



JOB FINDER WEBSITE FOR DISABLED PEOPLE: REQUIREMENTS ELICITATION

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Abstract:

Requirements elicitation plays an important role as an activity to capture the needs from stakeholders in a variety of context. Being the earliest phase in requirements engineering process, we believed that the responsibility of selecting right requirements elicitation technique is among the essential factors contributing to the success or failure of developed system. This research explores the requirements elicitation activity within the context of developing Job Finder Website for disabled people. To provide a website that can fulfil disabled user needs, the requirements engineer certainly faced challenges. However, if an appropriate selection of requirements elicitation techniques was not neglected, requirements elicitation activity conducted with disabled people can gain accurate user requirements. This research refers to Malaysia Social Welfare Department's as a case to study whether selected requirements elicitation technique is suitable for people with visual, communication, hearing and physical disability. Before the correct requirement elicitation techniques were selected, selection criteria were identified based on literature and interview session with Malaysia Social Welfare Department's employees. We then demonstrate the applicability of selected techniques through illustrative examples. The output of this work is a list of requirements elicitation techniques to be applied in designing Job Finder Website for Disabled People.

Keywords:

Requirements Elicitation, Disabled People, Requirements Elicitation Technique

Introduction

This paper focuses on the research work on selecting the right requirement elicitation technique to identify requirements for Job Finder Website for Malaysia citizens who have visual, communication, hearing, and / or physical disabilities. As an effort to ensure more employment opportunities are extended to disabled people, the Malaysian Government issued and circulated General Order (PP 10/1988) to allow and offer at least 1% of civil service positions to disabled people (Tiun, L.T, Khoo, S.L, 2013). However, based on statistic extracted from Ministry of Human Resource as of 31st March 2022, person with disabilities (PWD) make up only 0.3% of employees in ministries and state secretary government offices (Statistik Pekerjaan & Perburuhan Siri 32 Bil 2/2022) thus highlighting the lack of success of the 1% quota policy. Somehow, the private sector performed more satisfactorily as they were able to recruit a total of 17,000 workers with disabilities. Results from studies by the Organization of Economic Cooperation and Development reported that the average rate of workers with disabilities is 44% out of 75% of normal employees (Rozali et al., 2017). Additionally, the outcome of our interview session with stakeholders from Malaysia's Social Welfare Department shows that the percentage of employment for disabled people is unsatisfactory since the disabled people have various challenges; among them is a dedicated website for them to apply for occupation. Nevertheless, it has been found that disabled people's chances of getting a job from other website such as jobsmalaysia.my are low because they need to compete with non-disabled candidates. Hence, by providing correct functionalities for Malaysia Social Welfare Department Job Finder website, these PWD are expected to get better job opportunities based on their preferences, condition, abilities, and skills. This paper presents descriptions of requirements elicitation techniques and methods as an initial step to design the Job Finder website initiated by Malaysia Social Welfare Department, as an agency under the Ministry of Women, Family and Community Development which is given the responsibility to assist PWD in searching for suitable jobs. Before the suitable requirement elicitation techniques were selected, selection criteria were identified based on literature and interview session with experts from Malaysia Social Welfare Department. Then, the results that disclose the contextual requirements elicitation techniques used throughout the requirements elicitation research process is presented.

Literature Review

There are three points discussed in this section namely requirements engineering, requirements elicitation and people with disabilities.

Requirements Engineering

Software system requirements engineering is defined as a process to determine the purpose of the system and identifying the stakeholders' needs as well as documenting it in a way that helps in analysis, communication, and implementation (Nuseibeh & Easterbrook, 2000).

According to Hull, Jackson and Dick (2010), requirements engineering (RE) is a process that encompasses the activities of requirements gathering, requirements analysis, specification, requirements validation and requirements management. Meanwhile, Pohl and Rupp (2015) point out that there are four core activities in RE namely requirements elicitation, requirements documentation, requirements validation and negotiation and requirements management. As mentioned earlier on, this paper focuses on the earliest activity in RE, namely requirements elicitation.

Requirements Elicitation

Requirement elicitation plays an important role as an activity to capture the needs from stakeholders in a variety of context. Being the earliest phase in requirements engineering process, the responsibility of selecting right requirements elicitation technique is among the essential factors contributing to the success or failure of developed system. Requirement elicitation emphasizes the needs to obtain all information and requirements from the stakeholders and the choice of suitable techniques to be used to gather the required information. Requirement elicitation, designated as requirements discovery, capture, recollection, acquisition, or extraction, is a task that involves several activities that should permit requirements engineers, jointly with the stakeholders, to understand what the requirements of a given system (Fernandes & Machado, 2015). However, if requirements are not taken seriously by the development team, it causes many projects failed to meet the client or stakeholder expectations and not fulfilling their needs and wants (Ahmed, Jabeen, Hafeez, Batool, & Fareen, 2015). The quality of the product comes from the complete and right requirements being fulfilled.

Table 1 shows summary of user requirements elicitation techniques suggested by Stephanidis (2009). According to the author, there are a variety of elicitation approaches acceptable for people with physical disabilities, including direct observation, interviews, and others. However, depending on the sort of physical disability the user has, such as impairment of the upper or lower limbs, there are some ways that can be used with minor changes. When it comes to techniques that require physical effort, such as questionnaire and survey or user trials, individuals with physical impairments like upper limb physical disabilities typically rely on assistive devices such as mobility aids, manipulation aids, communication aids, and computer interface aids. However, since people with physical disabilities can communicate well, the techniques that require communication such as interview, group discussion, brainstorming and direct observation should not be a problem. The written material that may be used during requirement elicitation process should be provided to visual impairment in an appropriate form such as Braille alphabets or any accessible electronic form as well as assistive hardware and software. As for group discussion technique, the moderator should ensure that all material is presented and explained orally.

In this study, we used statistics obtained from the Ministry of Women, Family and Community Development, which show that people with disabilities can be categorised into a few different types of disabilities, as shown in Table 2. We are concentrating on physical disabilities