where a volunteer can keep track of their achievements, a marketplace for qualified jobs recommendations, and a rewarding system via gamification .

Other challenges for the current volunteer management platform is its failure to satisfy volunteer's psychological needs, which drive them to perform volunteering tasks. These needs differ for each volunteer and range from increasing their social network, acquiring a new skill, helping a cause, and the feeling of belonging to an organization. [27]. Other considerations include technology infrastructure, which governs how volunteers interact with the organization, other volunteers, and beneficiaries. It revealed that common technologies that are used for collaborating tend to be shared documents like Google Spreadsheets, instant messaging applications, and other social platforms. However, technology infrastructure which connects volunteers and a cause they care about is still lacking.

Many commercialized system such as Volunteer Mark [28] and InitLive [29] tries to bridge up these gaps, by providing solutions such as feedback system, real time communication, and registration process. However these systems only focus on the use-case of an on-site volunteering task.

3.2 Recommender System

The development of recommendation system starts from knowledge-based recommender system. These recommender utilized weight adjustment for a chosen high level parameter and how to query result. Some work adopt a hierarchical ranking algorithm, and a choice for the user to adjust tweak some parameter to refine the query [30]. For domain that has constraint such as finance, a set of rule is implemented to filter the searching space, based on the user's requirements. Similarly to other type of recommendation system, knowledge-based recommendation system could be combined with other type such as content-based, by first query the result based on a parameter, then performs ranking via profile similarity [31]. The system could also suggest a query relaxation if the search result is empty [32].

Content-based recommendation system are often use when an item features could be defined and there are little to no user interactions data. In the domain of job recommendation, keywords from the resume and the job description are extracted and cleaned to create profiles. The recommendation is made based on the distance between the job profile and the candidate profile [33], or through a probabilistic modeling [34]. The team *layer6.ai* from the *ACM Recommender Systems Challenge'17* utilized deep learning and gradient boosting machine in order to make recommendation based on candidate profile and job profile [35].

Researches in collaborative filtering could be divided into two distinct categories. A neighbourhood based and a model based which utilized matrix factorization or neural network. For collaborative filtering candidate's applications history are widely used among the researches. In job recommendation domain similarity between candidates applicant patterns are calculated and a prediction score is generated based on a normalized similarity score [36]. For items that are location dependent, a travel penalty or separate model for each area group are calculated in order to give a recommendation based on the user's location [37], although this technique could also be applied to other type of recommendation system.

However in terms of enterprises level usage, a hybrid between content-based and collaborative filtering is used along with contextual data in order to generate a more detailed recommendation. The famous networking platform *Linked* uses by aggregating content-based score and collaborative filtering score via a linear equation [38]. *AskStory* modeled the relationship between candidates, company, and jobs via graphs, and then refined the weight of the edges via content similarities.

In this thesis, an item would be a registered volunteer, and the user would be a task that is created within the system. The system handles a "Cold-Start" problem by utilizing a volunteer's personality as a profile through a psychological questionnaire. However, some systems can derive the personality by other means such as content generation [39]. Past studies suggest that using personality improves the system performance by allowing the system to recommend more diverse items [40], and it could handle the "Cold Start" problem effectively [41]. Many researches utilizes the big five as a means of user profile generation [18]. However, in this research a customized questionnaire would be used to as a custom made psychometric questionnaire.

Chapter IV

METHODOLOGY

4.1 Questionnaire Design

Due to the cold-start problem stated in previous sections, the research must find an appropriate way to extract and quantify human's attribute which deem as attractive in the context of volunteering work. This leads the research to the first step of constructing a psychometric questionnaire.

4.1.1 Attribute Identification

A focus group with volunteers and medical personnel was conducted to determine the amount of different volunteering job within the hospital, and how "close" they are related to one another. Medical personnel and volunteers are asked to order these distinct jobs based on their opinion of job similarity. A multi-dimensional scaling[42] is then applied to identify all the variable dimension which causes the distinction between each volunteering job. These dimensions are displayed below.

1. Hospital vs Non-Hospital (helping new patient vs family counseling)
2. Interaction vs Knowledge (group music vs health education)
3. Empathy Required vs Empathy not Required (handicraft vs individual counseling)

Through literature review an appropriate attribute were extracted under each of the dimension variables displayed in table 4.1, table 4.2, table 4.3, table 4.4, and table 4.5.

Table 4.1: attribute related to the hospital dimension

Attribute	Description
Experience and Attitude Towards Public Hospital	Their experience and attitude toward hospitals
Service Orientation	Their tendency to like serving others

Table 4.2: Distinct attributes related to the interaction dimension

Attribute	Description
Creativity	How creative are they
Enthusiasm	Whether or not they're energetic during work hours
Playfulness	Their tendency to make jokes or play with others positively

Table 4.3: Distinct attributes related to the knowledge dimension

Attribute	Description
Teaching Experience	Have they ever teach anyone before
Commitment to Learning	Are they the type that like to keep learning continuously
Intellectual Acumen	Their ability to teach and transfer knowledge to others

Table 4.4: Distinct attributes related to the empathy dimension

Attribute	Description
Empathy	Their tendency to understand the feeling of others
Realistic Optimism	Their tendency to have to a positive outlook on life, but is still within the realm of possibility
Caring and Supportive Nature	Their tendency to care and support other people

Table 4.5: Distinct attributes that may not be related to any dimension

Attribute	Description
Self Control	Their ability to remain calm and control their emotions under pressure

Six attributes which the domain experts deem as important is then chosen to go through the formative measurement model process. These chosen attributes are displayed below.

1. Experience and Attitude Toward Public Hospital
2. Service Orientation
3. Enthusiasm
4. Intellectual Acumen
5. Caring and Supportive Nature

6. Self Control.

4.1.2 Formative Measurement Model

Based on literature review, questions and answer for each attribute is constructed. The questions are based upon biodata in order to refers these attribute. The newly created questionnaire is separated into two distinct questionnaire due to its lengthy items, and under go a testing trials with hospital volunteers to determine the quality of each questions. The first set consist of questions measuring Experience and Attitude Toward Public Hospitals, Service Orientation, and Intellectual Acumen, while the second set consist of questions measuring Self Control, Enthusiasm, and Caring and Supportive Nature. The first set was tested with 112 volunteers, and the second set was tested with 97 volunteers. The refined version of the questionnaire is displayed in the appendix.

4.1.3 Feedback Model

In order to both validate performance of the questionnaire and the performance of the volunteer a feedback model must be implemented. Through literature review, the feedback model is divided into 2 separate questionnaire. The first questionnaire is for determining the volunteer performance, and the second questionnaire is for volunteer to determine their satisfaction in completing the volunteering task. The attribute associate with volunteer performance and volunteer satisfaction is displayed in table 4.6 and table 4.7 respectively. The full of version of the questionnaire are displayed in the appendix.

Table 4.6: Distinct attributes for volunteer performance

Attribute	Description
Relationship With Clients	How well they interact with a client, if there is one
Teamwork	How well they interact with their teammate
Motivation	How energetic they are during work hours
Self-Awareness	Do they know their roles in their work, such that they're not over extending their responsibilities

Table 4.7: Distinct attributes for volunteer satisfaction

Attribute	Description
Importance	Do they feel that the work they're doing is important
Support From Organization	Does the volunteer feel that the organization is helping them during their work period

4.2 Process Design

The service design process is used to extract functional requirements and what steps are necessary to make the user experience as pleasant as possible. An in-depth interview and co-creative workshop is used to create a user persona and ultimately a service design

blueprint.

4.2.1 Persona

From an in-depth interview with the domain experts, the research team has identified 5 potential users for the system. All of them have different characteristics and behaviours toward the system.

1. **The Lonely Retired Elderly Volunteer:** According to the medical personnel, these group are the most common volunteers. This persona age consist of people who are older than 50 and is retired from their everyday occupation. Their children rarely visit them, hence leaving them with nothing to do at home. These people does volunteering work for the sake of fulfilling their social needs. Their technology prowess is the lowest among the persona group. They do own a smartphone, but they only use instant messaging application to communicate with their family and friends.
2. **The Overworked Medical Personnel :** This persona serves as the one who interacts with the volunteer management system and the volunteers. Due to the nature of their occupation, they are constantly rushing to attend their patients. They are the one that is directly affected by the disadvantages of the current volunteer management system. Although they have a high educational background, they do not wish to change the current system if learning it means introducing more work for them. Their technological prowess at the medium level. They know how to use their smartphone for various purposes. However it will take them a significant amount of time to learn how to use a new technology.
3. **The Busy Adult Volunteer :** This group age range is 35-45 and is identified by the amount of burden they have to carry in order to support their family or advance their careers. This persona does not frequently engaged in on-site volunteering activities, but prefer to donate items to the hospital instead. They are busy with raising a family and progressing their career, but they have the capital and the willingness to contribute to the society. This persona's technology prowess is at the same level as the overworked medical personnel persona.

4. **The Passionate Young Adult Volunteer :** According to the medical personnel, they are the rarest among the personas and is the easiest to work with. This group age range is 34-30, and is characterized by their passion and enthusiasm to service other. Their primary objective in life is to explore the world. They engage in volunteering activities, due to their core belief system. Additionally, they also perceive volunteering activities as a mean to discover themselves, and do something productive. Their technological prowess is the highest between all the persona group, due to their upbringing. Their activities on smartphone includes, playing games, social media, and web browsing.
5. **The Student Volunteer :** This persona main objective for volunteering is building a good resume. They needed the activity for their college or job applications. This persona normally appeared once, and does not normally come back to the site again. Their technological prowess is equal to the passionate young adult volunteer persona.

4.2.2 Service Design Blueprint

A co-creative workshop consisting of a research team, volunteers, and medical personnel was held in order to finalize the process design. The output of the workshop is a Service Blueprint, which behaves similarly to the current system in terms of its semantics. The blueprint is displayed in figure 4.1. The idea is to make the process as close to the current flow as close as possible to lower the learning curve of the system. This is extremely critical for medical personnel, since the effort to learn a new system will over-powered its benefit.

parallel activities

Stage	1 AWARENESS TRIGGER	2 CONSIDERATION DISCOVER	3 CONSIDERATION INSIGHT GATHERING	4 ACTION TASK CREATION	5 ACTION REGISTRATION	6 ACTION CONFIRMATION	7 ACTION TASK AVAILABILITY	8 ACTION TASK ACQUISITION	9 ACTION SCHEDULE	10 ACTION EXECUTION	11 RETENTION FEEDBACK	12 RETENTION TRAINING	13 ADVOCACY COMMUNITY										
Volunteer Action	motivation volunteer have different type of motivation: both positive and negative	searching for available channels type of work > generic volunteer > specialised volunteer			register 1. general information 2. skills 3. education 4. address 5. hobby 6. specialty	Medisa test fit to receive to receive type of presentation/questionnaire for being volunteer	available tasks (notification) volunteer received selection of available tasks including task description, type work, presentation, time, date, open.	task accept > responding to available task > being able to see personal content detail of medical staff > filter additional require-ment, such as, parking	preparing > prepare for the meeting with medical staff > receive task & condition on how to participate	working > check-in > doing the task	self-reflection reflected on activity and experience	training > building and	sharing & connecting > building volunteer community that involved with both medical staff, volunteers and patient/family > sharing experience and knowledge										
Staff Action			insight gathering > interviewing and discussing with patient and family > patient/family /forming skills > discussing with independent participant/organisation	create tasks (create) 1. general requirement 2. input number of volunteer needed 3. input correct information, date, and place				preparing > prepare for the meeting with volunteers > preparing equipments (if need)	introduction and monitor > help task > check on time and regulation > introduce patient and family > monitoring progress	evaluation evaluate volunteer's performance and giving feedback/suggestion for future development	workshops > workshop, developing content knowledg and the medical staff need to expanding the resources by external > professional develop, developing special skill for volunteer	update sharing experience and on going progress of patient and family that could be engaged with											
Digital Evidence	> Facebook > Website > WhatsApp > Line	> Facebook > Website		> website > application form	> website > questionnaire form	> website "Task Detail" > email	> website - "Task Log" - "Task Detail"	> website > chat channel (?)	> email notification > sms notification	> QR code > P2P > telephone	> profile > online evaluation form > website & app "task Heavy"	> website & app "Task Heavy"	> website & app > Facebook > LINE										
Physical Evidence		> P2P > Telephone > mail > traditional media	> P2P > application form						> P2P > telephone	> P2P > telephone		> workshop and training > space > facilitators and speakers											
Stakeholder	> admin	> admin > marketing team	> patients > family > doctors, nurses, medical staffs	> medical staffs	> admin > support		> admin > patients > medical staffs			> patients > medical staffs > support	> medical staffs > patient & family		> volunteer > medical staffs > patient & family										
LINE OF INTERNAL INTERSECTION																							
Medisa Action	content marketing offer what's your type of volunteer/ user as a trigger to connect to Medisa platform.	marketing offer accessibility and awareness of Medisa platform through different media channels			job categorisation create standard template: 1. non-human, non-specified 2. non-human, specified 3. human, non-specified 4. human, specified	classification assign types to personality and classify them into different categories based on their characteristics (how they / they will be a volunteer)	AI1 matching & notification offer notification for each-base on update available jobs	AI1 notification offer notification for medical staffs for that the job has been accepted.	notification offer notification for medical staffs for that the job has been accepted.	QR code attendance check-in QR code and monitor attendance done the task.	collecting feedbacks building volunteer community and connect them into user-friendly format	ignite and look over volunteer ignite and look over the right skill and enough skill to serve patient and look over of volunteer experience through that their interaction with Medisa platform.	news & contents > generate news on volunteer community and on going activities on social media or website > generate knowledge contents	Goal & Objective looking for sustainable volunteer in long-term spiritual and personal growth	open-up volunteer community and give them a clear boundary and groups of audience	understand and evaluate patient & family need	personalised patient & family need (no job (digital format) with our user-friendly) template	building volunteer database and network	differentiate users (volunteer) into specific categories, in the task while describing to them in the future (or AI1)	offer selections of task (no volunteer based on their profile and level of experience	at these stages, Medisa assess that users to have their own world to participate and enhance the business experience	focus on developing and building growth community	create sustainable volunteer community and develop personal skill on spiritual, social and assess their own and needs of health

Figure 4.1: The service design blue print resulting from a workshop

The blueprint covers areas from creating awareness to potential volunteers until they finally become a regular volunteer. All of the rows represent each stakeholder's actions relative to the steps as well as highlighting the objective of each column. The physical and digital evidence are what tools or methods are used in each step. The *Med-Asa* action columns represent what is required for the system to do in order to achieve the same goal as the digital and physical evidence. Overall, the actions can be grouped into the following categories.

Recruitment: The goal of the recruitment process is to be able to identify a volunteer's aptitude and attitude through a custom made psychometric questionnaire. When the volunteer completes the questionnaire process, their profile is saved in the database and waits for further upcoming tasks.

Seeking Help: Medical personnel fill in a form when they need help, demanding what kind of requirements the task needs. This process mimics the current physical process.

Notification: The system automatically sends out a task invitation to selected volunteers through a social media channel. The volunteer is allowed to respond to the task invitation notification right away within the system.

Reminder: The system automatically sends out reminders to volunteers through communication channels.

Attendance: Medical personnel in charge of the supervision takes an attendance check through the application or lets the volunteer scan a *QR code* as attendance.

Evaluation: When volunteers finish their tasks, medical personnel must rate the volunteer's performance, while volunteers must rate how much they like the job. A notification will be sent to both of parties as a reminder to complete the questionnaire. The results from all of the questions are saved into the database.

Reflection: The evaluation results are used as a means of suggesting to volunteers what to improve on. This makes the volunteers become more motivated and more involved in doing volunteering work.

The service blueprint maps out what tasks are needed to be done in the process for

all of the stakeholders. This provides the team with valuable insights on what the system should be able to do and where each stakeholders are within the process.

4.2.3 Requirements

From the service design process, a use-case diagram(Figure 4.2) is constructed outlining what the system should be able to do.

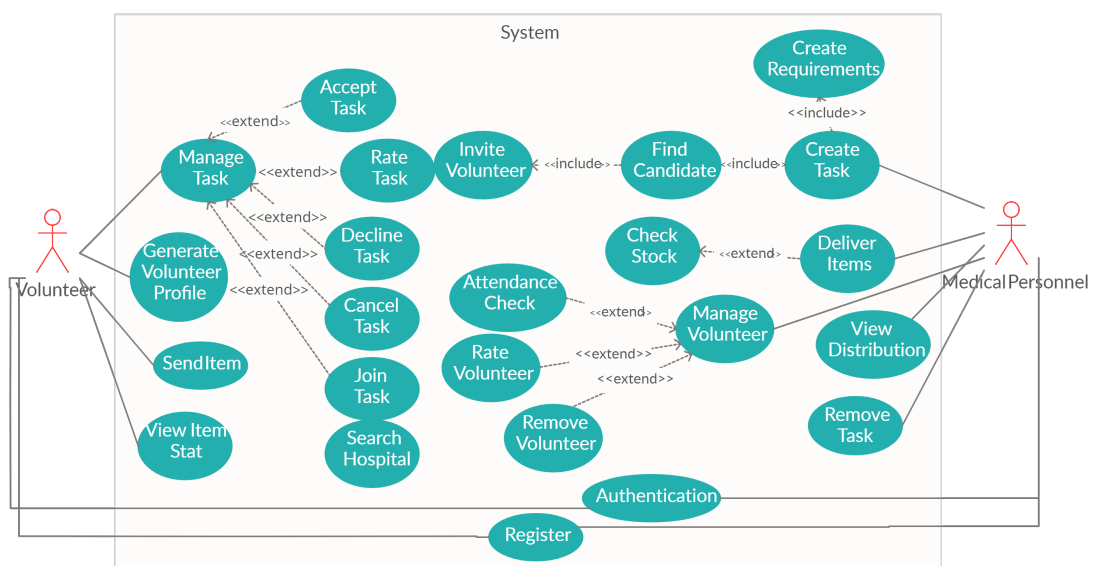


Figure 4.2: The overall use-case for the system

A table of the requirement table are separated by role in table 4.8 and table 4.9 .

Table 4.8: Functional Requirement for Volunteers

Requirement Number	Requirement and Description
1	Potential volunteer must be able to register to the application via Website or through Line platform
2	Volunteer must be able to conduct a volunteer profile analysis
3	Volunteer must be able to view their personal information and their volunteer profile
4	Volunteer must be able to receive tasks that they are matched with
5	Volunteer must be able to respond to their task notification, which includes declining, cancelling and accepting the task
6	Volunteer must be able to sign up for remote tasks that are open for registrations
7	Volunteer must be able to register their time slot that they are free to be called on
8	Volunteer must receive a feedback notification from the system
9	Volunteer must be able to perform feedback evaluation
10	Volunteer must be able to send a face shield to the registered warehouse destination
11	Volunteer must be able to receive their serial number and view their delivery status
12	Volunteer must be able to view the result of face shield distributions of the system

Table 4.9: Functional Requirement for Medical Personnel

Requirement Number	Requirement and Description
1	Organization that wishes to be part of the system should be able to sign up
2	Organization should be able to request items from other organizations
3	Organization should be able to send items from their inventory to a destination location
4	The stock for the items should be added or deducted accordingly
5	Medical personnel should be able to call for the registered volunteers during their available time slot
6	Medical personnel should be able to create daily on-site tasks
7	Medical personnel should be able to check in and check out volunteers that are signed up on on-site tasks
8	Medical personnel should be able to reject volunteers that signed on the tasks
9	Medical personnel should be able to give feedback to volunteers when they finish the task for both remote and on-site tasks
10	System should be able to assign a mentor to the volunteers
11	System should directly inform volunteers of an incoming task
12	Medical personnel should be able to assign multiple mentors to a task

4.2.4 Proposed Process

From the service design blueprint and the use-case diagram, a detailed process could be created.

4.2.4.1 Volunteer Registration

The volunteer registration process (figure 4.3) is the first step before the volunteer can do any other tasks within the system. The registration process has two alternatives: a chat bot or website application.

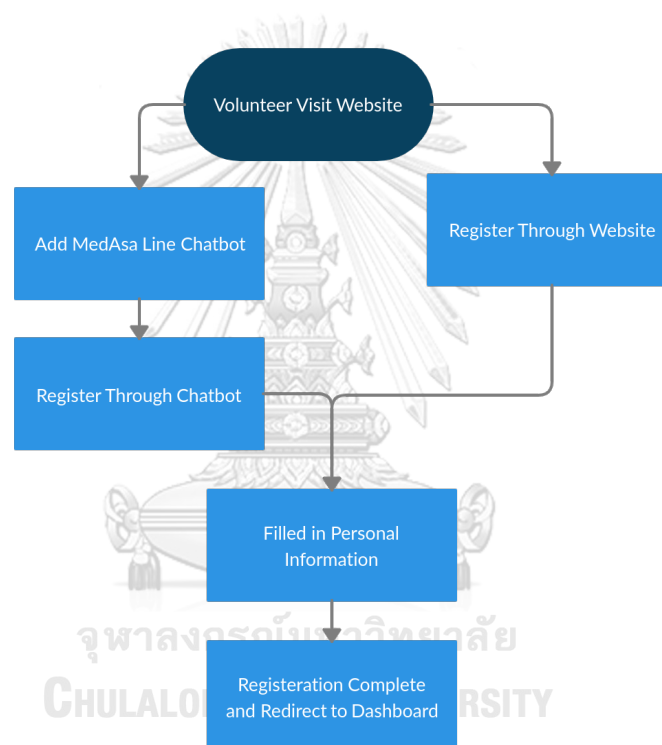


Figure 4.3: The registration flow for volunteer

4.2.4.2 Medical Personnel Registration

Similar to registering for volunteers (figure 4.4, medical personnel register through a different chat bot to avoid confusion for those users who are both medical personnel and volunteers. Medical personnel can use their own volunteer account to register for a medical personnel account to avoid redundancy.

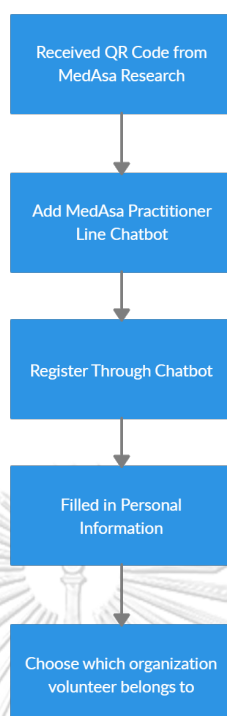


Figure 4.4: Registration process for medical personnel

4.2.4.3 On-Site Task

The on-site task process was designed to mimic the current process. A side by side comparison is displayed in figure 4.5

1. **Recruitment:** Volunteers registered by filled in a paper form. A face to face interview is then conduct to gauge their attitude and personality through the volunteer registration process (figure 4.3). After that, the result is recorded onto paper and stored in a cabinet.
2. **Matching:** When there is a demand for an on-site task, suitable candidates are looked up based on the required task's hard-skill and soft-skill requirements. A list of candidate is then generated and an inquiry is made through phone call. In this step, medical personnel may need to conduct a quick interview again to double check. After all the candidates has been confirmed, an attendance sheet is made and printed out.
3. **Execution:** During the task, volunteer would signed their name on the attendance sheet and proceed with the task. When the task is finished, the volunteers would

checked out and return home.

4. **Reflection:** An informal review between the medical personnel involves then take place in a form of group discussion, unfortunately the result of the review is not systematically recorded

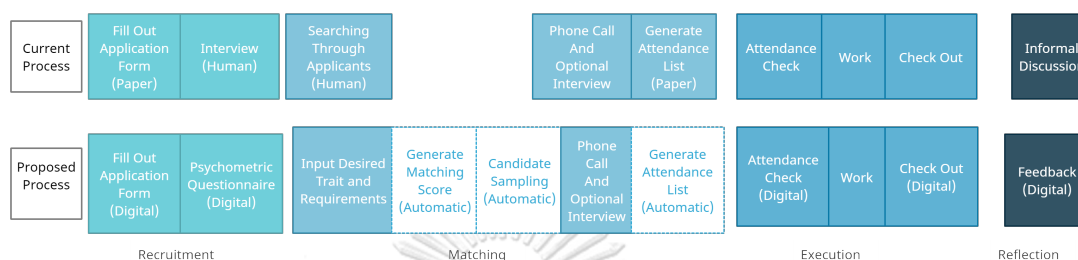


Figure 4.5: A side by side comparison between the current process and the proposed process for on-site volunteer

4.2.4.4 Item Donation

Under the assumption that a volunteer has already made or acquired some of the items that they wish to donate. The process follow 4 steps which are similar to the original process.

1. **Volunteer Engagement:** Volunteers can mail the items straight to the department without the needs to contact the hospital.
2. **Item Receives:** The Medical personnel eventually receives the items, and may recorded it on paper or excel files.
3. **Item Redistribution:** If there is a need to distribute the items to other local hospital or other facility, however the book keeping process is not strictly followed.
4. **Report Generation:** Periodically they would make a report from the excel file, but their records are not accurate since some transaction may be missing or approximated.

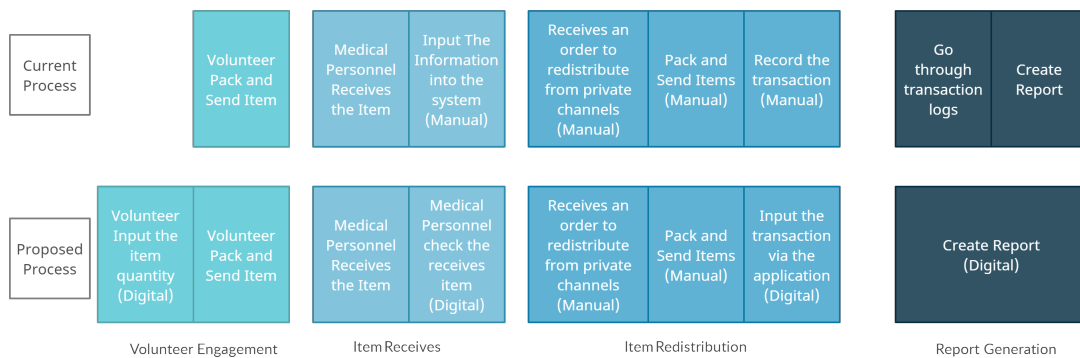


Figure 4.6: A side by side comparison between the current process and the proposed process for item donation

4.3 System Design

From the functional requirements that were generated from the process design and following the separation of concern principle [43], the system follows modular monolithic architecture as shown in figure 4.7.

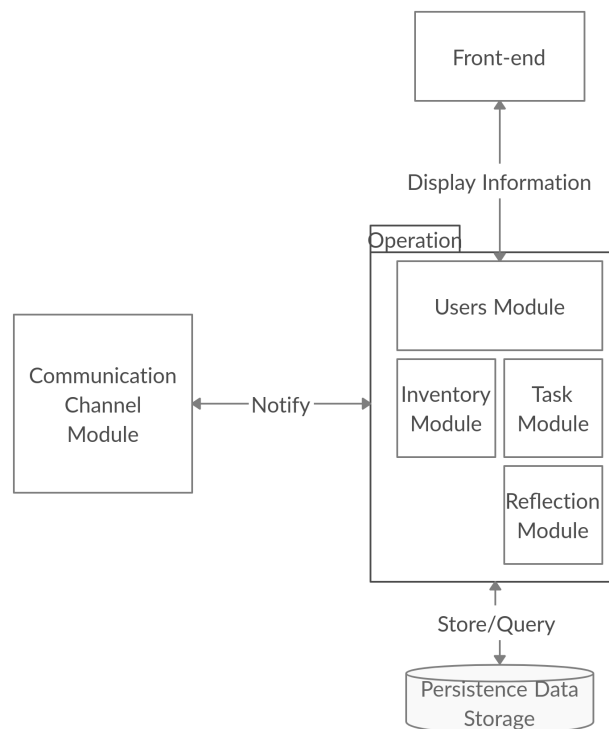


Figure 4.7: The overall module’s grouping and interactions

4.3.1 Front-End

The front-end is responsible for displaying data and providing an interface between users and the system.

4.3.2 User Module

The user module deals with creating and querying users and all related information.

4.3.3 Task Module

The task module is used to create and query tasks, as well as calculate matching scores between volunteers and tasks. The matching algorithm follows a hybrid recommender approach. Volunteer are first filtered through a hard-constraint such as age and location. Then a matching score is calculate through a soft-constraint methodology.

The score s_t calculation for an input task T with task profile \vec{T} between volunteer V with volunteer profile \vec{V} is composed of the volunteer profile to task profile matching score (equation 4.2), the normalized moving average of volunteer's past performance (equation 4.4), the normalized moving average of whether or not the volunteer like this kind of task (equation 4.3), and their activeness within the system (equation 4.5). The final score is then aggregate with equation 4.1 with w as a hyper parameters in this equation, signifying each component's importance. For volunteers that does not have a past performance or past satisfaction score, the value will be set to 1 as oppose to 0. This is to give the benefit of doubts to the newly registered volunteers.

$$s_t(\vec{V}, \vec{T}) = w_1 s_1 + w_2 s_2 + w_3 s_3 - w_4 p_v \quad (4.1)$$

$$s_1(\vec{V}, \vec{T}) = \cos(\vec{V}, \vec{T}) = \frac{(\vec{V} \cdot \vec{T})}{\|\vec{V}\| \|\vec{T}\|} - p_v \quad (4.2)$$

$$s_2(V, T) = \frac{\sum_{n=1}^5 w_n a_n}{\beta \sum_{n=1}^5 w_n} \quad (4.3)$$

$$s_3(V, T) = \frac{\sum_{n=1}^5 w_n b_n}{\beta \sum_{n=1}^5 w_n} \quad (4.4)$$

$$p_v = \frac{Status_0}{Total} \quad (4.5)$$

In order to make it fair, a candidate selection algorithm is implemented to pick the most suitable candidate. The system divides volunteers into 3 tiers: high tier, middle tier, and low tier and will randomly pick 60% from the high tier, 30% from the middle tier and 10% from the low tier.

Once the selected volunteers accept the task, the system will assign volunteers to the mentor with the lowest mentee in order to allocate the amount of grading mentors have to do.

4.3.4 Inventory Module

The item module deals with item distributions and keeping track of sending and receiving statistics.

4.3.5 Reflection Module

Provides methods for volunteers and medical personnel to provide feedback for tasks that are completed by them.

4.3.6 Communication Channel Module

The module provides an interface for the system to be able to send push notification to users if they are not currently using the front-end module.

4.3.7 Persistence Storage

A database used for storing information within the secondary memory of the server.

4.4 Data Model

From the Process Design and the Requirements Gathering phases, important data models are identified as the following.

1. Attribute
2. Task
3. Users
4. Questionnaire
5. Item Transaction

4.4.1 Attribute Data Model

The attribute model connects the User and Task data model together. The attribute represents the latent variables which influence the volunteer's job performance and satisfaction, which was identified and chosen in the designing the psychometric process.

4.4.2 User Data Model

The user data model governs the role for registered users within the system (Figure 4.8). The volunteer, medical staff, and organization model extends the user model to grant addition properties required to perform role specific tasks. This allows a user account to be both a volunteer, medical staff, or organization. This will make the user experience for people who are both volunteer and medical personnel more pleasant, since they do not have to remember multiple username and password.

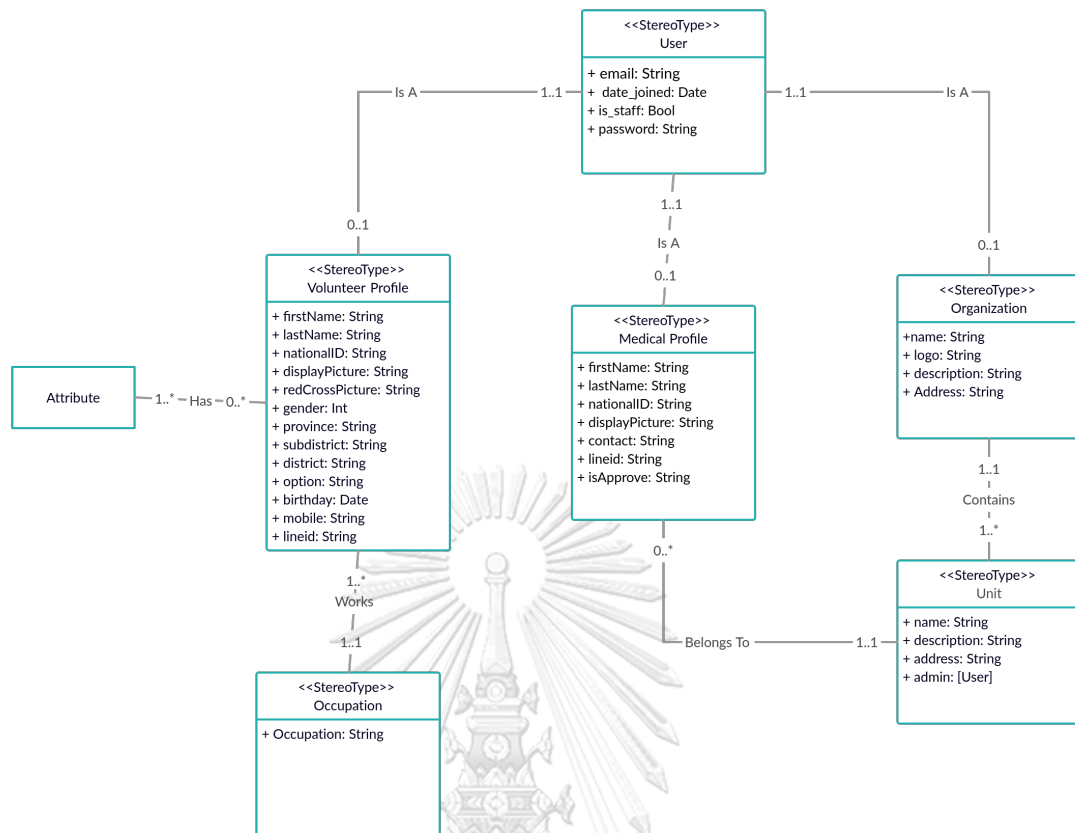


Figure 4.8: The user data model displaying its relevant association

4.4.3 Task Data Model

From the Gathering Requirement phase, each task can be classified with 2 attributes: One-Time/Routine and Onsite/Remote. An example for each type of task is shown in table 4.10. Each task has a hard requirements attribute such as the minimum/maximum age requirement and soft requirements such as the attribute preferred as illustrated in figure 4.9

Table 4.10: Task classification matrix and its example

	On-Site	Remote
Routine	Kiosk, Measurement	Remote group therapy
One-Time	Special event volunteer	Item donation

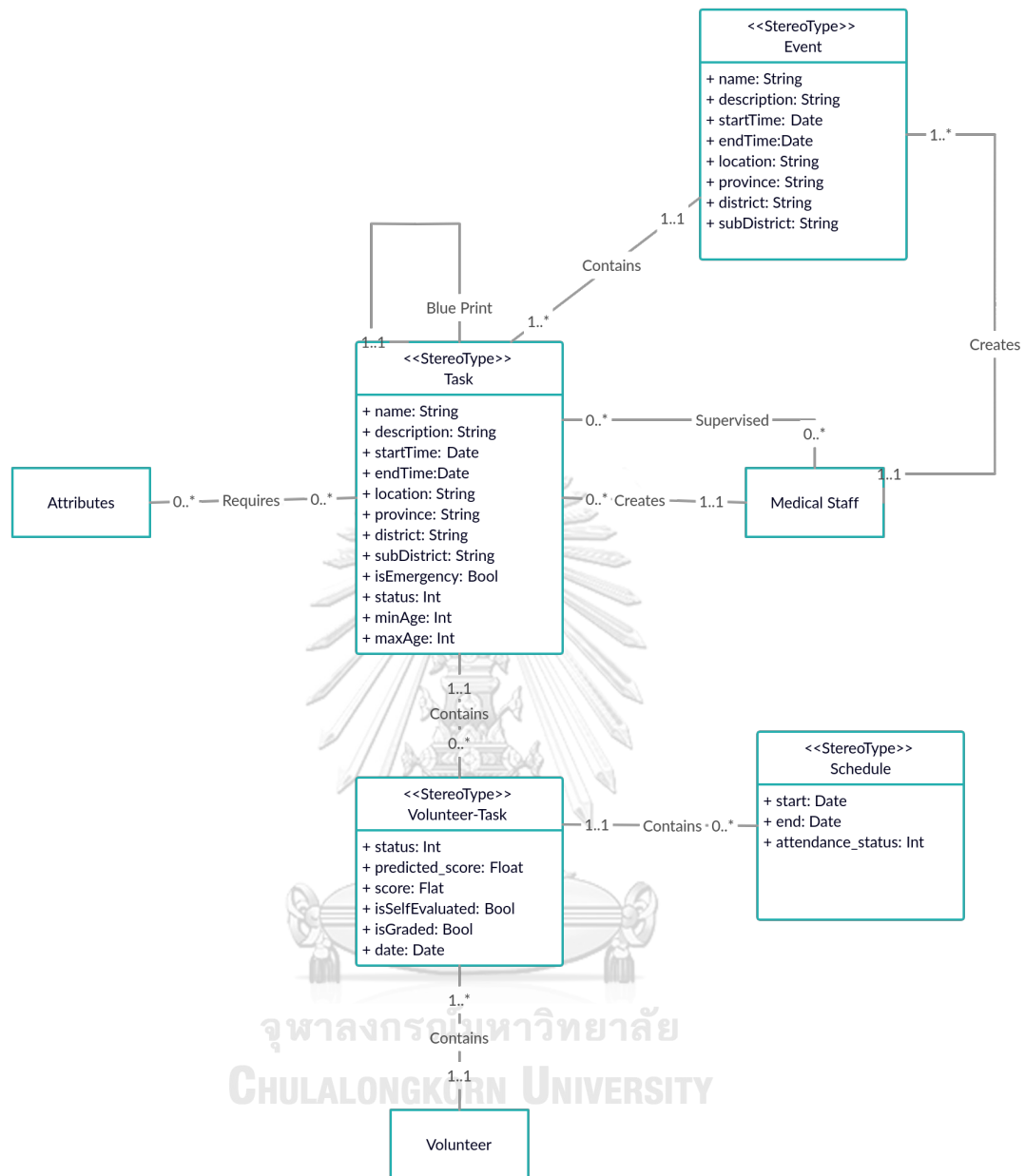


Figure 4.9: The state diagram for volunteer status when volunteer are invited to a task

Tasks could can be included in an event, such as Earth Day where an operation could be divided into multiple tasks which require high coordination. The blue print relationship is for the ease of data mining and machine learning. A task could essentially be the same, but has different name, hosted by different organization at a different place, by including the Blue Print flag, this allows the system to recognized that it is essentially the same task and

avoid data sparsity problems.

The Volunteer-Task class is for keeping track the current status of the volunteer for the particular task. These statuses in the system are as follows and the transition state is displayed in figure 4.10. The status in the class is used to keep track of the current status of the volunteers relative to the created task.

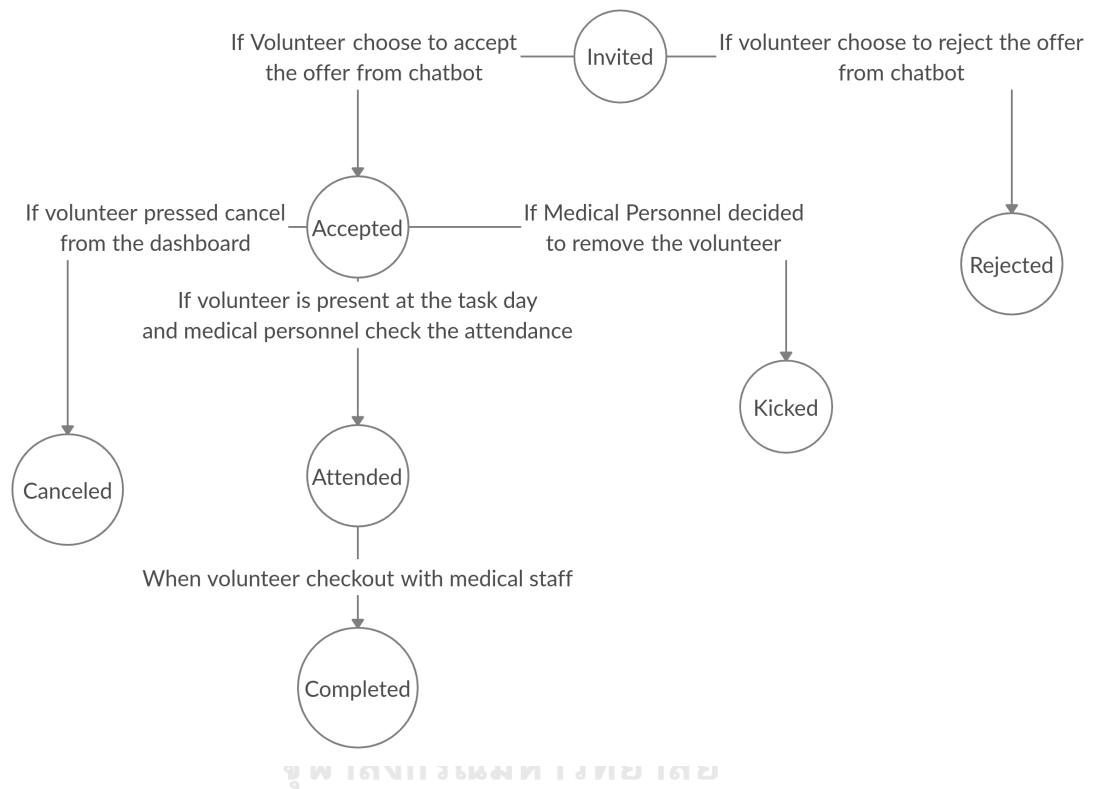


Figure 4.10: The state diagram for volunteer status when volunteer are invited to a task

- Invited: The volunteer has been invited by the system.
- Rejected: The volunteer has rejected the invitation.
- Accepted: The volunteer accepted the invitation.
- Canceled: The volunteer accepted the invitation but later cancels it.
- Kicked: The volunteer was removed by one of the medical personnel.
- Attended: The volunteer has arrived to the on-site task.

- Completed: The volunteer has completed the task, which means that their mentor has already checked out.

4.4.4 Inventory Data Model

Although the system primarily support the receiving face shield from volunteer and then re-distributed it to other hospitals, the item transaction data model was designed with scalability in mind as illustrated in Figure 4.11. Volunteer or medical personnel can send multiple type of items in one transaction. This allows the system to handle any sudden changes in the items demand, or when there is a new donation campaign in the future.

Transactions are divided into two categories: SendingTransaction and HelpTransaction. SendingTransaction is when volunteer donate items to a warehouse which belongs to a registered unit owned by an organization, while HelpTransaction is when a warehouse re distributed their face shield. This make it easier for the system to aggregate and provide meaningful results such as: Which province receives the most face shields? How many face shield the unit sent out in total? Volunteer from which province donate the most face shield? These insight could be use later on to develop a more sophisticated model.

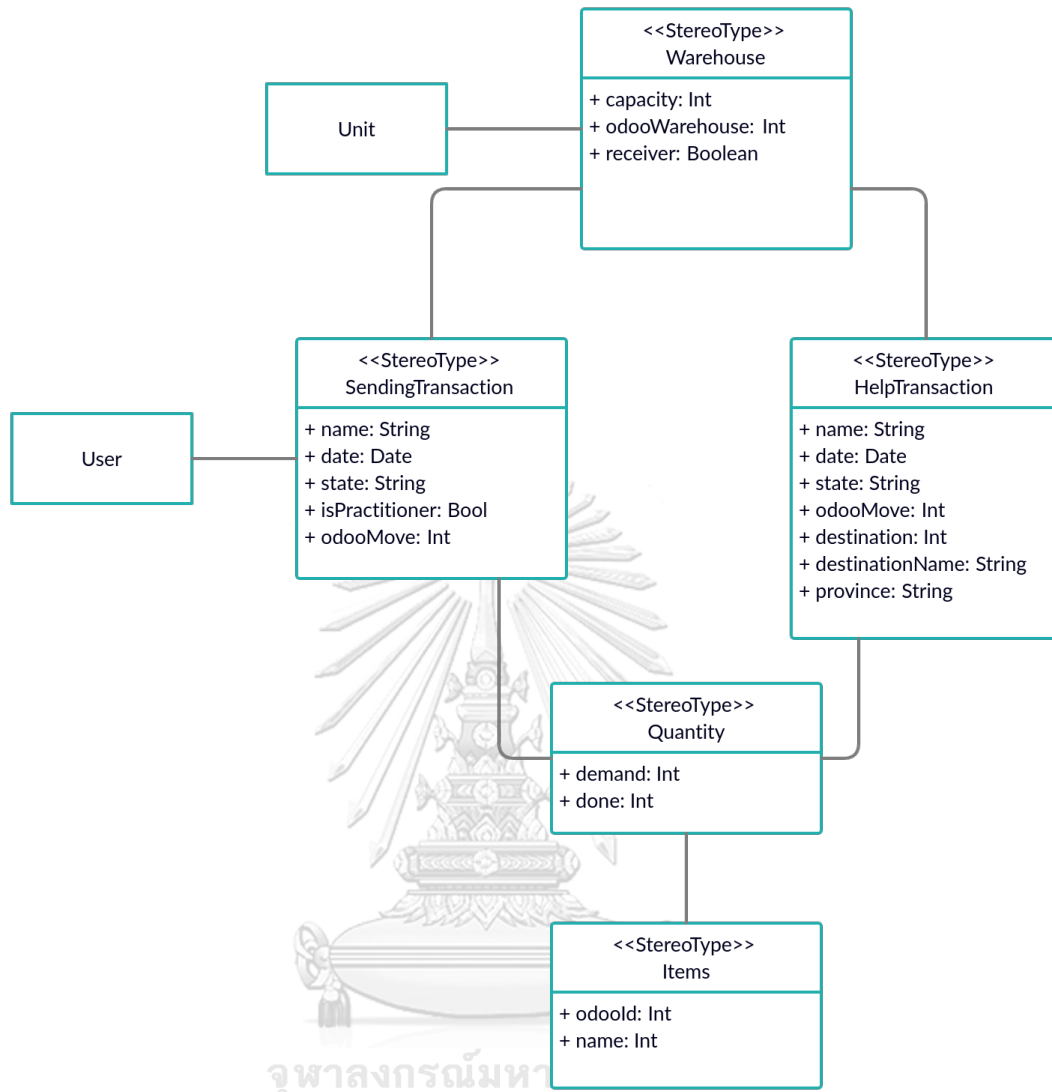


Figure 4.11: The inventory data model which governs the Inventory module

4.4.5 Questionnaire Data Model

The questionnaire data model (displayed in figure 4.12) is used in both the User module and the Feedback module. The questionnaire data model is designed to be a general purpose questionnaire as opposed to multiple rigid questionnaire for volunteer profile generation, feedback and evaluation.

The pros in utilizing a general purpose questionnaire model includes the ability to change, update or add a new questionnaire without changing the code. This allows the

system to be extends to other domains which may require a different psychometric measurements. Additionally, none of the psychometric is at its final draft, and tend to changes with each iterations, having a flexible questionnaire will improves the development speed and experience.

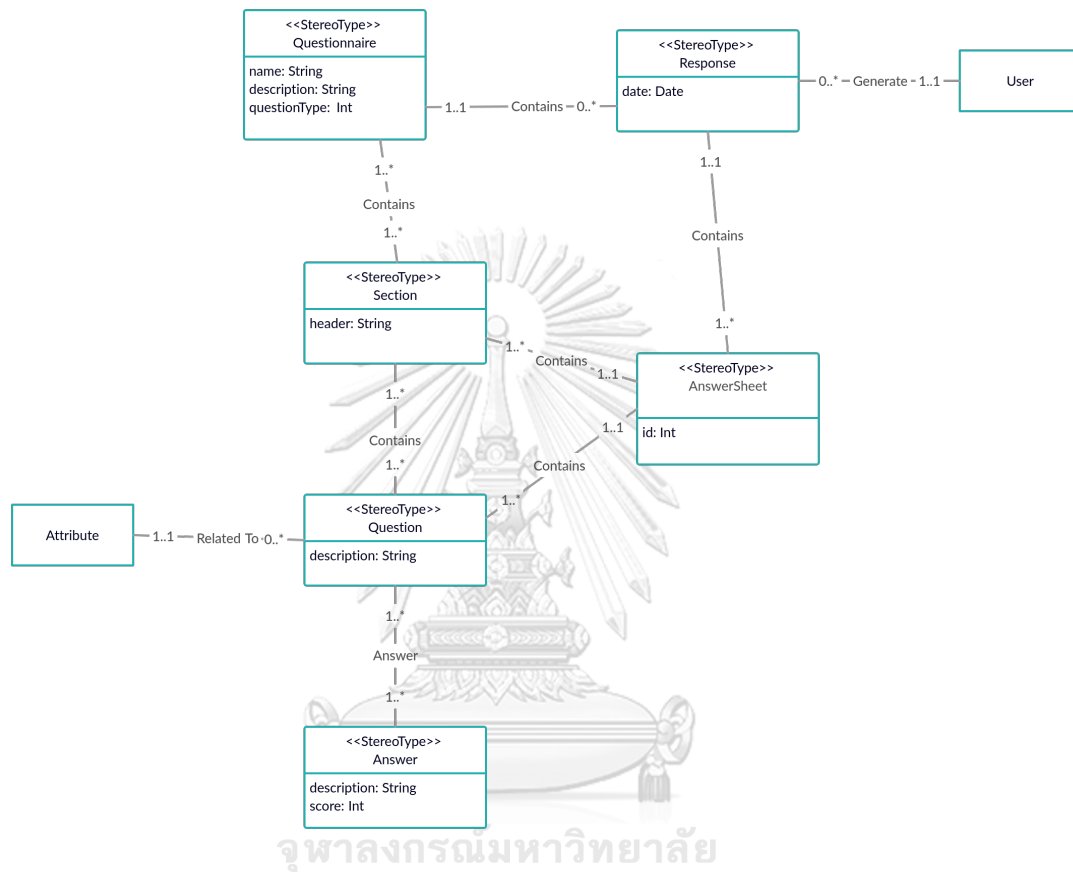


Figure 4.12: The questionnaire data model for volunteer profiling, feedback, and self-evaluation

4.4.6 Data Model Interactions

Although they seem to be isolated from each other, these data model's interactions are the central core of how the system manage volunteering tasks. As illustrated in Figure 4.13 , the user data model interacts with the task data model by providing it with an actor, such as volunteers (For doing the task) and medical staff (For managing the task). The questionnaire data model and attribute data model facilitate the profile generations in a form of a psychometric test before entering the system and as a feedback loop.

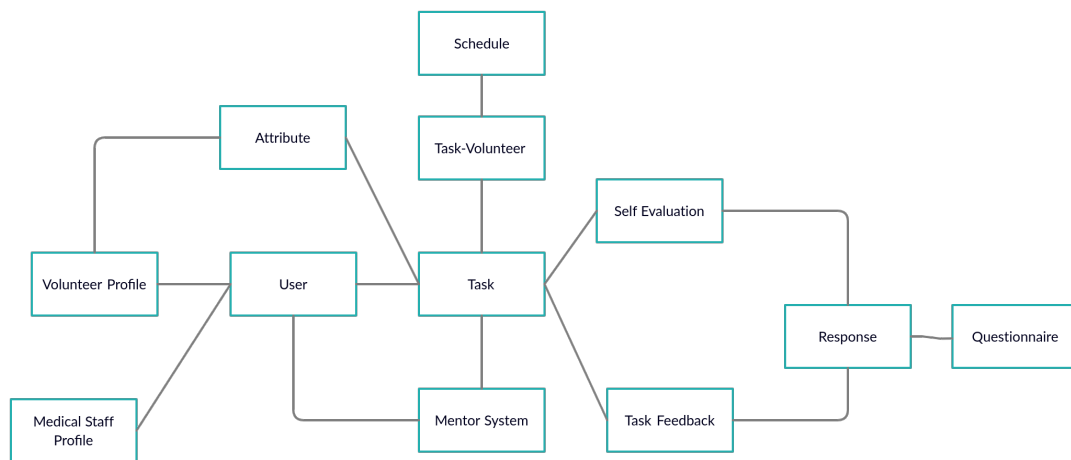


Figure 4.13: The interaction between each data model in order to facilitate the volunteering task management system

4.5 System Implementation

From the system design, several tools are considered and chosen to best satisfy the system's requirements. The overall system infrastructure is displayed in figure 4.14.

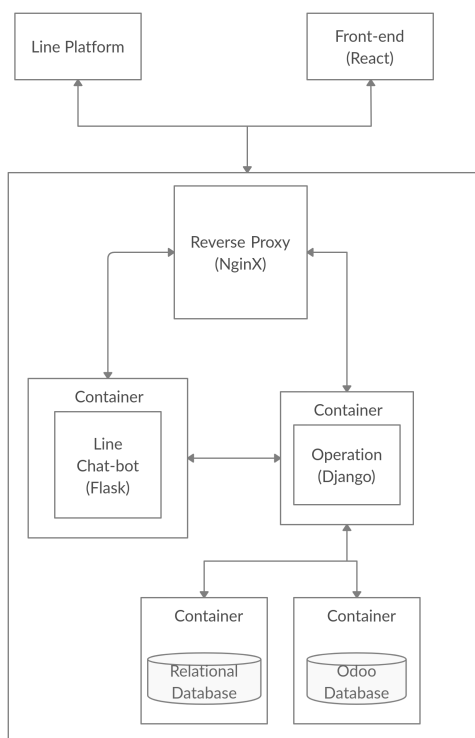


Figure 4.14: The infrastructure of the system

4.5.1 Front-end Module

The front-end module is responsible for displaying data and acting as a user interface. The research chooses to implement the front-end module as a web application with React [44] to enable cross platform accessibility. However, extra work may have to be done in order to make the interface responsive to different screen sizes.

4.5.2 Operation Back-end

The operation back-end is responsible for handling volunteer management processes. The operation back-end is written in Python with the Django Framework [45], due to the versatility of the language and numerous libraries which support machine learning algorithms. The system also utilizes Odoo, an open-source ERP[46] as an immutable backup database for item transaction.

4.5.3 Communication Channel

HTTPS protocol and messaging queue is used as a communication channels between services. The front-end module communicates with the operation back-end via HTTPS protocol, while the operation back-end communicates with the chat bot with a messaging queue due to its asynchronous nature.

The communication channel communicates between users and the system through the Line instant messaging platform, due to the majority of the users having low technological prowess (Lonely Elderly Volunteer Persona), it is difficult for them to use the system through advanced medium such as the App Store. It make more sense if we were to use something they are accustomed to, therefore, we utilized Line instant messaging platform as one of the system's touch point. Additionally the application is popular for all ages in Thailand [47], this also guarantee that all the other personas could be reached. Users only need to add the Line chatbot as their friend in order to begin interacting with the system. They can receive notifications and task invitations in a form of chat messages. These messages could be interacted through the message prompt which is provided by the Line's application. This allows volunteers who are not accustomed to browsing the internet through web browser to use the system, which ultimately make the experience seamless.

4.5.4 Persistence Storage

From the analysis of the data model in the previous section, the data are tightly coupled and have a definite structure, therefore the database used in this system is MySQL [48], a relational database.

4.5.5 Deployment

The system is tested in a nationwide scale during the COVID-19 period, thus the scalability and availability of the system is an important criteria. All the modules are containerized with Docker [49]. This allows the whole system to be run anywhere despite the external environment with a minimum configuration, thus increasing the portability of the system. NginX [50]. A reverse proxy is utilized as a mean of relaying the client's HTTP request to the correct service.

4.6 Marketing

A marketing campaign was devised in order to draw in volunteers who wanted to test the system or donate face shields.

4.6.1 Official Facebook Page

In terms of public relation (PR), a Facebook page named "Med-Asa" has been created in order to advertise and reports how the project is doing (Figure 4.15). The page contains basic information about what is Med-Asa, and how to register for the project. Additionally, the page also post status that are related to the performance of the project such as when a specific mile stone has been reached. The page was also promoted and shared to many other public group such as Thailand Red Cross and Thai volunteering communities.

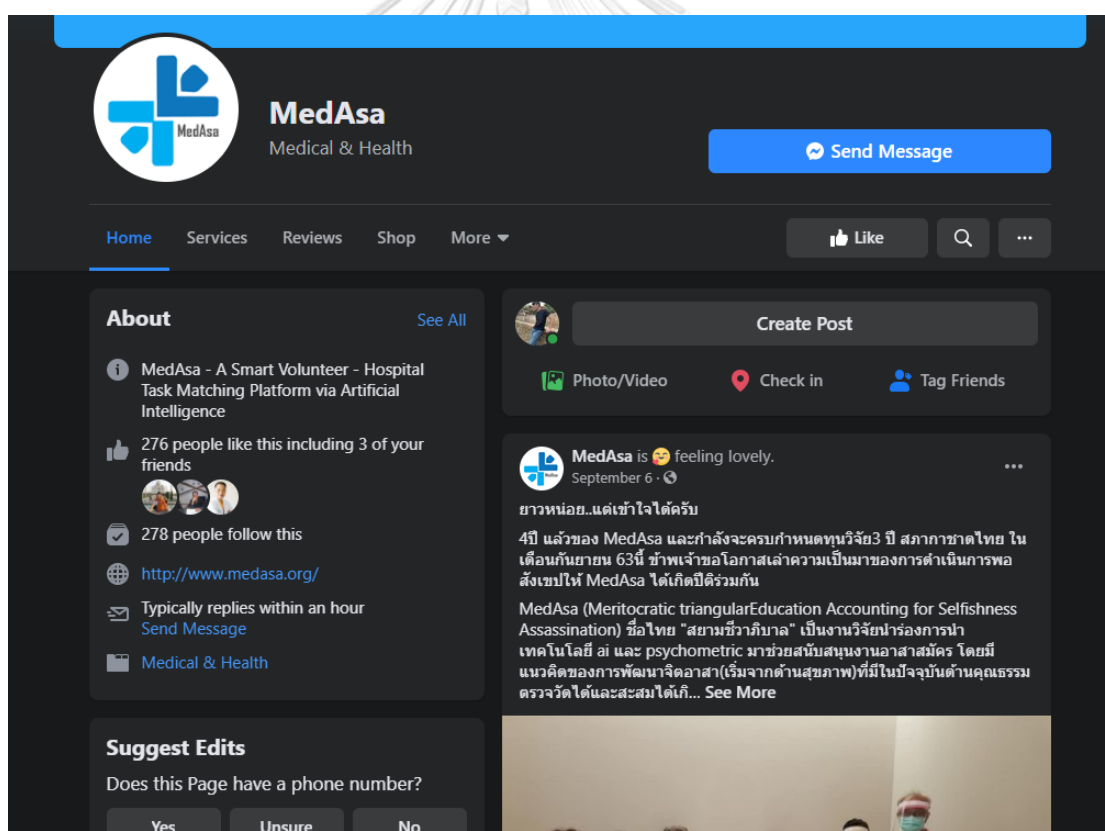


Figure 4.15: The Facebook Page of the proposed system under the named of Med-Asa

Two Line chat bot has also been created for both medical personnel and volunteer to use. The QR for the line chat bot is embedded within the Front-End module, along with the instruction for how to registered as a volunteer.

4.6.2 Influencer

The thesis had help from a well known influencer/doctor/singer to help create and promote the project through video contents. The content contains information about the thesis as well as tutorials on how to create a proper face shield.



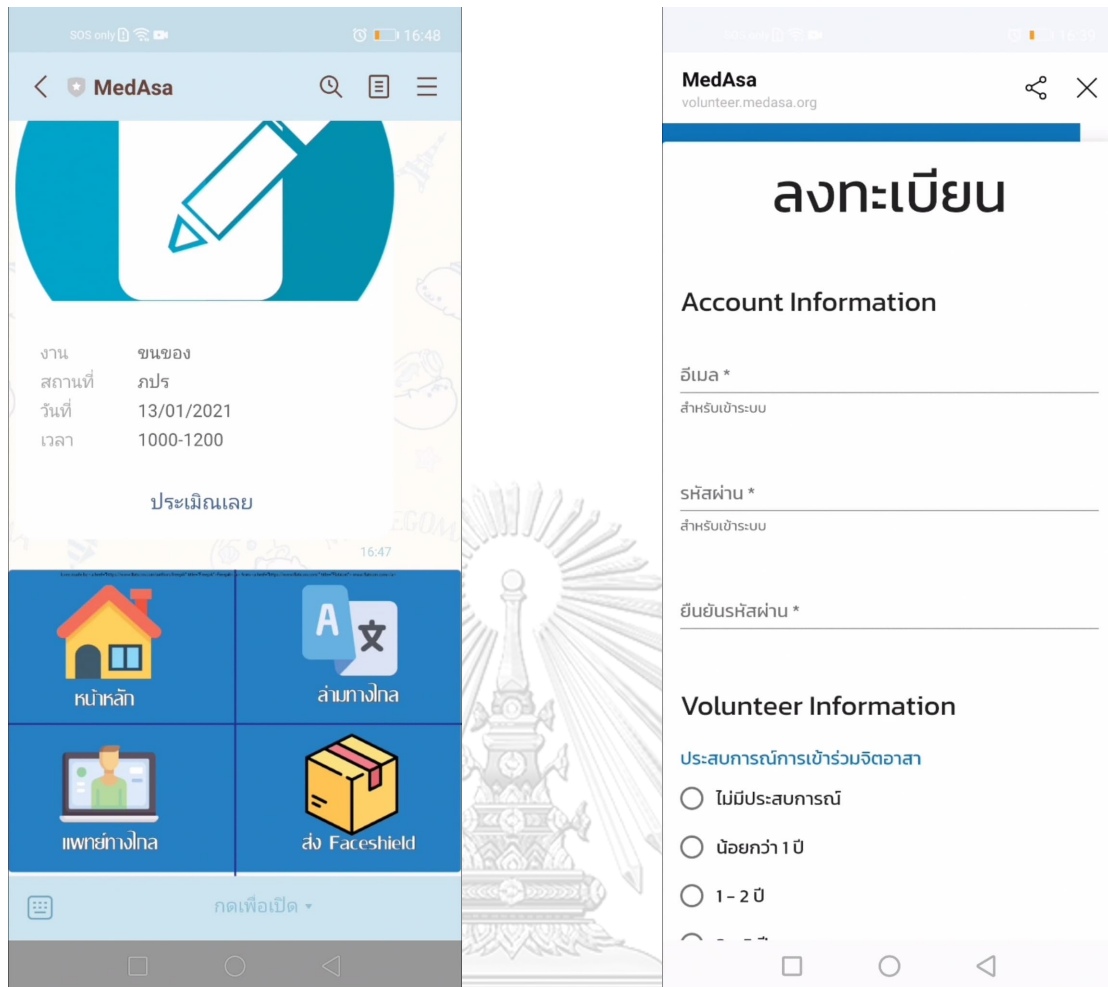
Chapter V

RESULTS

This section review the result that was gathered during the COVID-19 pandemic. Unfortunately, many on-site tasks have had to be canceled from hospitals due to its safety regulations. However, the remote tasks and face shield donation tasks are still necessary and plausible for operations. The system was deployed and tested for 2 months with a public organization as a face shields quality control and distribution hub. During the testing period, the research team is physically within range of the users in order to observe any difficulty in using the system, as well as providing technical support.

5.1 Sample User Interface

User interface was designed according to the Google Material design system. Through multiple iterations of the user interface design, a finalized version of the UI is implemented. Figure 5.1 displayed pages that are prospect volunteers must go through in order to register within the system. Figure 5.2 displayed the volunteer profile generation process. These process are still group within the recruitment phase for the On-Site task. Figure 5.3 outlined the Matching phase to the Execution phase, and Figure 5.4 outlined the Reflection phase, which marks the end of an On-Site process.



(a) Line Rich Menu for volunteer

(b) Registration page for volunteer

Figure 5.1: Volunteer registration pages

Volunteer MedAsa
volunteer.medasa.org

สอบตามวิธีใช้งาน

ประสพการณ์ของคุณ 1

1. เมื่อฉันเจ็บป่วย ฉันจะทำอย่างไร

- หามอยู่ที่สถานอนามัย
- ซื้อยาทานเอง จากร้านขายยา
- หามอดาน คลินิกแถวบ้าน
- หามอยู่ในโรงพยาบาลรัฐ
- หามอยู่ในโรงพยาบาลเอกชน

2. ฉันมีคนรู้จัก (เช่น คนทั่วไปที่ไม่สนิทกันมาก) หรือคนใกล้ชิด (เช่น คนในครอบครัว หรือเพื่อนสนิท ฯลฯ) ทำงานอยู่ในโรงพยาบาลรัฐ

- ไม่มีเลย
- ฉันมีคนรู้จัก บางคน ทำงานใน โรงพยาบาลรัฐ
- ฉันมีคนใกล้ชิด บางคน ทำงานใน โรงพยาบาลรัฐ
- ฉันมีคนรู้จัก หลายคน ทำงานใน โรงพยาบาลรัฐ
- ฉันมีคนใกล้ชิด หลายคน ทำงานใน โรงพยาบาลรัฐ

3. ตั้งแต่จำความได้ ฉันเคยร่วมกิจกรรมต่าง ๆ กับโรงพยาบาลรัฐ (เช่น วิ่งการกุศล บริจาคเงิน หรือบริจาคโลหิต ฯลฯ)

- ไม่เคยเลย
- 1-3 ครั้ง
- 4-6 ครั้ง
- 7-9 ครั้ง
- 10 ครั้ง หรือมากกว่า

Volunteer MedAsa
volunteer.medasa.org

สอบตามวิธีใช้งาน

แบบสอบถามระบบ Med-Asa

ประสพการณ์ของคุณ 1
 ประสพการณ์ของคุณ 2
 ประสพการณ์ของคุณ 3
 ประสพการณ์ของคุณ 4

ประสพการณ์ของคุณ 4
บันทึกข้อมูลเรียบร้อยแล้ว

ประสพการณ์ที่เกี่ยวข้องกับโรงพยาบาล

5 ไม่พึงประสงค์ต่าง ๆ ในการทำงานจิตอาสา
 6 การให้บริการ
 7 ให้ความสำคัญ
 8 ให้ความสำคัญ
 9 ให้ความสำคัญ
 10 ให้ความสำคัญ

11 ความพึงพอใจในการทำงาน
 12 การควบคุมตัวเอง

SUBMIT

(a) The custom made psychometric questionnaire

(b) The result from the psychometric questionnaire

Figure 5.2: Volunteer profile generation process pages

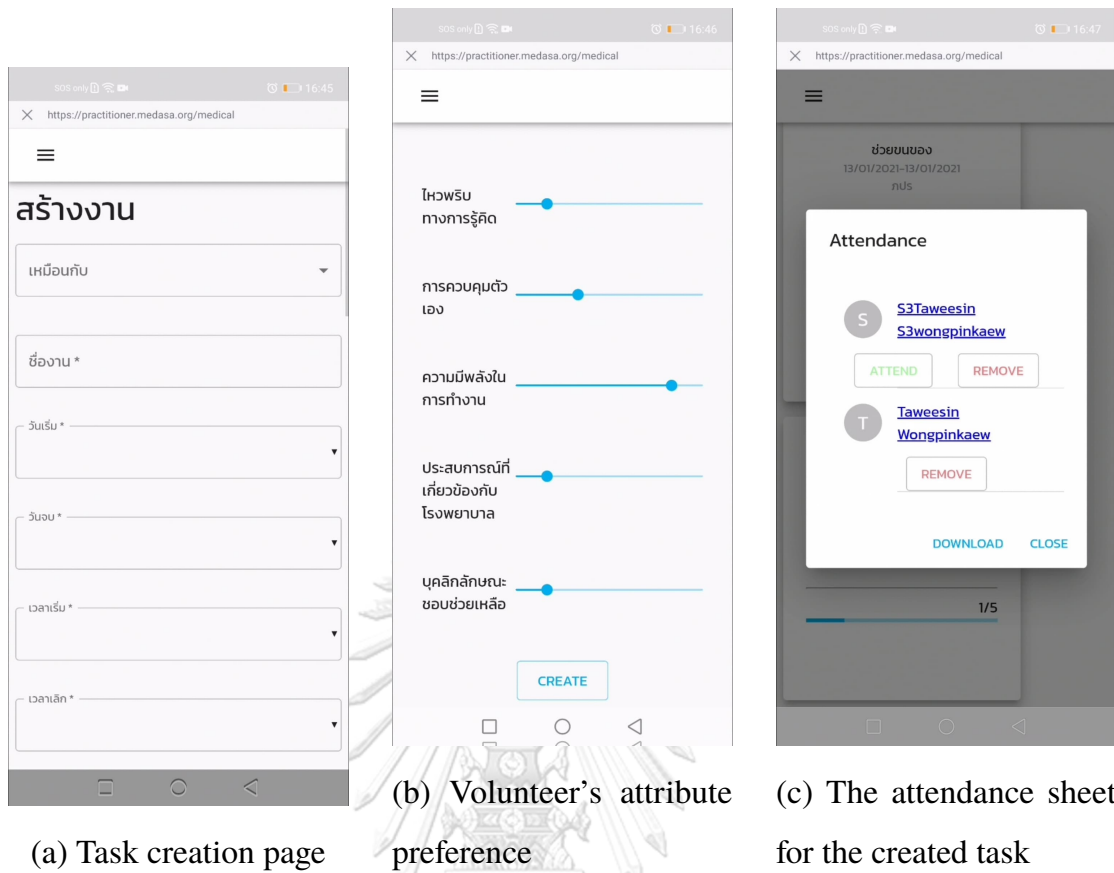
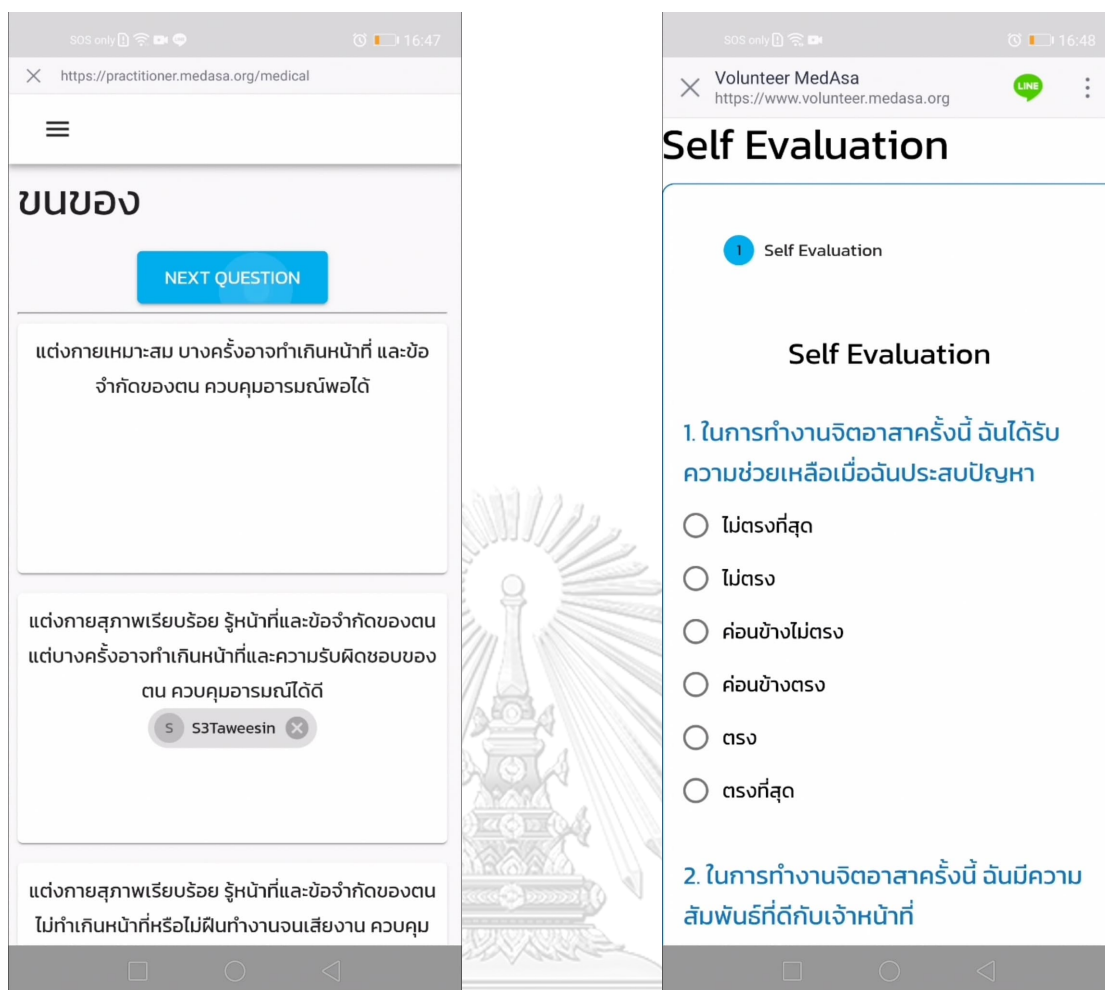


Figure 5.3: Task creation pages

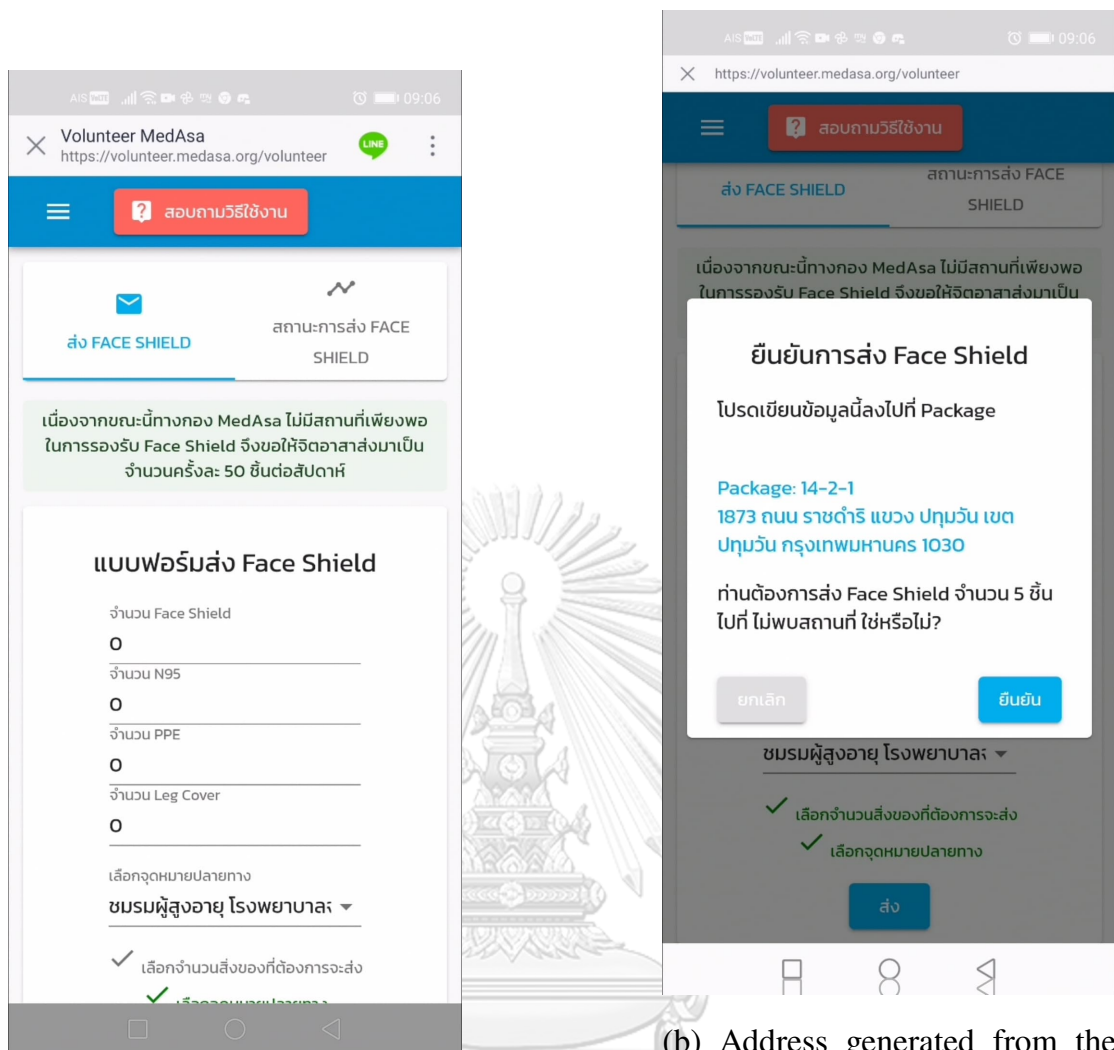


(a) Volunteer evaluation

(b) Volunteer satisfaction

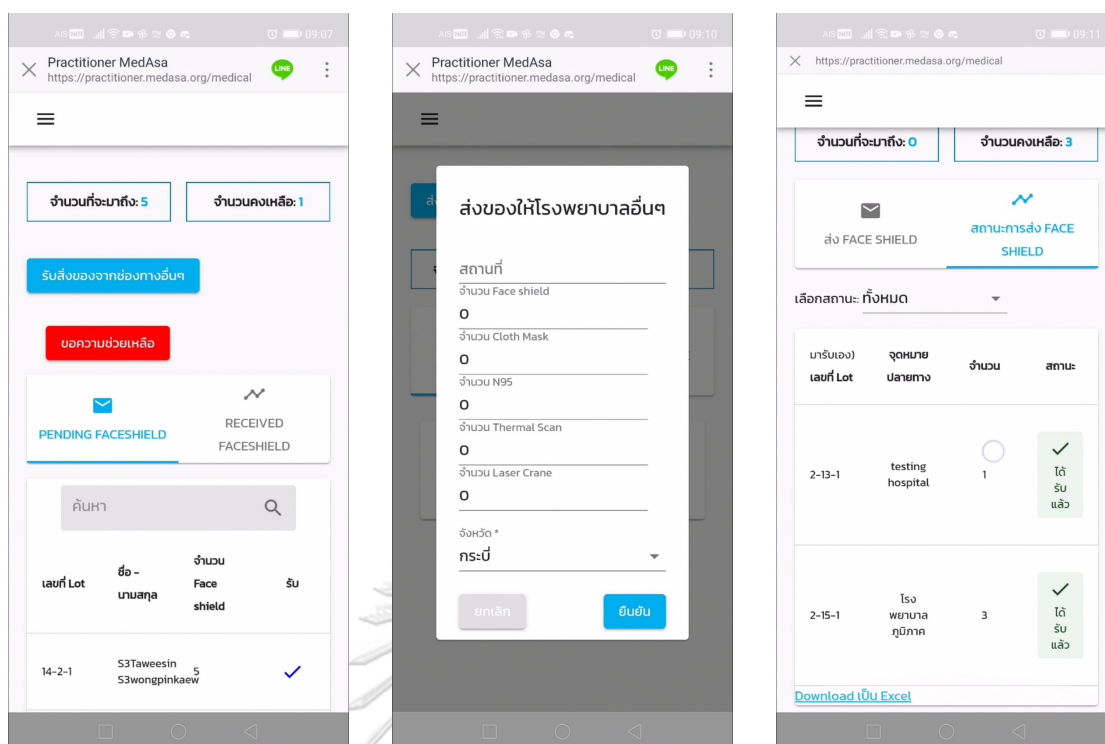
Figure 5.4: Feedback pages for both volunteer and medical personnel

For the item donation process, figure 5.5 displayed the pages for volunteer to complete the Engagement phase. Figure 5.6 displayed the rest of the phases.



(a) Volunteer item donation page system (b) Address generated from the system

Figure 5.5: Item donation pages



(a) Arriving item donation menu (b) Face shield redistribution page (c) Redistribution history page

Figure 5.6: Donated item management page

5.2 Comparison With Other Volunteer Management Systems

A features comparison between the system and others open-source volunteer management platforms in the market (Table 5.1)

The system is more tailor made for tasks within hospitals due to its high risk and organized nature. Thus communication, matching, psychometric and warehouse features are necessary for this domain. Most volunteer management system lacks these features out of the box.

Table 5.1: Features comparison with other platforms the asterisk indicates tailored features

	IVolunteer	Volunteer Mark	InitLive	SpONSOR	Proposed System
Recruitment	✓	✓	✓	✓	✓
Task Creation	✓	✓	✓	✓	✓
Feedback			✓		✓
Psychometric*					✓
Matching*		✓	✓	✓	✓
Communication*		✓	✓		✓
Warehouse*					✓
Remote Task					✓

5.3 User Demographic

The distribution of the volunteers within the system is displayed in figure 5.7. Most users are what the team imagine the persona. The majority of system users are female over the age of 50, which is the user group who will potentially have the most trouble using the system [51].

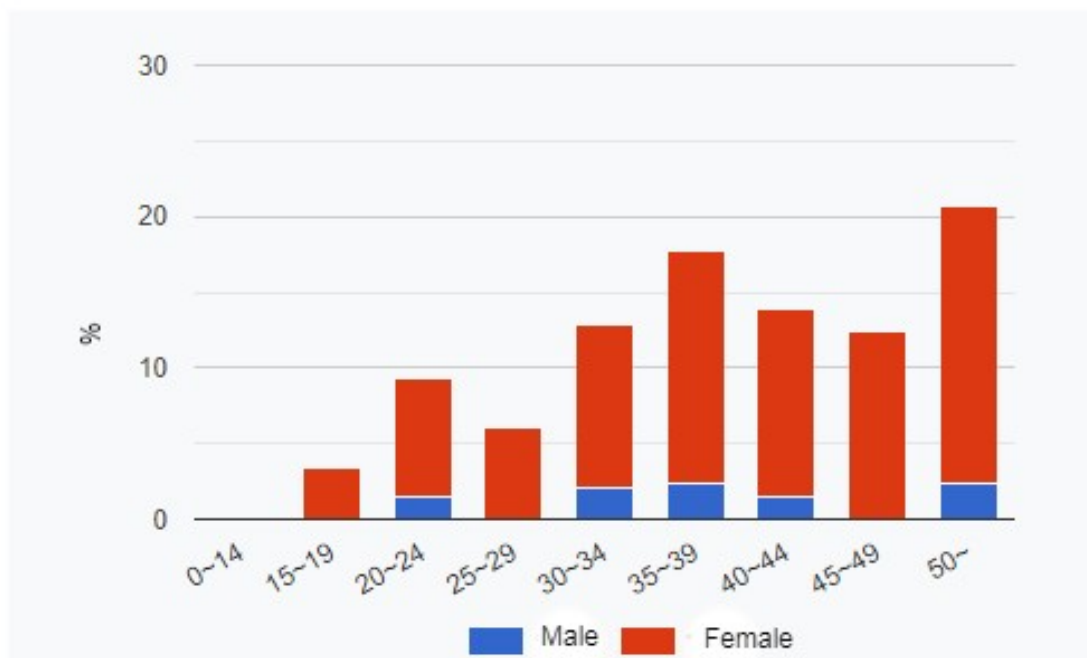


Figure 5.7: The age and gender distribution of the volunteer who registered to the platform

5.4 Sample Matching

During the testing period, the weights in equation 4.1 are 0.33 for all the weight relating to matching and 1 for the penalty. The matching samples for a QC Face-shield task displayed in table 5.2 are displayed in table 5.3.

Table 5.2: QC Face-shield task requirements

Requirement	Value
Service Orientation(Att 3)	3
Intellectual Acumen (Att 5)	4
Self Control (Att 6)	2
Enthusiasm (Att 7)	3
Hospital Experience and Attitudes (Att 9)	1
Caring and Supportive Nature (Att 10)	5
Age Range	15-50
Location	Bangkok

Table 5.3: Sample volunteers which is matched by the algorithm for QC Face-shield task

Att 3	Att 5	Att 6	Att 7	Att 9	Att 10	Cos	Past Satis- faction	Past Perfor- mance	Score
3.86	3.46	3.17	3.75	2.6	4.09	0.96	1	1	0.98
4.14	2.54	3.25	2.75	2.2	3.04	0.95	1	1	0.97
2.57	2.92	3.08	3.5	1.6	2.73	0.93	1	1	0.97
3.86	3.77	3.08	3.25	3.8	4.09	0.93	1	1	0.97
4.14	3.46	3.58	3.5	2.6	4.09	0.93	1	1	0.96
3.43	2.92	3.33	2.50	2.80	3.36	0.92	1	1	0.97
4.43	3.09	3.00	3.50	3.8	3.90	0.92	1	1	0.97
4.0	3.92	3.33	4.75	3.2	4.27	0.96	1	0.85	0.924

The system tend to over-estimated volunteers who never have done the volunteer task. However, when they are evaluated by medical personnel, their score will be adjusted. Notice that the Past Performance attribute caused the last volunteer to be scored lower than his/her peers.

5.4.1 Predicted Weighted Item Coverage and Average Utility Per Set

The item coverage and average utility per set of the proposed system for QC Face-shield task is calculated and determined through 30 trials is displayed in table 5.4, 5.5, and 5.6 . The All-Star algorithm is to mimic the current process. Volunteer who are most suitable for the task was picked. In this research, predicted weighted item coverage is used as a metric to measure item coverage, because it take into the account the utility of the item into account to provide a more insightful metric.

Table 5.4: Weighted Item Coverage and Average Utility Per Set for 3 different algorithm when searching for 4 candidates

Algorithm	Weighted Item Coverage@10	Average Utility Per Set@4
Proposed System	0.905	0.952
All Star	0.062	0.976
Random	0.686	0.923

Table 5.5: Weighted Item Coverage and Average Utility Per Set for 3 different algorithm when searching for 6 candidates

Algorithm	Weighted Item Coverage@10	Average Utility Per Set@6
Proposed System	0.917	0.952
All Star	0.09	0.976
Random	0.954	0.938

Table 5.6: Weighted Item Coverage and Average Utility Per Set for 3 different algorithm when searching for 10 candidates

Algorithm	Weighted Item Coverage@10	Average Utility Per Set@10
Proposed System	0.950	0.960
All Star	0.153	0.973
Random	1	0.936

The All Star algorithm produce more average utility per set, but it comes with a cost of inferior weighted item coverage. This happen because, the same volunteers are always being picked for the task, even though there are other volunteers with high utility. Therefore

the system is heavily penalized by the missed utility of the missed volunteers. The random algorithm yield better item coverage as the number of candidate increases, but it is still inferior to the proposed system in terms of utility per set.

5.5 Impact on COVID-19

The research team see COVID-19 as a chance to test the system in a real environment rather than a research setting with a recruited volunteer. The system directly facilitates the pipeline of face shield distribution to an area that is in need of medical attention, especially the southern part of Thailand.

5.5.1 Face Shield Distribution

The face shield distribution of the hub has distributed 98,112 face shields to 35 out of 77 provinces across Thailand. This is considered to be more than most public organization face shield donations to other hospitals in Thailand.

5.6 Performance Speed-Up

The time it takes for volunteers to go through the volunteer recruitment journey is measured and compared with the system in table 5.7. The overall speed up is calculated from equation 5.1 using the system 381.7x. The statistics from human performance are based on an in-depth interview with 2 employees from a Human Resources department in a public volunteer management organization. In this measurements there are 936 registered volunteers who completed the psychometric questionnaire in the database.

$$S_{SpeedUp} = \frac{T_{Human}}{T_{System}} \quad (5.1)$$

Table 5.7: Comparison between the time it takes for a human and system to accomplish common tasks

	Human (minute)	System (minute)
Registration	5	25.44
Candidate Matching	10080	0.03
Send Notifications	30	0.02
Feedback	60	1.09
Total	10146	26.58

5.7 Volunteer Usability Test

5.7.1 System Usability Scale

In order to prove that the newly created process will not hinder or intimidate potential volunteers, the System Usability Scale(SUS) was broadcasted via the Line chat bot as well as social media. Approximately 900 participants were invited from both social media and chat bots, 70 people who have used the system responded back. The descriptive statistic of each question is displayed in table 5.8, and its histogram is displayed in figure 5.8 to figure 5.17.

Table 5.8: Descriptive statistic for each of the question used in the SUS

Question	Average	Variance	Standard Deviation
1	3.64	1.76	1.33
2	2.38	1.65	1.28
3	3.71	1.65	1.28
4	2.16	1.78	1.34
5	3.46	1.43	1.20
6	2.06	1.06	1.03
7	3.55	1.40	1.18
8	2.01	1.49	1.22
9	3.59	1.39	1.18
10	2.09	1.52	1.23

Q1. I think I would like to use this system frequently

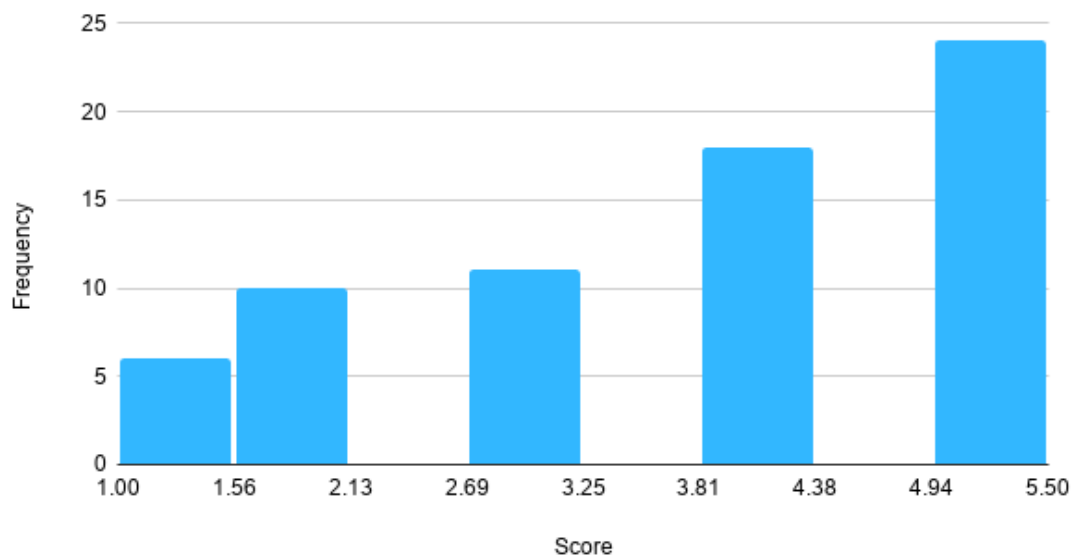


Figure 5.8: Histogram for item number 1 in the SUS

Q2. I found the system unnecessarily complex.

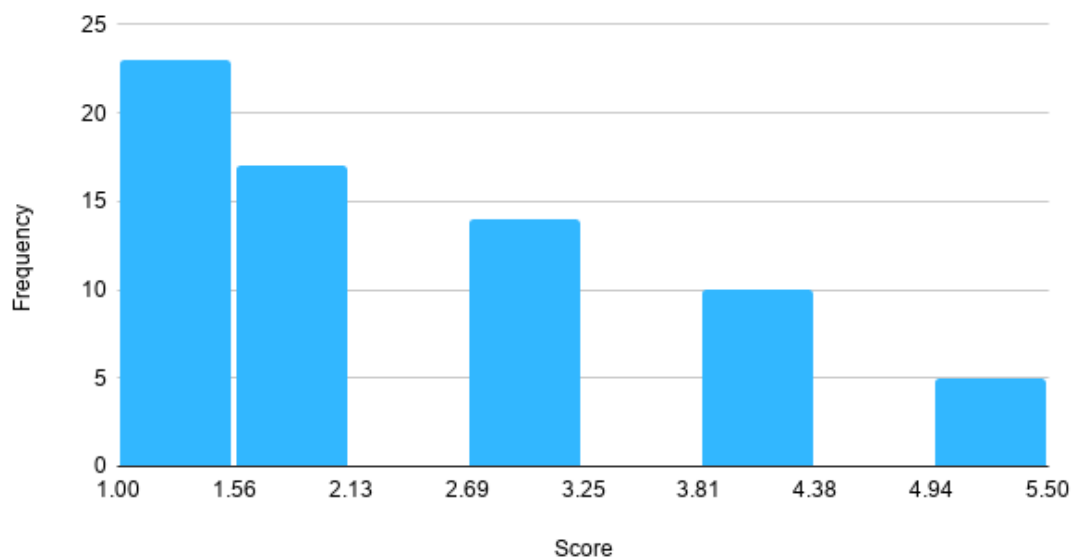


Figure 5.9: Histogram for item number 2 in the SUS

Q3. I thought the system was easy to use

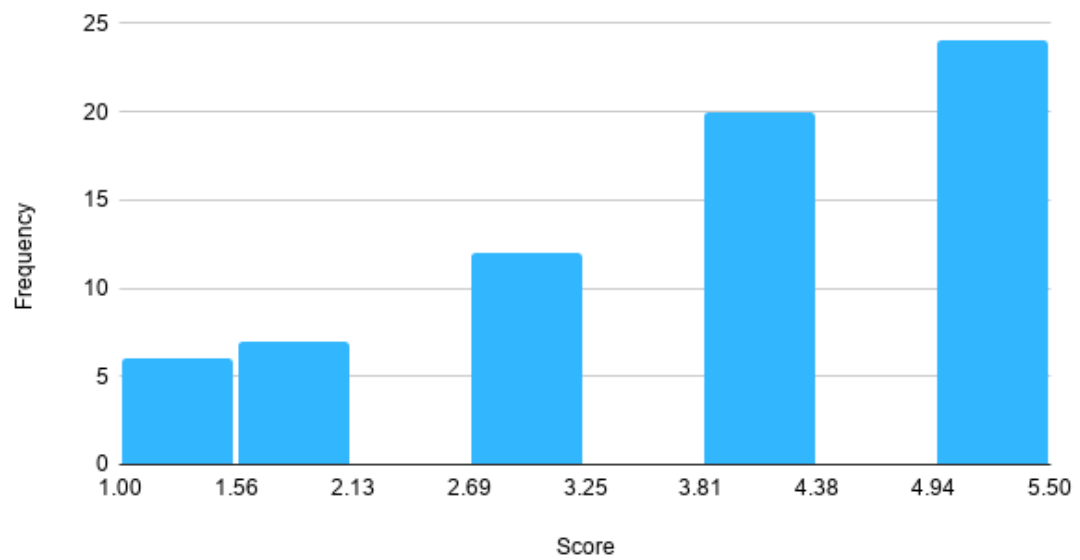


Figure 5.10: Histogram for item number 3 in the SUS

Q4. I think that I would need the support of a technical person to be able to use this system

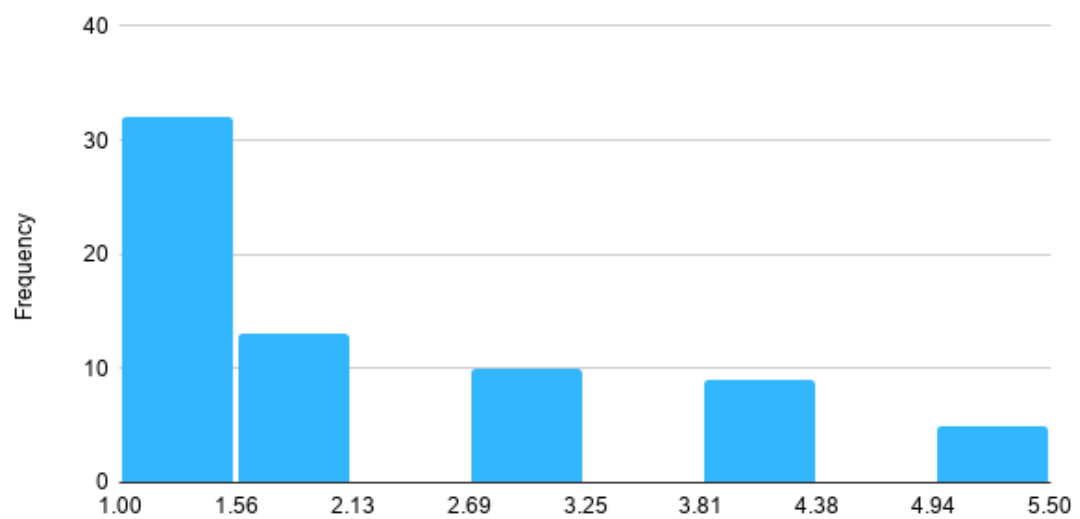


Figure 5.11: Histogram for item number 4 in the SUS

Q5. I found the various function in this system were well integrated

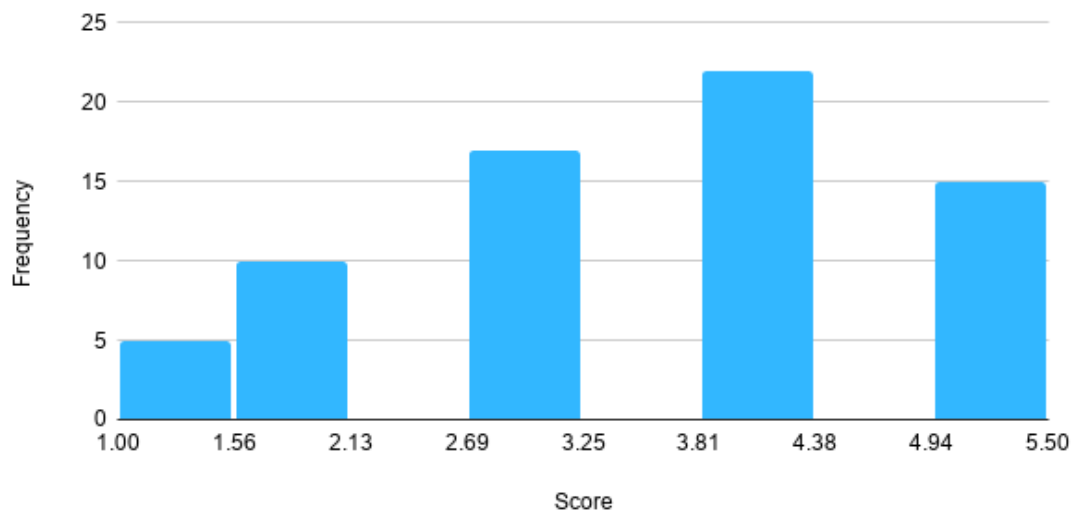


Figure 5.12: Histogram for item number 5 in the SUS

Q6. I thought there was too much inconsistency in this system

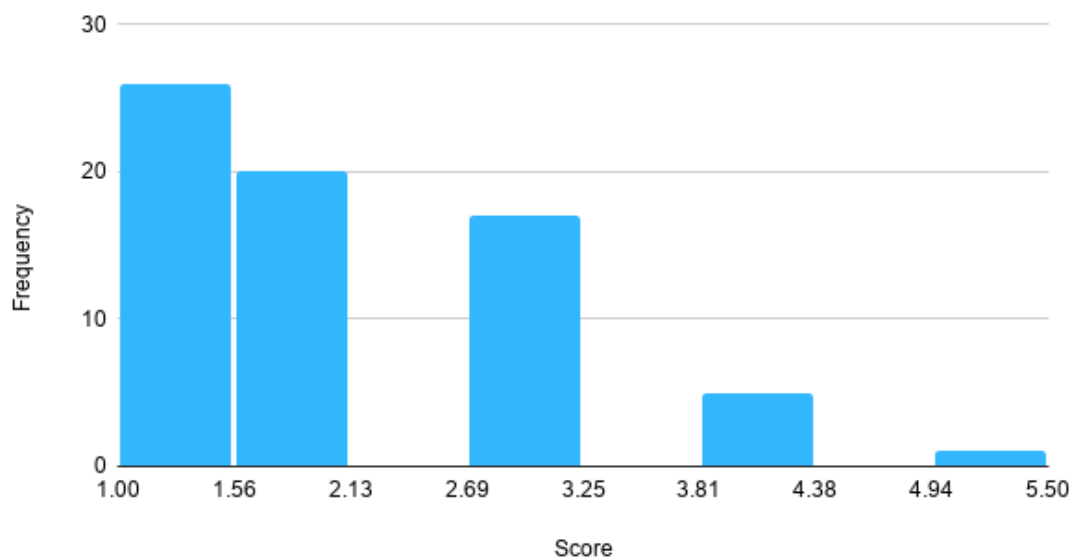


Figure 5.13: Histogram for item number 6 in the SUS

Q7. I would image that most people would learn to use this system very quickly

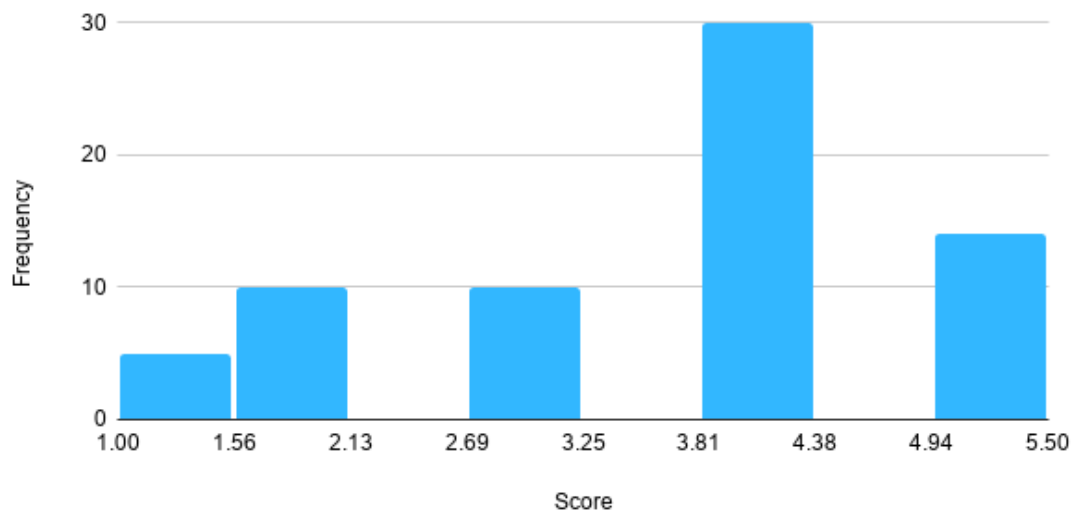


Figure 5.14: Histogram for item number 7 in the SUS

Q8. I found the system very cumbersome to use

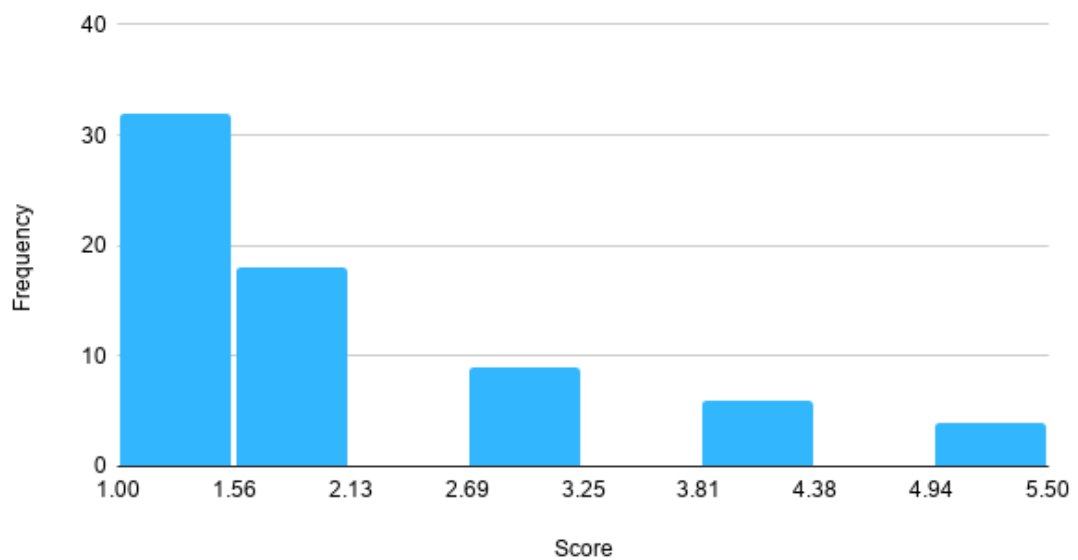


Figure 5.15: Histogram for item number 8 in the SUS

Q9. I felt very confident using the system

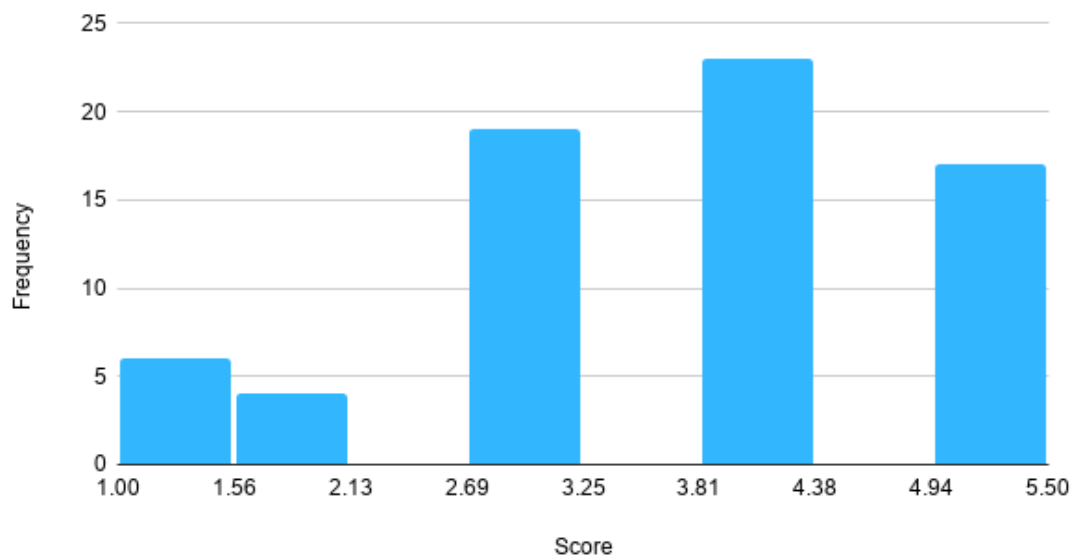


Figure 5.16: Histogram for item number 9 in the SUS

Q10. I needed to learn a lot of things before I could get going with this system.

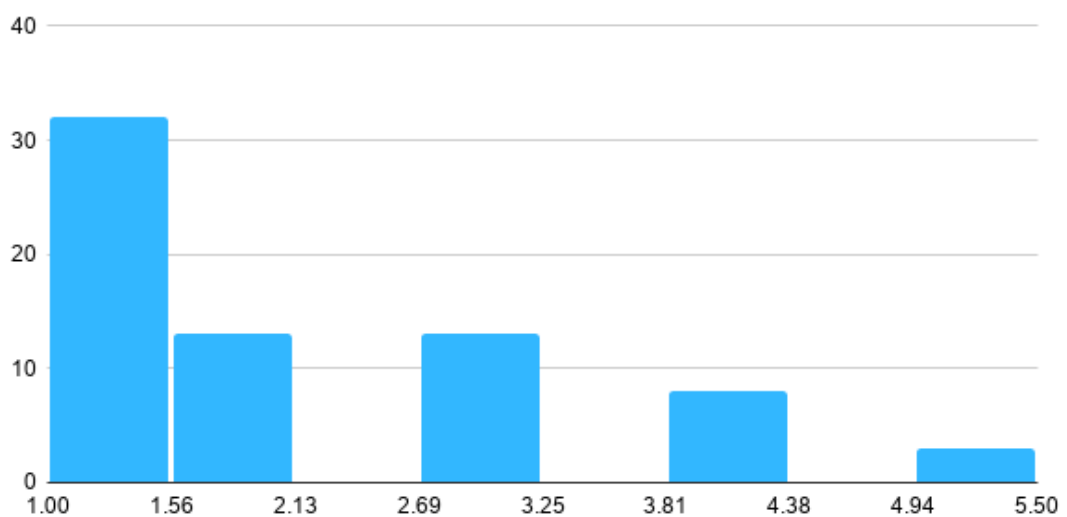


Figure 5.17: Histogram for item number 10 in the SUS

Through calculation of the overall response, the system achieved a 68.151 in the SUS

score. This system is still within the range of an industrial grade standards [52]. Thus the increase in complexity may not hinder volunteers from using the system.

5.7.2 In-Depth Interview

In order to further understand the usability of the system in volunteer's perspective, an in-depth interview was conducted with a volunteer who used the system before. In this research, 2 volunteers are randomly picked based on their answers in the SUS. This research had pick Ms.M (pseudonym) and Mrs.A (pseudonym). Ms.M is a 29 years old office worker, who gives a score of 47.5 in the SUS, and Mrs. A is a 54 years old retired woman. She scored 92.5 in the SUS.

1. Tell me about your previous volunteering experience?

Both Ms.M and Mrs. A would not rated themselves as an experienced volunteers. "I would not say that I am an active volunteer, but during my years as a university student, I've participate in a volunteer camp..." said Ms.M. Mrs. A recalled doing volunteering when she was in her younger years, but she does not recall the experience. However, both of them are known to recently participate in charity events.

2. What do you dislike most about volunteering?

Ms. M stated that she disliked the registration part of the volunteering the most. "... Normally, when you sign up for an volunteering event, the process is very tedious...I have to wait really long in order to volunteer for an event, and the interviewing process is very flow... I remembered waiting till 19:00PM after class just to get an interview for a volunteering camp, which I will not know if I'll get it or not. " Mrs. A, does not recall having a direct negative experience, "I do not recall having any negative experiences..." However, she does state a pain point which she faces. "Sometimes, it is really hard to gather all the information about a charity... Most of the information are scattered through out the internet... I sometimes also have doubt whether or not the item reaches the party and did they actually use my donated items to the right purposes" said Mrs. A.

3. What do you think about the system's registration process?

"The registration process is very long, but it is understandable" said Ms. M. Her opinion about the registration process length remain positive. "The process is similar to those personality quiz that I used to do... Thus I am used to doing something like this..." However, she also stated that the on boarding experience should be improved. "...It was really hard to figure out anything at first... There were a lot of menu to go through and the guide was limited.... I have to use my intuition to guide me and where to go next after the initial registration process..." Fortunately in the end Ms.M still think it's better than what she went through during her past experience as stated by her, "... at least I do not have to wait until 19:00 PM for something that I don't know if I'll get in or not..." Mrs. A have similar experiences on the registration process. "It was very confusing at first, there was a lot going on... However, the websites gives a very direct way of asking for support... The support was really helpful in helping me to complete the task" said Mrs. A. Regarding, the psychometric questionnaire she also agree with Ms.M that the process was tedious, but when she reached the end she was happy with the result.

4. What is your impression of the system?

Ms. M was very critical about the system. "...I like the idea of the system... It would solves a lot of problems in the volunteering domain... However, I feel that the design and how the dashboard displayed information to the user is not organized or well thought of compared to other commercial software...In the end, I think it just need a bit of refinement." In the other hand, Mrs. A was impressed with the system. "...When I first saw the system, I thought that it was really unique... We have really advanced... It would be nice if the system were to be implemented a full-scale to see its full potential.... In the end, it was a honest and direct approach to improves the volunteering system."

5. What part of the system do you dislike the most?

Ms. M and Mrs. A, both agree that the user interface and how the information are displayed to the user could be improved. "...The functionality is already good, but it seem like the system just push all of these to you... I first felt a bit overwhelm, before I get used to it... There are many options that I don't really use within the system..." said Ms. M. Mrs. A stated "...Apart of adding the Line bot, I was not sure of what to do next... This could be just me though... However, after getting an explanation from the support, everything becomes

clear... The dashboard was a bit messy for my taste though..."

6. What part of the system do you like the most?

Ms. M stated that she like the idea of the system the most. "... I think it is a noble cause... I can imagine people using it in the future... Although, I can achieve what I wanted to do on the system... I just feel that it is incomplete..." Ms. M can not pin point the reason why she felt that way, when asked for further details. In the other hand, Mrs. A likes the item donation charity the most. "...I like how there is a Line channel bot that tell you when your item arrives... I thought that this process was well thought of... I had no problem using it and could imagine myself using the same system for other type of donations... I thought that integrating Line was really creative cause it is something that I always use..."

To summarize, both of the volunteer gives a positive comment about the platform's idea and its value proposition. Unfortunately, these volunteer does not have a long-term experience with volunteering. Ms.M is the only one that could recalled on her previous volunteering experiences, which are unrelated to volunteering in a hospital. Overall, Ms M was more critical of the system than Mrs A. However, most of the issue that they raised when asked about the difficulty of the system are similar to each other. The amount of information that the user need to grasp at first sight is too over-whelming. Luckily, Mrs. A decided to call for help via the hot line button, which may have increased her user experience.

5.8 Solution Effectiveness

Since, there are no reliable tools which can measure how well the solution fitted to the problem at hand, an in-depth interview with relevant stakeholder was used. We choose a contextual in-depth interview with the facility's manager, since she is the one who is solely responsible to whether or not she will use the system. During the interview, we wanted to know the following 5 information in order to gauge our solution-to-problem fit.

1. What were the process like before this system?

In terms of the project's scale, the manager stated that "Before having this system, the faculty did not accept any face-shield donations from external sources. It manufactures face-shields by volunteered faculty members and only distributes locally."

Most of the process within the facility was done manually and unsystematically, claimed the manager. The registration process is an open process, as stated by the manager "Normally, anyone can walk in and register and chances are we have to accept all of them". bookkeeping is not a strict procedure as the manager said that "Everything is done manually, when we go buy materials and when we send out the face shield, I would record it in my book"

2. What were the challenges you faced before using this system?

The problem arises from the manual unsystematic registration system, and the manual bookkeeping system. "...Sometimes we have to accept every member that applied, and the problem arises that we do not really know what to do with them... Some people can't really do anything much... The process is then slowed down", said the manager when asked to comment about the registration process before. For the bookkeeping process, she stated that "There are times when I forgot to record the data. Sometimes people just come up and asked for the face-shield, and I said to myself that I will record it in later... Sometimes I forgot about it."

3. What area did this system help during the process?

The manager was impressed with the change in the bookkeeping process, the registration process, and the increased in production scale. The manager stated that "Thanks to the new registration and the task matching process, this allowed us to filter volunteers we can do everything more efficiently...". Furthermore, the IT system introduced a systematic method in dealing with the bookkeeping process as quoted by the manager, "...The system make it easier to audit information, we know how much we are receiving and sending now". The project's scale also increased with the help of an IT infrastructure, since it is more accessible and provide more reach. Ultimately the manager believes that without the help of the system, they would not make such an impact as quoted by the manager "...with us alone, we could only get so far... ."

4. How much do you trust the volunteer chosen by this system?

The manager stated that she has no problem with the volunteer chosen by the system, when asked to comment about the volunteers which helped quality control the face shield.

Human factors and the context of the situation may have played a part in this, she stated that "When you do something good, it will always be returned to you".

5. Do you think you'll use this system in a long run?

The manager is positive about wanting to use the system in a long run, as stated by the manager, "I want the system to stay with us... There is always will be a natural disaster and poverty in Thailand... The facility is not poor, but we need a way to be able to reach those in needs..."



Chapter VI

DISCUSSION

In this chapter the result from the experiment is explored.

6.1 Solution Effectiveness

In this thesis, we have solved the problems that were listed in the problem statement.

1. **Lack of Scalability:** By using an online psychometric questionnaire with the proper database, the process can handle variety of workloads. The system can handle 200 users at the same time with 2 CPU core and 4 GB of RAM. Volunteers are no longer limited to hospital opening hours, and could also do the whole registration process from home.
2. **Inconsistency in Standards:** The online psychometric questionnaire provide a standard for the recruitment process. The score is bounded from 0-1, which make it easy for a direct comparison between volunteers. Hospitals are not affected by brain-drain or becoming overly dependent on one expert.
3. **Unable to Audit:** Data related to volunteering activities are kept in an organized fashion and could be search and analyze in a timely manner.
4. **Scattered Information:** We have unified the item donation process and on-site task process. Everything regarding to volunteer's information is now under one system.

According to an in-depth interview from the deployment during COVID-19 breakout, the system is proving to be effective and is accepted by the medical personnel as a tool they would use on a regular basis. From table 5.1 the system has more features packed and is tailor made for a health-care context where there are higher regulations and less trust between volunteers and medical personnel. Results from table 5.7 show that the system speeds up the volunteer recruitment and management process by 337.8x. However, the system should not be viewed as total replacement for the human interview, but as a decision support system.

The system can scope from hundreds of volunteers that may need to be interview into a management amount.

In terms of the volunteer's perspective, the system does solves some of the existing pain point, such as the scalability and the auditability of the system as stated from the volunteer "..... at least I do not have to wait until 19:00 PM for something that I don't know if I'll get in or not." and "...I like how there is a Line channel bot that tell you when your item arrives..."

6.2 Volunteer User Experience

6.2.1 Trade-Off Between Data Collection and User Experience

Although the volunteer registration process time has been increased by 500%, the SUS shows that the usability of the system is still within an acceptable range. However, from observations during the testing, many users felt that the questionnaire of 64 questions for evaluating their volunteer profile was too long. Unfortunately for research purposes the questionnaire could not be reduced as requested. This combined with the amount of security that is needed to perform tasks in a health care context makes the registration form overwhelming for some volunteers who only wish to donate face shields. However, despite the criticism from the lengthy registration process, volunteers still managed to complete the process. This proves the process is acceptable to an extent.

6.2.2 Other Possible Challenges

From the descriptive statistic of the SUS displayed in table 5.8, all of the odd number questions average score does not reach the score of 4. These questions are mainly concern of with the user's perception of the system's functionality. This may suggests that there are mixed feeling within the volunteering group. However, its histogram shows that majority of the volunteers are still in favored of the system, since the distribution is skewed to the left. Although, Q5. "I found the various function in this system were well integrated" (figure 5.12) , Q7. "I would imagine that most people would learn to use this system very quickly"

(figure 5.14) , and Q9. "I felt very confident using the system" (figure 5.16) proves to have an interesting distribution, since the majority of volunteers score a 4 rather than a 5 in these questions. This suggests, that the user interface of the proposed system may be unorganized and over-whelming for new users. The same conclusion could be concluded from in-depth interview with the volunteers. There could be a correlation, between this problem and the over-all impression of the system. However, how the user think its affect them is subjective, which explains the differences in the SUS score, but both volunteers outlined the same problem.

A new dashboard and a proper on-boarding experience when using the system for the first time may have to be introduced. Fortunately, in the end these volunteers agree, that it is not difficult to use, since Q4 "I think that I would need the support of a technical person to be able to use this system" (figure 5.11), and Q3 "I thought the system was easy to use" (figure 5.10) is heavily skewed in favor of the system.

6.3 Human-Factor and Technology Adoption

It can be argue that part of success of the project lies in the human connection and social cohesiveness between all the stakeholders. Through the service design process, our team creates shared understanding between all the stakeholders, and promoting a feeling of ownership for everyone. Medical personnel does not feel that they are being forced to use a technology, but they are invited to make an impact together. The feeling of ownership make it easier for us, to pin point the needed requirements, as well as making the technology adoption easier. Stakeholders would know the important of why the technology is needed, what roles do they play within the process, and how the technology work, thus making them more likely to use the system.

However the disadvantage for taking the service design method is the amount of time it takes to go through all the phases. It is very difficult to conduct an interview or hold a workshop where all the stakeholders are present. This may be unattractive to some project managers.

Although the on-site volunteering task management and the item donation was a success, the remote translator was not. Many volunteers sign up for the remote task, but none

of the medical personnel used it, even though they were the one who requested it during a meeting. The main reason on the failure is that they have to use their own numbers when dialing the volunteers. This increased their phone bill and make the features unattractive. Therefore it is important to consider the economic behaviour of the user in a given design as well.

6.4 Future work

The service design process is an iterative approach. This iteration is deemed as successful in terms of speeding up the performance and satisfying both the business needs and user needs.

In this iteration, the accuracy of the proposed matching model could not be effectively determined. Challenges in data collection within this research context include initial skepticism from the hospital, and the tremendous amount of co-operation needed for both volunteers and medical staff to give task feedback, since this process is not compulsory.

The 64 questions psychometric questionnaire could also be reduced given that there are significant volunteer-task interactions data. These data could be used to determine which questions in the questionnaire are ineffective hence reduce the number of questions needed in order to determine the volunteer profile.

In the next iteration, the research should focus on developing ways or policies which facilitate the data collection process. This could mean providing incentives for users to give feedback to the system. The incentive could be removed when the system has enough data. A new on-boarding experience is needed to make the system feel less over-whelmed, this could be suggests in a form of an interactive tutorial that are commonly seen in an online games.

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Appendix I

Code Snippet

Finding Volunteer For A Given Task

```
1  volunteerList = []
2      requirementObject = self.requirements.all()
3      requirementDictionary = {}
4      currentYear = int(datetime.now().year) + 543
5      maxPeople = 0
6      attributeUnitVector = 0
7
8      ## Calculate The Value for Task Requirement
9      for r in requirementObject:
10         requirementDictionary[r.attribute.id] = r.value
11         attributeUnitVector += r.value * r.value
12     attributeUnitVector = math.sqrt(attributeUnitVector)
13
14     ## Change to international standard for birth date
15     minBirthdate = currentYear - self.minAge
16     maxBirthdate = currentYear - self.maxAge
17
18     ## Hard Constraint for Task
19     volunteer = VolunteerProfile.objects.filter(
20         birthday__year__gte=maxBirthdate, birthday__year__lte=
21         minBirthdate, province=self.province).all()
22
23     ## Calculating Score For Filtered Volunteer
24     for v in volunteer:
25         att = v.attributes_set.all()
26
27         ## Finding last 5 past performance
```

```

26         past_performance = v.volunteer.taskFeedback.filter
(task__bluePrint=self.bluePrint).order_by('-id')[:5]
27         average_performance = sum([performance.response.
SingleScore() for performance in past_performance])/max(len
(past_performance), 1)
28         if average_performance == 0:
29             average_performance = 4
30
31         ## Finding last 5 past satisfaction
32         past_satisfaction = v.volunteer.selfEvaluations.
filter(task__bluePrint=self.bluePrint).order_by('-id')[:5]
33         average_satisfaction = sum([performance.response.
SingleScore() for performance in past_satisfaction])/max(
len(past_performance), 1)
34         if average_satisfaction == 0:
35             average_satisfaction = 5
36
37         ## Calculating the Cosine Similarity
38         volunteerUnitVector = 0
39         attributeDictionary = {}
40         for a in att:
41             if a.attribute.id in requirementDictionary:
42                 volunteerUnitVector += a.value * a.value
43                 attributeDictionary[a.attribute.id] = a.
value
44         volunteerUnitVector = math.sqrt (
volunteerUnitVector)
45
46         ## Calculating Penalty
47         numberOfIgnore = v.volunteer.tasks_details.filter(
status=0).count ()
48         numberOfAllTask = v.volunteer.tasks_details.count
()

```

```

49         penalty = 0
50         if numberOfAllTask is not 0:
51             penalty = numberOfIgnore/numberOfAllTask
52         dotProduct = 0
53         isEligible = True
54         for key in requirementDictionary:
55             if key in attributeDictionary:
56                 dotProduct += requirementDictionary[key] *
attributeDictionary[key]
57             else:
58                 isEligible = False
59
60         ## Check if Dot Product is zero for cases where
people did not the questionnaire
61         if dotProduct != 0:
62             weight = Decimal(0.33)
63             consine_sim = Decimal((dotProduct/(
volunteerUnitVector * attributeUnitVector))
64
65             ## Normalized all the score to keep it bounded
from 0 - 1
66             normalized_average_performance = Decimal(
average_performance/4)
67             normalized_average_satisfaction = Decimal(
average_satisfaction/5)
68             if isEligible:
69
70                 ## Combine the Score
71                 score = round(Decimal(weight*consine_sim)
+ Decimal(weight*normalized_average_performance) + Decimal(
weight*normalized_average_satisfaction) - Decimal(penalty)
,4)
72             else:

```



```
73         score = -1
74         if score >= 0:
75
76             ## Append to volunteer list for eligible
candidate
77
78             volunteerList.append(
79                 {
80                     "volunteer_id": v.volunteer.id,
81                     "score": score,
82                     "attribute": attributeDictionary,
83                     "req": requirementDictionary,
84                     "past_performance":
normalized_average_performance,
85                     "past_satisfaction":
normalized_average_satisfaction,
86                     "consine_similarity": consine_sim,
87                     "penalty": penalty
88                 }
89             )
90
91             maxPeople = self.capacity
92
93             ## Determining which sample algorithm to use
94             if(sampling_strategy is "RANDOM"):
95                 return random.sample(volunteerList, maxPeople)
96             elif(sampling_strategy is "ALLSTAR"):
97                 return sorted(volunteerList, key=lambda volunteer:
volunteer["score"], reverse=True)[:maxPeople]
98             else:
99                 return self.Sampling(sorted(volunteerList, key=
lambda volunteer: volunteer["score"], reverse=True),
maxPeople)
```

Candidate Sampling

```

1 def Sampling(self, volunteerArray, maxPeople):
2
3     ## First Tier Ranked by Score (Top Level)
4     one_third = math.ceil(len(volunteerArray)/3)
5     first_tier = random.sample(volunteerArray[:one_third],
6     math.ceil(maxPeople * 0.6))
7
8     ## Second Tier Ranked by Score (Middle Level)
9     second_tier = random.sample(volunteerArray[one_third:
10    2*one_third], math.ceil(maxPeople * 0.3))
11
12    ## Third Tier Ranked by Score (Last Level)
13    third_tier = random.sample(volunteerArray[2*one_third:
14    3*one_third], math.ceil(maxPeople * 0.1))
15
16    return first_tier + second_tier + third_tier

```

Mentor-Mentee Assignment

```

1 def generateMentor(self, volunteer):
2     volunteer = User.objects.get(id=volunteer)
3     supervisors = self.supervisors.all()
4     minLength = 999
5     mentorWithinMentee = None
6     if supervisors.count() != 0:
7         for supervisor in supervisors:
8             menteeLength = MentorSystem.objects.filter(task
9             =self, mentor=supervisor).all().count()
10            if minLength >= menteeLength:
11                mentorWithinMentee = supervisor
12                minLength = menteeLength
13            MentorSystem.objects.create(task=self, mentor=
14            mentorWithinMentee, mentee=volunteer)
15        else:

```

```
14         creator = self.creator
15         MentorSystem.objects.create(task=self, mentor=
creator, mentee=volunteer)
```

Related Documents

This section covers all the related documents that are related to the system design.

Data Dictionary

The data dictionary for the Operation back end is described in this section.



Table A.1: The data dictionary sample for Attribute Table

Field	Data Type	Size	Description	Example
attribute	varchar	255	The name of the measured attribute	Empathy
description	varchar	255	The description of the measured attribute	ความสามารถในการเข้าใจผู้อื่น



Table A.2: The data dictionary sample for Attribute_User Table

Field	Data Type	Size	Description	Example
email	varchar	255	user's Email	medicalstaff@gmail.com
date_joined	Date		The date which the user registered	11-20-219
lineid	varchar	35	The user's line id	U62a40f04e18zc 06e2bd6adae6472862b
is_active	boolean		Is the user still active within the system	1
role	Int		The User's role within the system (1 = Volunteer, 2 = Medical Staff, 3 = Organization, 4 = Admin)	2
is_staff	boolean		'Is this user an admin	0

Table A.3: The data dictionary sample for MedicalStaff_profile Table

Field	Data Type	Size	Description	Example
firstName	varchar	50	User's firstname	Somchai
lastName	varchar	50	User's lastname	Lee
medicalStaff	Foreign Key		Authentication_User Table's ID	1
organization	Foreign Key		Authentication_User Table's ID	2
nationalID	Int		The user's national ID	1103701514376
unit	Foreign Key		Unit_Table's ID	1
displayPicture	varchar	150	The display's picture URL	/media/ somchai.jpg

Table A.4: The data dictionary sample for Organization_profile Table

Field	Data Type	Size	Description	Example
name	varchar	50	Organization's name	Charity Aid For the Blind
organizationID	varchar	50	The registered organization ID	
logo	varchar	255	URL of the organization logo	/media/charity_aid.png
description	varchar	255	Organization's detail	Organization to help the blind in Bangkok, one eye sight at a time.
address	varchar	255	the address of the organization	171/250 Ramkhamhaeng Street Bangkok
organization	Foreign Key		Authencation_Unit Table's ID	1

Table A.5: The data dictionary sample for Organization_unit Table

Field	Data Type	Size	Description	Example
name	varchar	50	the name of the unit	Finance
description	varchar	50	Unit's description	Deal with the finance
address	varchar	255	The unit's address	Charity Aid Organization 2nd Floor 201
organization	Foreign Key		Organization_profile table's ID	1

Table A.6: The data dictionary sample for Faceshield_helptransaction Table

Field	Data Type	Size	Description	Example
quantity	Int		The quantity that was sent	400
odooMove	Int		Odoo Move object's ID	4
destination	Int		Odoo's location id	9
warehouse_id	Int		Odoo's warehouse ID	10
name	Varchar	255	Transaction's name	4-192-1
destination_name	Varchar	255	the destination	K Hospital
province	Varchar	255	The province of the destination	กรุงเทพฯ

Table A.7: The data dictionary sample for Faceshield_items Table

Field	Data Type	Size	Description	Example
odooId	Int		Odoo's Id	3
name	Varchar	255	The name of the item	Face Shield

Table A.8: The data dictionary sample for Faceshield_SendingTransaction Table

Field	Data Type	Size	Description	Example
quantity	Int		The quantity that was sent	400
odooMove	Int		Odoo Move object's ID	4
destination	Int		Odoo's location id	9
warehouse_id	Int		Odoo's warehouse ID	10
name	Varchar	255	Transaction's name	4-192-1
volunteer_id	Foreign Key		The Authentication_user table's ID	5
is_practitioner	Boolean		Does this package come from a practitioner	0

Table A.9: The data dictionary sample for Faceshield_Quantity Table

Field	Data Type	Size	Description	Example
demand	Int		The number of item that's demanded	400
done	Int		The number of item that received	400
helping Transaction_id	Foreign Key		Helping Transaction ID	9
sending Transaction_id	Foreign Key		Sending Transaction ID	10
item_id	Foreign Key		Faceshield_items table's ID	1

Table A.10: The data dictionary sample for Faceshield_warehouse Table

Field	Data Type	Size	Description	Example
capacity	Int		The capacity of the warehouse	5000
receiver	Int		Is this warehouse part of the Med-Asa alliance	0
odooWarehouse	Int		Odoo Warehouse's ID	9
unit_id	Int		Unit Id	10

Table A.11: The data dictionary sample for Questionnaire_questionnaire Table

Field	Data Type	Size	Description	Example
name	varchar	50	The title of the questionnaire	Volunteer Classification Questionnaire
author	Foreign Key		Authentication_user table's ID	2
date	Date		The date which the questionnaire was created	1-1-2019

Table A.12: The data dictionary sample for Questionnaire_question Table

Field	Data Type	Size	Description	Example
description	varchar	255	The question that's being asked	คุณคิดว่าคุณชอบทำงานที่ใช้ความคิดมากน้อยเพียงใด
attribute	Foreign Key		Attribute_attributes table's ID	4
questionnaire	Foreign Key		Questionnaire_questionnaire table's ID	1
questionType	Int		The type of question (0 = Multiple Choice, 1 = Slider, 2 = Ranking)	0

Table A.13: The data dictionary sample for Questionnaire_answer Table

Field	Data Type	Size	Description	Example
score	Int		The score which will be given to this answer	-5
description	varchar	50	The answer text	ไม่เห็นด้วย
question	Foreign Key		Questionnaire_question table's ID	1

Table A.14: The data dictionary sample for Questionnaire_answersheet Table

Field	Data Type	Size	Description	Example
user	Foreign Key		Authentication _user table's ID	2
questionnaire	Foreign Key		Questionnaire _questionnaire table's ID	1
question	Foreign Key		Questionnaire _question table's ID	20
answer	Foreign Key		Questionnaire _an- swer table's ID	3
date	Date		The date created	4-10-2019

Table A.15: The data dictionary sample for Questionnaire_selfevaluationattribute Table

Field	Data Type	Size	Description	Example
attribute	varchar	255	The name of the measured attribute	Satisfaction
description	varchar	255	The descrip- tion of the measured attribute	How well the volunteer is satisfied with the task

Table A.16: The data dictionary sample for Questionnaire_selfevaluation Table

Field	Data Type	Size	Description	Example
question	Varchar	255	The question text	คุณคิดว่างานนี้ดีหรือไม่
attribute	Foreign Key		ID ของ Questionnaire _selfevaluationattribute	1

Table A.17: The data dictionary sample for Questionnaire_selfevaluationresponse Table

Field	Data Type	Size	Description	Example
question	Foreign Key		Questionnaire _selfevaluation table's ID	2
answer	Integer		The score for the answer	1
task	Foreign Key		Task _tasks table's ID	20
volunteer	Foreign Key		Authentication _user table's ID	3

Table A.18: The data dictionary sample for Task_event Table

Field	Data Type	Size	Description	Example
name	Varchar	255	The event's name	Earth Day
description	Varchar	255	The event's detail	A day to increase global warming awareness
startTime	Time		The event's starting time	9:00
endTime	Time		The event's ending time	16:00
startDate	Date		The starting date of the event	1-4-2019
endDate	Date		The ending date of the event	10-4-2019
location	Varchar	255	The location of the event	Lumphini Park
creator	Foreign Key		Authentication _user table's ID	4

Table A.19: The data dictionary sample for Task_feedbackcategory Table

Field	Data Type	Size	Description	Example
category	varchar	255	Category's name	Teamwork
description	varchar	255	Category's de- scription	The ability for volunteer to work with strangers

Table A.20: The data dictionary sample for Task_feedback Table

Field	Data Type	Size	Description	Example
volunteer	Foreign Key		Authentication _user table's ID	1
task	Foreign Key		Tasks_tasks table's ID	4
category	Foreign Key		Tasks_feedback category table's ID	2
score	Integer		The score they got from the medical personnel	5
percentiles	Integer		Their percentile	0.3

Table A.21: The data dictionary sample for Task_feedbackanswer Table

Field	Data Type	Size	Description	Example
category	Foreign Key		ID ของ Tasks _feedbackcategory table	1
description	Varchar	255	The displayed text	คนนี้ทำงานได้ดี มาก
score	Int		The score which the volunteer get	5

Table A.22: The data dictionary sample for Task_mentorsystem Table

Field	Data Type	Size	Description	Example
task	Foreign Key		Tasks_tasks table's ID	1
mentor	Foreign Key		Authentication _user table's ID	4
mentee	Foreign Key		Authentication _user table's ID	3

Table A.23: The data dictionary sample for Tasks_Schedule Table

Field	Data Type	Size	Description	Example
start	DateTime		The start date and time of the task	2020-03-31 10:00:00 000000
end	DateTime		The end date and time of the task	2020-03-31 10:00:00 000000
attendance_status	Integer		The attendance status of the volunteer	0
task_id	Foreign Key		Tasks_volunteers table's ID	90

Table A.24: The data dictionary sample for Tasks_Requirement Table

Field	Data Type	Size	Description	Example
task	Foreign Key		Tasks_tasks table's ID	1
attribute	Foreign Key		Attribute_attributes table's ID	4
value	Int		The amount of skilled needed	10

Table A.25: The data dictionary sample for Tasks_Tasks Table

Field	Data Type	Size	Description	Example
name	Varchar	255	The task's name	Clean Hospital 1
description	Varchar	255	The task's detail	Clean with de- tergent
startTime	Time		The task's starting time	9:00
endTime	Time		The task's ending time	16:00
startDate	Date		The starting date of the task	1-4-2019
endDate	Date		The ending date of the task	10-4-2019
location	Varchar	255	The location of the event	Hospital 1 Building
creator	Foreign Key		Authentication _user table's ID	4
capacity	Int		Amount of people needed	10
isEmergency	Boolean		Is the task urgent	0
bluePrint	Foreign Key		Task that is the same but has dif- ferent name or lo- cation	1
status	Int		Task's status (0 = Incomplete, 1 = Complete)	0

Table A.26: The data dictionary sample for Tasks_volunteers Table

Field	Data Type	Size	Description	Example
volunteer	Foreign Key		Authentication _user table's ID	3
task	Foreign Key		Tasks_tasks table's ID	1
date	Date		The date which volunteer got invited	28-3-2019
status	Int		volunteer's status (0 = Invited, 1 = Cancel, 2 = Accepted, 4 = Attended, Waiting for Feedback, 5 = Complete, 6 = Kicked Out, 7 = Closed)	0
predicted_score	Int		The score which the system pre- dicted	0.91
score	Int		Actual score	0.7
isSelfEvaluated	Boolean		Has this vol- unteer evaluate themselves	0
isGraded	Boolean		Has this volunteer been graded	0

Table A.27: The data dictionary sample for Volunteer_Attribute Table

Field	Data Type	Size	Description	Example
volunteer	Foreign Key		Authentication_user table's ID	1
attribute	Foreign Key		Attribute_attributes table's ID	4
value	Int		The amount of skilled the volun- teer has	10

Table A.28: The data dictionary sample for Volunteer_Profile Table

Field	Data Type	Size	Description	Example
firstName	varchar	50	The volunteer's firstname	Lina
lastName	varchar	50	the volunteer's lastname	Smith
nationalID	Int		The volunteer's citizen id	102983712321
volunteer	Foreign Key		Authentication_user table's ID	1
displayPicture	varchar	150	Display picture URL	/media/lina
occupation	Foreign Key		Volunteers_occupation table's ID	1

System Usability Scale (SUS)

The SUS follows a Likert Scale system, where the answers for each questions consist of Strongly Disagree to Strongly Agree.

1. I think that I would like to use this system more frequently
2. I think I found the system unnecessary complex
3. I thought the system was easy to use
4. I think I would need the support of a technical person to be able to use this system
5. I found the various functions in this system were well integrated
6. I thought there was too much inconsistency in this system
7. I would imagine that most people would learn to use this system very quickly
8. I Found the system very cumbersome to use
9. I felt very confident using the system
10. I needed to learn a lot of things before I could get going with this system

Psychometric Questionnaire

1. เมื่อฉันเจ็บป่วย ฉันจะอย่างไร
 - a) หาหมอที่ สถานีอนามัย
 - b) ซื้ยาทานเอง จากร้านขายยา
 - c) หาหมอตตาม คลินิกแถวบ้าน
 - d) หาหมอในโรงพยาบาลรัฐ
 - e) หาหมอในโรงพยาบาลเอกชน
2. ฉันมีคนรู้จัก (เช่น คนทั่วไปที่ไม่สนิทกันมาก) หรือคนใกล้ชิด (เช่น คนในครอบครัว หรือเพื่อนสนิท ฯลฯ) ทำงานอยู่ในโรงพยาบาลรัฐ
 - a) ไม่มีเลย

- b) ฉันมีคนที่รู้จัก บางคน ทำงานใน โรงพยาบาลรัฐ
- c) ฉันมีคนที่ใกล้ชิด บางคน ทำงานใน โรงพยาบาลรัฐ
- d) ฉันมีคนที่รู้จัก หลายคน ทำงานใน โรงพยาบาลรัฐ
- e) ฉันมีคนที่ใกล้ชิด หลายคน ทำงานใน โรงพยาบาลรัฐ
3. ตั้งแต่จำความได้ ฉันเคยร่วมกิจกรรมต่าง ๆ กับโรงพยาบาลรัฐ (เช่น วิ่งการกุศล บริจาคเงิน หรือ บริจาคโลหิต ฯลฯ)
- a) ไม่เคยเลย
- b) 1-3 ครั้ง
- c) 4-6 ครั้ง
- d) 7-9 ครั้ง
- e) 10 ครั้ง หรือมากกว่า
4. ฉันคุ้นเคยกับระบบการให้บริการของโรงพยาบาลรัฐ มากน้อยเพียงใด
- a) ไม่คุ้นเคยเลย
- b) คุ้นเคยเล็กน้อย
- c) คุ้นเคยปานกลาง
- d) คุ้นเคยค่อนข้างมาก
- e) คุ้นเคยเป็นอย่างดี
5. ในสมัยเรียน เมื่อใดก็ตามที่คุณครูขอให้ฉันช่วยเหลือ ฉันจะ...
- a) ฉันมักจะหลีกเลี่ยง ไม่ให้ครูขอความช่วยเหลือได้
- b) ฉันช่วยเหลือคุณครูน้อยมาก
- c) ฉันช่วยเหลือคุณครูปานกลาง
- d) ฉันช่วยเหลือคุณครู ทุกครั้ง
- e) ฉันอาสาช่วยเอง โดยคุณครู ไม่ต้องออกปากขอ
6. ในสมัยเรียน เพื่อน ๆ มองว่าฉันเป็นนักเรียนแบบไหน
- a) ผู้คงแก่เรียน
- b) นักกิจกรรม ของโรงเรียน

- c) ผู้ที่คุณครู ไว้ใจให้ช่วยดูแลเพื่อนๆ หรือ งานในโรงเรียน
- d) นักเรียนทั่วไป ที่ไม่ได้มีอะไรเด่น เป็นพิเศษ
- e) นักเรียนที่คุณครู ต้องคอยตักเตือน เรื่องการเรียน หรือ ความประพฤติ
7. เมื่อฉันเห็นคนที่ดูเหมือนจะหลงทาง ฉันทำอย่างไร
- a) ฉันไม่ค่อย สังเกตสิ่งรอบตัว เวลาไปไหนมาไหน
- b) คอยสังเกตดูห่าง ๆ ว่าเขาต้องการความช่วยเหลือหรือไม่
- c) เดินเข้าไปดูใกล้ ๆ เพื่อจะช่วยเหลือ อะไรก็ได้
- d) เดินเข้าไปถาม ว่าเขาต้องการความช่วยเหลือหรือไม่
- e) หาทางช่วยเหลือ หรือลงมือให้ความช่วยเหลือทันที
8. เวลาที่ฉันเล่าเรื่อง คนฟังมักจะแสดงที่ทำอย่างไร
- a) คนฟัง ดุงง ๆ ไม่เข้าใจ
- b) คนฟังขอให้ฉัน เล่าซ้ำอีกครั้ง
- c) คนฟังเกิดการ เข้าใจผิดในบางประเด็น
- d) คนฟังเข้าใจถูกต้อง แต่ไม่ครบหมด ทุกประเด็น
- e) คนฟังเข้าใจถูกต้องครบถ้วน โดยไม่มีข้อสงสัย
9. เมื่อฉันสนใจเรื่องใด ฉันจะหาทางเรียนรู้เรื่องนั้นมากน้อยเพียงใด
- a) น้อยมาก (รู้แค่เพียงผิวเผิน)
- b) น้อย (พอเข้าใจได้บ้าง)
- c) ปานกลาง (เข้าใจดี)
- d) มาก (เข้าใจดีมาก)
- e) มากที่สุด (เข้าใจครบถ้วน จนสอนคนอื่นได้)
10. เมื่อเจอกับปัญหาใหม่ ๆ ฉันเข้าใจปัญหาได้ง่ายหรือยากเพียงใด
- a) ง่ายมาก
- b) ค่อนข้างง่าย
- c) ค่อนข้างยาก
- d) ยากมาก

- e) ยากมากที่สุด
11. ฉันมีประสบการณ์ ในการสอนหรือการเป็นวิทยากร มากน้อยเพียงใด
- ไม่มีเลย
 - มีประสบการณ์เล็กน้อย
 - มีประสบการณ์ ปานกลาง
 - มีประสบการณ์ สูง
 - มีประสบการณ์ สูงมาก
12. เมื่อฉันโกรธ ฉันมักจะทำอย่างไรกับคูกรณี
- พูดแสดงความโกรธ อย่างชัดเจน (เช่น พูดเสียงดัง ได้เถียง ต่อกว่า ฯลฯ)
 - พูด เพื่อให้เขารู้สึกผิด
 - พูด เพื่อบอกว่า ฉันไม่พอใจเรื่องอะไร โดยไม่ตำหนิเขา
 - ไม่พูดอะไร แต่ชักสีหน้าไม่พอใจ
 - ไม่พูดอะไร เก็บอารมณ์และสีหน้า
13. ที่ผ่านมา เมื่อมีงานเข้ามามาก ฉันมักจะทำอย่างไร
- หยุดทำงาน แล้วอยู่เฉย ๆ ไม่ทำอะไร
 - ยังคงทำงานต่อ แต่มีการบ่น
 - หยุดพักงานไว้ก่อน เพื่อวางแผนการ จัดระบบงาน
 - ทำงานต่อไปเรื่อย ๆ เพื่อให้งานเสร็จทันเวลา
 - ทำงานต่อไปเรื่อย ๆ เพื่อให้งานเสร็จอย่างเรียบร้อยสมบูรณ์
14. ที่ผ่านมา หลังเลิกงานในแต่ละวัน ฉันมักจะรู้สึกอย่างไร
- รู้สึกหมดแรง และอยากพักผ่อน
 - รู้สึกพลังเหลือน้อย และอยากพักผ่อน
 - ยังเหลือพลังอยู่บ้าง พอที่จะทำอะไร เล็ก ๆ น้อย ๆ ได้
 - ยังเหลือพลังอยู่มาก พอที่จะทำ เรื่องอื่นต่อได้
 - ยังมีพลังเต็มเปี่ยม และต้องการที่จะ ทำเรื่องอื่น ๆ ต่อ
15. ฉันมีประสบการณ์การทำงานบริการ ที่มีการพบปะพูดคุยกับผู้คน มากน้อยเพียงใด

- a) ไม่มี ประสบการณ์เลย
- b) มีประสบการณ์ บ้างเล็กน้อย
- c) มีประสบการณ์ ปานกลาง
- d) มีประสบการณ์ค่อนข้างมาก
- e) มีประสบการณ์ มาก
16. เวลาที่เพื่อนทั่ว ๆ ไปมีเรื่องร้องไห้เสียใจ ฉันมักจะเป็นอย่างไร
- a) ไม่เข้าใจว่าเพื่อน จะเสียใจไปทำไมกับเรื่องแบบนี้
- b) เฉย ๆ ไม่รู้สึกเสียใจ ไปกับเพื่อน
- c) รู้สึกเสียใจ และ ร้องไห้ไปกับเพื่อน
- d) เข้าใจเรื่องราว และ เหตุผลที่เพื่อนเสียใจ
- e) เข้าใจในความเสียใจ ที่เพื่อนรู้สึก
17. เมื่อมีเรื่องที่ต้องตัดสินใจร่วมกันภายในครอบครัว ฉันมักจะทำอย่างไร
- a) เป็นผู้ไกล่เกลี่ย และหาข้อสรุป
- b) นั่งฟังเฉย ๆ
- c) เป็นผู้เสนอ ความคิดเห็น
- d) เป็นผู้ตัดสินใจแทน ทุกคนในครอบครัว
- e) เป็นผู้หาข้อมูล มานำเสนอให้กับคนอื่น ๆ ในครอบครัว
18. ฉันมีประสบการณ์เกี่ยวกับการให้บริการคนชรา มากน้อยเพียงใด
- a) ไม่มี ประสบการณ์เลย
- b) มีประสบการณ์ บ้างเล็กน้อย
- c) มีประสบการณ์ ปานกลาง
- d) มีประสบการณ์ค่อนข้างมาก
- e) มีประสบการณ์ มาก
19. หลังจากฉันให้คำแนะนำกับใครไปแล้ว ฉันมักจะทำอย่างไร
- a) ลืมไปเลย
- b) ติดตามดูว่า พวกเขาทำตามคำแนะนำหรือไม่

- c) ติดตามดูว่า ชีวิตพวกเขา ดีขึ้นหรือไม่
- d) คอยเอาใจช่วย อยู่ห่าง ๆ
- e) คอยไถ่ถามเป็นระยะ ว่าพวกเขา เป็นอย่างไรบ้าง
20. ฉันเคยได้รับการอบรมเกี่ยวกับการกู้ชีพ และ การปฐมพยาบาล บ้างหรือไม่
- a) เข้ารับการอบรม เป็นประจำ และสามารถปฏิบัติจริงได้
- b) เคยเข้ารับการอบรม และเชื่อว่า จะ สามารถปฏิบัติจริงได้
- c) เคยเข้ารับการอบรม แต่ไม่มั่นใจว่าจะสามารถปฏิบัติจริงได้
- d) ไม่เคย แต่สนใจ เข้ารับการอบรม
- e) ไม่เคย และยังไม่สนใจเข้ารับการอบรม
21. ฉันสูบบุหรี่ มากน้อยเพียงใด
- a) ฉันสูบบุหรี่จัด และสูบในทุกสถานที่ที่ทำได้
- b) ฉันสูบบุหรี่ เป็นประจำ
- c) ฉันสูบบุหรี่บ้าง นาน ๆ ครั้ง
- d) ฉันไม่เคย สูบบุหรี่เลย
- e) ฉันเคยสูบบุหรี่ แต่ปัจจุบันเลิกแล้ว
22. หากไปโรงพยาบาลรัฐ ผู้รับบริการจะต้องรอนาน
- a) ไม่ เห็นด้วยอย่างยิ่ง
- b) ไม่ เห็นด้วย เล็กน้อย
- c) กลาง ๆ
- d) เห็นด้วย เล็กน้อย
- e) เห็นด้วยอย่างยิ่ง
23. หากเพื่อนสนิทหรือคนในครอบครัวโทรมา แล้วฉันไม่ได้รับสาย ฉันจะหาเวลาโทรกลับทันทีที่ฉันสะดวก
- a) ไม่ เห็นด้วยอย่างยิ่ง
- b) ไม่ เห็นด้วย เล็กน้อย
- c) กลาง ๆ

- d) เห็นด้วย เล็กน้อย
- e) เห็นด้วยอย่างยิ่ง
24. ในงานสังสรรค์ ฉันมักจะเป็นคนคอยดูแลและบริการเพื่อน ๆ
- a) ไม่ตรง เลย
- b) ตรงเล็กน้อย
- c) ตรง ปานกลาง
- d) ตรง มาก
- e) ตรง มากที่สุด
25. เวลาฉันคิดอะไร ก็มักจะพูดออกไปเลย
- a) ไม่ตรง เลย
- b) ตรงเล็กน้อย
- c) ตรง ปานกลาง
- d) ตรง มาก
- e) ตรง มากที่สุด
26. ฉันมักจะพูด โดยไม่ทันคิด
- a) ไม่ตรง เลย
- b) ตรงเล็กน้อย
- c) ตรง ปานกลาง
- d) ตรง มาก
- e) ตรง มากที่สุด
27. ฉันคิดถึงผลเสียที่อาจเกิดขึ้น ก่อนที่ฉันจะโพสต์ข้อความออนไลน์
- a) ไม่ตรง เลย
- b) ตรงเล็กน้อย
- c) ตรง ปานกลาง
- d) ตรง มาก
- e) ตรง มากที่สุด



28. เมื่อมีใครขึ้นเสียงใส่ฉัน ฉันมักจะตอบโต้กลับด้วยเสียงที่ดังกว่า
- ไม่ตรง เลย
 - ตรงเล็กน้อย
 - ตรง ปานกลาง
 - ตรง มาก
 - ตรง มากที่สุด
29. เพื่อน ๆ สามารถรับรู้ได้ว่าฉันกำลังไม่พอใจ โดยที่ฉันไม่ต้องบอก
- ไม่ตรง เลย
 - ตรงเล็กน้อย
 - ตรง ปานกลาง
 - ตรง มาก
 - ตรง มากที่สุด
30. ในสมัยเรียน ฉันเป็นคนสอนการบ้านให้เพื่อน
- ไม่เคย เลย
 - น้อยมาก
 - บ่อย ปานกลาง
 - บ่อย มาก
 - เป็นประจำ
31. เมื่อคู่สนทนาไม่เข้าใจสิ่งที่ฉันพูด ฉันจะเปลี่ยนวิธีการพูด หรืออธิบายใหม่
- ไม่เคย เลย
 - น้อยมาก
 - บ่อย ปานกลาง
 - บ่อย มาก
 - เป็นประจำ
32. ในสมัยเรียน ฉันเป็นคนติวสอบให้เพื่อน
- ไม่เคย เลย



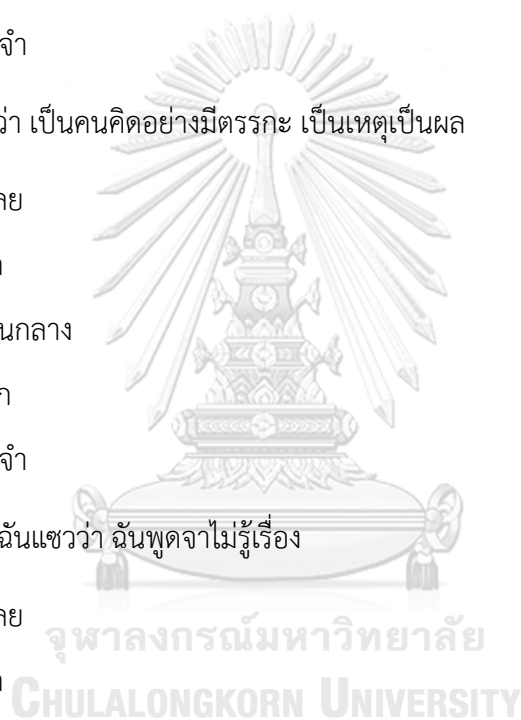
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- b) น้อยมาก
c) บ่อย ปานกลาง
d) บ่อย มาก
e) เป็นประจำ
33. ฉันทอธิบายเรื่องยาก ๆ ให้คนเข้าใจง่ายได้
- a) ไม่เคย เลย
b) น้อยมาก
c) บ่อย ปานกลาง
d) บ่อย มาก
e) เป็นประจำ
34. ฉันทเปลี่ยนรูปแบบการทำงาน เพื่อให้ทำงานง่ายขึ้น หรือให้ได้ผลลัพธ์ที่ดียิ่งขึ้น
- a) ไม่เคย เลย
b) น้อยมาก
c) บ่อย ปานกลาง
d) บ่อย มาก
e) เป็นประจำ
35. ฉันทได้รับมอบหมายให้สอนงานรุ่นน้อง/พนักงานใหม่
- a) ไม่เคย เลย
b) น้อยมาก
c) บ่อย ปานกลาง
d) บ่อย มาก
e) เป็นประจำ
36. ฉันทสอน อธิบาย หรือถ่ายทอดความรู้เรื่องต่าง ๆ ให้กับผู้อื่น
- a) ไม่เคย เลย
b) น้อยมาก
c) บ่อย ปานกลาง



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- d) บ่อย มาก
e) เป็นประจำ
37. ฉันได้รับคำชมว่า เป็นคนหัวไว เรียนรู้ได้เร็ว
- a) ไม่เคย เลย
b) น้อยมาก
c) บ่อย ปานกลาง
d) บ่อย มาก
e) เป็นประจำ
38. ฉันได้รับคำชมว่า เป็นคนคิดอย่างมีตรรกะ เป็นเหตุเป็นผล
- a) ไม่เคย เลย
b) น้อยมาก
c) บ่อย ปานกลาง
d) บ่อย มาก
e) เป็นประจำ
39. เพื่อนสนิทของฉันเชื่อว่า ฉันพูดจาไม่รู้เรื่อง
- a) ไม่เคย เลย
b) น้อยมาก
c) บ่อย ปานกลาง
d) บ่อย มาก
e) เป็นประจำ
40. ฉันได้รับคำชมว่า นำเสนองาน/รายงานหน้าห้อง (present) ได้ดี
- a) ไม่เคย เลย
b) น้อยมาก
c) บ่อย ปานกลาง
d) บ่อย มาก
e) เป็นประจำ



41. เมื่อฉันอารมณ์เสีย ฉันจะแสดงท่าทีบางอย่างที่ทำให้คนรอบข้างรู้สึกไม่ดี
- a) ไม่เคย เลย
 - b) น้อยมาก
 - c) บ่อย ปานกลาง
 - d) บ่อย มาก
 - e) เป็นประจำ
42. ฉันรู้สึกหงุดหงิด เมื่อคู่สนทนาแสดงท่าทีหรือสีหน้าไม่พอใจใส่ฉัน
- a) ไม่เคย เลย
 - b) น้อยมาก
 - c) บ่อย ปานกลาง
 - d) บ่อย มาก
 - e) เป็นประจำ
43. เพื่อน ๆ คอยเตือนให้ฉันใจเย็น ๆ
- a) ไม่เคย เลย
 - b) น้อยมาก
 - c) บ่อย ปานกลาง
 - d) บ่อย มาก
 - e) เป็นประจำ
44. ฉันหลุดปากพูด ในสิ่งที่ไม่ควรพูด
- a) ไม่เคย เลย
 - b) น้อยมาก
 - c) บ่อย ปานกลาง
 - d) บ่อย มาก
 - e) เป็นประจำ
45. ฉันเป็นคนคอยไกล่เกลี่ยความขัดแย้งระหว่างเพื่อน
- a) ไม่เคย เลย



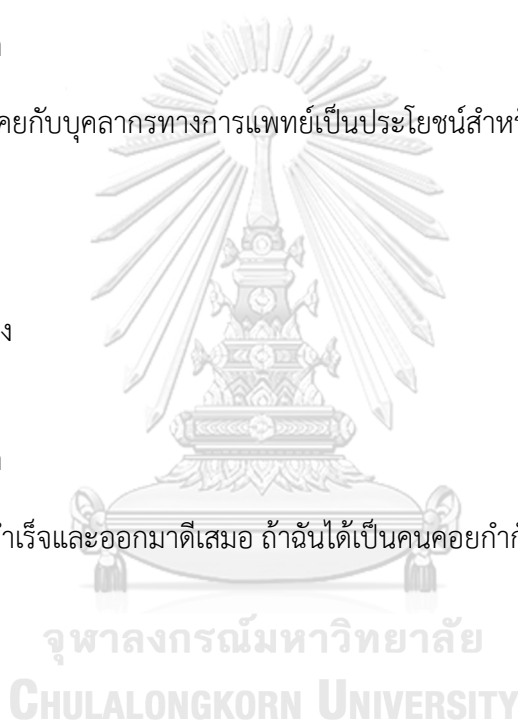
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- b) น้อยมาก
c) บ่อย ปานกลาง
d) บ่อย มาก
e) เป็นประจำ
46. ฉันมีปัญหา ไม่สามารถรับมือกับอารมณ์หงุดหงิด โกรธ เสียใจ ของผู้คนรอบข้างได้
- a) ไม่เคย เลย
b) น้อยมาก
c) บ่อย ปานกลาง
d) บ่อย มาก
e) เป็นประจำ
47. เมื่อมีงานเข้ามามาก ฉันจะอยู่ทำงานนอกเวลาเพื่อให้งานเสร็จ
- a) ไม่เคย เลย
b) น้อยมาก
c) บ่อย ปานกลาง
d) บ่อย มาก
e) เป็นประจำ
48. เพื่อนโทรมาคุยกับฉัน เวลาที่เขามีปัญหา
- a) ไม่เคย เลย
b) น้อยมาก
c) บ่อย ปานกลาง
d) บ่อย มาก
e) เป็นประจำ
49. เมื่อฉันซื้อของ ฉันไม่รับถุงพลาสติก
- a) ไม่เคย เลย
b) น้อยมาก
c) บ่อย ปานกลาง
- 
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- d) บ่อย มาก
- e) เป็นประจำ
50. ฉันเป็นหัวเรียวหัวแรงในการจัดกิจกรรมให้กับคนกลุ่มต่าง ๆ เพื่อให้เกิดการช่วยเหลือซึ่งกันและกันของคนในกลุ่ม
- a) ไม่เคย เลย
- b) น้อยมาก
- c) บ่อย ปานกลาง
- d) บ่อย มาก
- e) เป็นประจำ
51. ฉันมีประสบการณ์เกี่ยวกับธุรกิจเครือข่าย (เช่น ทีมขายตรง ฯลฯ) มากน้อยเพียงใด
- a) ไม่เคยมีประสบการณ์
- b) ใช้ผลิตภัณฑ์
- c) ใช้ผลิตภัณฑ์ และแนะนำต่อ
- d) ใช้ผลิตภัณฑ์ และเป็นรายได้เสริม
- e) ใช้ผลิตภัณฑ์ และเป็นรายได้หลัก
52. ฉันเชื่อว่า ฉันประสบความสำเร็จในการทำธุรกิจเครือข่าย (เช่น ทีมขายตรง ฯลฯ) มากน้อยเพียงใด
- a) ฉันไม่เคยมีประสบการณ์ การทำสิ่งนี้
- b) ฉันไม่ค่อย ประสบความสำเร็จ เท่าที่ฉันต้องการ
- c) ฉันประสบความสำเร็จ ในระดับหนึ่ง
- d) ฉันประสบความสำเร็จมาก
- e) มันคือสิ่งที่ฉันภาคภูมิใจ
53. ฉันเชื่อว่า อาหารเสริม (เช่น วิตามินรวม น้ำมันรำข้าว ฯลฯ) มีความจำเป็นต่อสุขภาพของคนทั่วไปมากน้อยเพียงใด
- a) ไม่จำเป็นเลย
- b) จำเป็นเล็กน้อย

- c) จำเป็นในระดับหนึ่ง
- d) จำเป็นมาก
- e) จำเป็นมาก และควรแนะนำต่อ
54. ฉันเชื่อว่า ความเจ็บป่วย เป็นผลมาจากบุญและกรรมของคน มากน้อยเพียงใด
- a) ไม่จริง
- b) อาจจริง
- c) จริงในบางโรค
- d) โรคโดยส่วนใหญ่เกิดขึ้นจาก ผลบุญและผลกรรม
- e) โรคทุกโรคเกิดขึ้น จากผลบุญและ ผลกรรมที่นำมา
55. ฉันทำงานที่มีลักษณะซ้ำ ๆ เหมือนเดิม (Routine) ได้นานเพียงใด โดยประมาณ
- a) น้อยกว่า 15 นาที
- b) ประมาณ 30 นาที
- c) ประมาณ 1-2 ชั่วโมง
- d) ประมาณครึ่งหนึ่ง ของชั่วโมงการทำงาน (4 ชั่วโมง)
- e) ตลอดชั่วโมง การทำงาน (8 ชั่วโมง)
56. ฉันเส้นสาย (มีคนรู้จัก เป็นคนสำคัญหรือมีอำนาจที่ฉันสามารถขอความช่วยเหลือได้) มากน้อยเพียงใด
- a) ไม่ค่อยมี
- b) มีน้อย
- c) มีอยู่บ้าง
- d) มีค่อนข้างเยอะ
- e) มีเยอะ
57. ฉันใช้เวลานานเพียงใด ในการปรับตัวเพื่อทำงานร่วมกับคนใหม่ ๆ
- a) ฉันชอบทำงาน คนเดียว 0% ชอบทำงาน เป็นทีม 100%
- b) ฉันชอบทำงาน คนเดียว 25% ชอบทำงาน เป็นทีม 75%
- c) ฉันชอบทำงาน คนเดียว 50% ชอบทำงาน เป็นทีม 50%

- d) ฉันทชอบทำงาน คนเดียว 75% ชอบทำงาน เป็นทีม 25%
- e) ฉันทชอบทำงาน คนเดียว 100% ชอบทำงาน เป็นทีม 0%
58. สำหรับฉันแล้ว เชื่อกาชาด/เหรียญกาชาด มีความสำคัญกับฉัน มากน้อยเพียงใด
- a) ไม่เลย
- b) น้อย
- c) ปานกลาง
- d) มาก
- e) มากที่สุด
59. การได้รู้จักคุ้นเคยกับบุคลากรทางการแพทย์เป็นประโยชน์สำหรับตัวฉันและครอบครัว
- a) ไม่เลย
- b) น้อย
- c) ปานกลาง
- d) มาก
- e) มากที่สุด
60. งานต่าง ๆ จะสำเร็จและออกมาดีเสมอ ถ้าฉันได้เป็นคนคอยกำกับดูแล
- a) ไม่เลย
- b) น้อย
- c) ปานกลาง
- d) มาก
- e) มากที่สุด
61. ในครอบครัวของฉัน ฉันเป็นคนที่ต้องคอยตัดสินใจเรื่องต่าง ๆ ให้กับทุกคนอยู่เสมอ
- a) ไม่เลย
- b) น้อย
- c) ปานกลาง
- d) มาก
- e) มากที่สุด



62. ฉันจะรู้สึกหงุดหงิด ถ้าคนในทีมตัดสินใจทำอะไรโดยไม่บอกฉันก่อน

- a) ไม่เลย
- b) น้อย
- c) ปานกลาง
- d) มาก
- e) มากที่สุด

63. ฉันเป็นหัวเรี่ยวหัวแรงในงานบุญต่าง ๆ

- a) ไม่เลย
- b) น้อย
- c) ปานกลาง
- d) มาก
- e) มากที่สุด

64. ฉันรู้สึกหงุดหงิด เวลาอยู่บนท้องถนน

- a) ไม่เลย
- b) น้อย
- c) ปานกลาง
- d) มาก
- e) มากที่สุด



Self Evaluation Questionnaire

1. ในการทำงานจิตอาสาครั้งนี้ ฉันได้รับความช่วยเหลือเมื่อฉันประสบปัญหา

- a) ไม่ตรงที่สุด
- b) ไม่ตรง
- c) ค่อนข้างไม่ตรง
- d) ค่อนข้างตรง
- e) ตรง

f) ตรงที่สุด

2. ในการทำงานจิตอาสาครั้งนี้ ฉันมีความสัมพันธ์ที่ดีกับเจ้าหน้าที่

a) ไม่ตรงที่สุด

b) ไม่ตรง

c) ค่อนข้างไม่ตรง

d) ค่อนข้างตรง

e) ตรง

f) ตรงที่สุด

3. ในการทำงานอาสาจิตครั้งนี้ ฉันได้รับการสนับสนุนจากเจ้าหน้าที่

a) ไม่ตรงที่สุด

b) ไม่ตรง

c) ค่อนข้างไม่ตรง

d) ค่อนข้างตรง

e) ตรง

f) ตรงที่สุด

4. เจ้าหน้าที่มองเห็นคุณค่าในสิ่งที่ฉันได้ทำในงานจิตอาสาครั้งนี้

a) ไม่ตรงที่สุด

b) ไม่ตรง

c) ค่อนข้างไม่ตรง

d) ค่อนข้างตรง

e) ตรง

f) ตรงที่สุด

5. ในการทำงานจิตอาสาครั้งนี้ ฉันรู้สึกว่ เจ้าหน้าที่และจิตอาสาต่างช่วยเหลือซึ่งกันและกัน

a) ไม่ตรงที่สุด

b) ไม่ตรง

c) ค่อนข้างไม่ตรง



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- d) ค่อนข้างตรง
- e) ตรง
- f) ตรงที่สุด

6. ผู้รับบริการพึงพอใจกับสิ่งที่ฉันทำในงานจิตอาสาครั้งนี้

- a) ไม่ตรงที่สุด
- b) ไม่ตรง
- c) ค่อนข้างไม่ตรง
- d) ค่อนข้างตรง
- e) ตรง
- f) ตรงที่สุด

7. สิ่งที่ทำในงานจิตอาสาครั้งนี้ สร้างความเปลี่ยนแปลงในทางที่ดีขึ้น

- a) ไม่ตรงที่สุด
- b) ไม่ตรง
- c) ค่อนข้างไม่ตรง
- d) ค่อนข้างตรง
- e) ตรง
- f) ตรงที่สุด




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8. ฉันทำงานจิตอาสาครั้งนี้ได้ดี

- a) ไม่ตรงที่สุด
- b) ไม่ตรง
- c) ค่อนข้างไม่ตรง
- d) ค่อนข้างตรง
- e) ตรง
- f) ตรงที่สุด

9. ฉันได้ทำให้งานจิตอาสาครั้งนี้เกิดผลดีต่อสังคม

- a) ไม่ตรงที่สุด

- b) ไม่ตรง
- c) ค่อนข้างไม่ตรง
- d) ค่อนข้างตรง
- e) ตรง
- f) ตรงที่สุด
10. ประโยชน์ที่ฉันสร้างจากงานจิตอาสาครั้งนี้ คຸ້มค้กับควมที่พຸ່มเทของฉััน
- a) ไม่ตรงที่สุด
- b) ไม่ตรง
- c) ค่อนข้างไม่ตรง
- d) ค่อนข้างตรง
- e) ตรง
- f) ตรงที่สุด
11. งานจิตอาสาครั้งนี้ทำให้ฉัันได้ใช้ควมรู้ควมสมรถที่มีอย่างเต็มที
- a) ไม่ตรงที่สุด
- b) ไม่ตรง
- c) ค่อนข้างไม่ตรง
- d) ค่อนข้างตรง
- e) ตรง
- f) ตรงที่สุด
12. ในระหว้่งการทำงานจิตอาสาครั้งนี้ ข้อมูลข้วสสรส้คัญต้่ง ๑ (เช่น การเปลี่นเปล่ง ก้หนดการ) ม้ถึงฉัันเสมอ
- a) ไม่ตรงที่สุด
- b) ไม่ตรง
- c) ค่อนข้างไม่ตรง
- d) ค่อนข้างตรง
- e) ตรง
- 
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f) ตรงที่สุด

13. ในการทำงานจิตอาสาครั้งนี้ ฉันมีอิสระในการจัดการงานที่อยู่ภายใต้ความรับผิดชอบของฉัน

a) ไม่ตรงที่สุด

b) ไม่ตรง

c) ค่อนข้างไม่ตรง

d) ค่อนข้างตรง

e) ตรง

f) ตรงที่สุด

14. การทำงานจิตอาสาในครั้งนี้ ค่ำค่ากับเวลาที่ฉันเสียไป

a) ไม่ตรงที่สุด

b) ไม่ตรง

c) ค่อนข้างไม่ตรง

d) ค่อนข้างตรง

e) ตรง

f) ตรงที่สุด

15. ฉันเป็นส่วนหนึ่งที่สำคัญของงานจิตอาสาครั้งนี้

a) ไม่ตรงที่สุด

b) ไม่ตรง

c) ค่อนข้างไม่ตรง

d) ค่อนข้างตรง

e) ตรง

f) ตรงที่สุด

16. ฉันได้เรียนรู้สิ่งใหม่ ๆ ที่จะประโยชน์ต่อฉัน จากการทำงานจิตอาสาครั้งนี้

a) ไม่ตรงที่สุด

b) ไม่ตรง

c) ค่อนข้างไม่ตรง



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- d) ค่อนข้างตรง
- e) ตรง
- f) ตรงที่สุด

17. ในการทำงานจิตอาสาครั้งนี้ ฉันมีความสัมพันธ์ที่ดีกับจิตอาสาคนอื่น ๆ

- a) ไม่ตรงที่สุด
- b) ไม่ตรง
- c) ค่อนข้างไม่ตรง
- d) ค่อนข้างตรง
- e) ตรง
- f) ตรงที่สุด

18. ฉันได้สร้างมิตรภาพที่ดีระหว่างการทำงานจิตอาสาครั้งนี้

- a) ไม่ตรงที่สุด
- b) ไม่ตรง
- c) ค่อนข้างไม่ตรง
- d) ค่อนข้างตรง
- e) ตรง
- f) ตรงที่สุด



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19. ในการทำงานจิตอาสาครั้งนี้ ฉันได้พบปะพูดคุยอย่างเป็นกันเองกับจิตอาสาคนอื่น ๆ

- a) ไม่ตรงที่สุด
- b) ไม่ตรง
- c) ค่อนข้างไม่ตรง
- d) ค่อนข้างตรง
- e) ตรง
- f) ตรงที่สุด

20. ในการทำงานจิตอาสาครั้งนี้ ฉันได้ใช้เวลาที่ตรงกับจิตอาสาคนอื่น ๆ

- a) ไม่ตรงที่สุด

- b) ไม่ตรง
- c) ค่อนข้างไม่ตรง
- d) ค่อนข้างตรง
- e) ตรง
- f) ตรงที่สุด

21. ฉันรู้สึกเป็นส่วนหนึ่งของกลุ่มที่ทำงานจิตอาสาครั้งนี้ด้วยกัน

- a) ไม่ตรงที่สุด
- b) ไม่ตรง
- c) ค่อนข้างไม่ตรง
- d) ค่อนข้างตรง
- e) ตรง
- f) ตรงที่สุด

22. จากประสบการณ์ทำงานจิตอาสาครั้งนี้ ฉันอยากกลับมาทำงานเดิมอีกครั้ง

- a) ไม่ตรงที่สุด
- b) ไม่ตรง
- c) ค่อนข้างไม่ตรง
- d) ค่อนข้างตรง
- e) ตรง
- f) ตรงที่สุด



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Volunteer Performance Questionnaire

1. ความมุ่งมั่นในงาน (commitment to the task)

- a) ทำงานได้พอใช้ ยังมีข้อบกพร่องอยู่บ้าง
- b) ทำงานดี มีข้อบกพร่องน้อย
- c) ทำงานได้ดีมาก ตรงเวลาและรับผิดชอบ แทบจะไม่มีข้อบกพร่อง
- d) ทำงานได้ดีเยี่ยม ตรงเวลา ทุ่มเท และรับผิดชอบ รวมทั้งกระตือรือร้นที่จะช่วยเหลืองานต่าง ๆ แทบจะไม่มีข้อบกพร่อง

2. ปฏิสัมพันธ์กับผู้รับบริการ (relationships to clients) 0 หมายถึง เป็นงานที่ไม่จำเป็นต้องมีปฏิสัมพันธ์กับผู้รับบริการ
- ผู้รับบริการไม่ค่อยพึงพอใจกับการให้บริการอยู่บ้าง
 - ไม่เริ่มสร้างความสัมพันธ์ รอการเข้าหาจากผู้รับบริการ หรือช่วยเหลือผู้รับบริการตามโอกาส
 - เริ่มสร้างความสัมพันธ์กับผู้รับบริการ และช่วยเหลือผู้รับบริการเป็นอย่างดี
 - เริ่มสร้างความสัมพันธ์กับผู้รับบริการ และช่วยเหลือผู้รับบริการเป็นอย่างดี เป็นผู้ฟังที่ดีและเอาใจใส่
3. การทำงานเป็นทีม (teamwork)
- มักทำงานคนเดียว ไม่ค่อยสื่อสารกับเจ้าหน้าที่และจิตอาสาคนอื่น ๆ สนใจเฉพาะงานของตนเอง
 - ทำงานเป็นทีมได้ดี สื่อสารกับเจ้าหน้าที่และจิตอาสาคนอื่น ๆ แต่มักให้ความสำคัญกับงานของตนเองมากกว่างานของทีม
 - ทำงานเป็นทีมได้ดีมาก ให้ความร่วมมือ สื่อสารกับเจ้าหน้าที่และจิตอาสาคนอื่น ๆ ช่วยเหลือเพื่อนร่วมทีมเพื่อให้บรรลุเป้าหมายของทีม
 - ทำงานเป็นทีมได้ดีเยี่ยม ให้ความร่วมมือเป็นอย่างดี สื่อสารกับเจ้าหน้าที่และจิตอาสาคนอื่น ๆ ได้อย่างมีประสิทธิภาพ ช่วยเหลือเพื่อนร่วมทีมเพื่อให้บรรลุเป้าหมายของทีม
4. การตระหนักรู้ในตนเอง (self-awareness)
- แต่งกายเหมาะสม บางครั้งอาจทำเกินหน้าที่ และข้อจำกัดของตน ควบคุมอารมณ์พอได้
 - แต่งกายสุภาพเรียบร้อย รู้หน้าที่และข้อจำกัดของตน แต่บางครั้งอาจทำเกินหน้าที่และความรับผิดชอบของตน ควบคุมอารมณ์ได้ดี
 - แต่งกายสุภาพเรียบร้อย รู้หน้าที่และข้อจำกัดของตน ไม่ทำเกินหน้าที่หรือไม่พินทำงานจนเสียหาย ควบคุมอารมณ์ได้ดีมาก
 - แต่งกายสุภาพเรียบร้อย และสะอาด รู้หน้าที่และข้อจำกัดของตน ไม่ทำเกินหน้าที่หรือไม่พินทำงานจนเสียหาย ปฏิเสธคำร้องขอที่เกินหน้าที่ของตนได้ ควบคุมอารมณ์

Raw Data

The following section displayed all the raw data for all the measurements that are used in this thesis.

SUS Score

The raw data of the SUS score which was broadcasted via social media and chat bot channels.

Table A.29: (1/4) SUS raw data.

Entry	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
1	5	4	5	4	5	3	3	4	3	4
2	5	1	5	1	4	1	5	1	4	1
3	4	3	3	2	2	2	4	2	3	3
4	1	3	1	2	2	2	1	1	1	1
5	5	3	2	2	2	4	2	4	2	5
6	2	2	3	4	3	3	4	3	3	4
7	3	3	3	3	3	3	3	3	3	3
8	3	3	5	2	3	2	4	3	3	3
9	3	1	5	1	3	3	3	1	5	2
10	3	3	2	4	3	4	2	3	3	3
11	4	3	3	3	3	3	4	4	3	3
12	2	2	2	2	2	2	2	2	3	3
13	3	3	4	1	3	3	2	3	3	2
14	3	4	3	4	2	3	4	3	3	4
15	5	3	5	1	4	3	4	2	1	1
16	1	4	4	1	4	3	4	2	4	2
17	4	1	5	1	3	1	5	1	5	1
18	4	2	5	1	1	2	5	1	5	1

Table A.30: (2/4) SUS raw data.

Entry	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
19	4	2	5	2	4	1	4	4	5	4
20	1	1	1	1	1	1	1	1	1	1
21	5	1	5	1	1	1	5	1	5	1
22	4	5	5	1	4	1	5	1	5	1
23	3	2	4	4	3	2	3	2	3	3
24	3	4	4	3	4	2	4	2	3	2
25	3	3	3	3	3	3	3	3	3	3
26	5	5	5	1	4	2	4	1	4	1
27	1	3	3	5	4	5	3	2	4	3
28	1	2	3	3	2	3	2	2	2	1
29	2	2	1	5	3	3	5	5	5	1
30	4	5	5	1	4	1	4	1	5	1
31	5	4	2	4	2	4	2	4	2	4
32	2	4	2	5	2	4	2	5	1	5
33	5	1	5	1	5	1	2	2	4	1
34	5	1	5	1	5	1	4	1	4	1
35	2	4	2	3	1	3	3	4	4	3

Table A.31: (3/4) SUS raw data

Entry	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
36	4	2	4	2	4	2	4	1	4	1
37	5	5	5	2	3	2	3	5	5	4
38	4	2	5	4	3	1	4	1	2	2
39	2	3	3	5	3	3	2	3	3	2
40	5	3	1	5	3	3	1	3	3	5
41	2	2	1	3	2	2	1	2	1	3
42	4	1	4	2	4	1	3	1	4	4
43	4	2	4	1	4	2	4	2	4	1
44	2	4	2	3	1	4	2	5	4	2
45	2	5	3	3	4	1	4	1	3	1
46	4	1	3	1	4	1	4	1	3	1
47	5	1	4	1	5	2	5	1	5	1
48	4	1	4	2	4	2	4	1	4	2
49	1	1	4	2	5	2	4	1	4	2
50	5	1	5	1	5	2	5	2	4	1
51	4	2	4	2	5	1	4	1	5	1
52	2	2	1	3	2	2	1	2	1	3
53	5	1	5	1	5	1	4	1	4	2
54	4	1	4	1	5	2	3	1	5	1

Table A.32: (4/4) SUS raw data

Entry	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
55	5	2	4	1	5	3	5	1	4	2
56	5	2	5	1	5	1	5	1	5	1
57	3	4	5	1	3	2	4	1	3	1
58	5	2	5	2	4	1	4	2	5	2
59	5	1	4	1	4	1	4	1	5	1
60	3	4	3	4	3	2	4	2	3	3
61	5	3	4	4	4	3	4	2	4	4
62	5	1	5	1	5	1	5	1	5	1
63	5	1	5	1	5	1	4	1	4	2
64	5	1	5	1	5	1	5	1	5	1
65	4	1	4	1	4	1	4	2	4	1
66	4	1	4	1	4	1	5	1	4	1
67	4	1	4	1	4	1	4	2	4	1
68	5	1	4	1	5	1	5	1	4	1
69	5	2	4	1	4	1	4	1	4	1

Registration Time

A registration task was given and timed to volunteer of the age group 18 - 55. The method is done via snowball sampling.

Table A.33: (1/2) The raw data of how many minute it takes for potential volunteer to register into the system.

Entry	Time (second)
1	18.35
2	20.19
3	25.55
4	26.45
5	28.44
6	25.15
7	25.24
8	20.14
9	30.55
10	31.43
11	25.11
12	20.12
13	19.49
14	20.34
15	33.31
16	22.27
17	19.43
18	25.32
19	25.54

Table A.34: (2/2) The raw data of how many minute it takes for potential volunteer to register into the system.

Entry	Time (second)
20	26.34
21	24.13
22	29.42
23	28.1
24	27.23
25	20.54
26	19.42
27	20.43
28	23.31
29	24.21
30	25.29
31	29.30
32	30.32
33	27.32
34	28.19
35	31.32
36	30.41
37	26.32

Feedback Time

A feedback task was given and timed to people who are in the age range of 40 - 55. In this task they had to evaluate 4 volunteers.

Table A.35: (1/2) Raw data of how many second it take to give feedback to 4 volunteers.

Entry	Time (second)
1	54
2	71
3	72
4	45
5	73
6	72
7	59
8	52
9	93
10	63
11	83
12	52
13	70

Table A.36: (2/2) Raw data of how many second it take to give feedback to 4 volunteers.

Entry	Time (second)
14	60
15	88
16	58
17	56
18	76
19	68
20	48
21	77
22	50
23	63
24	53
25	76
26	85
27	56
28	49
29	78
30	63
31	66
32	54
33	71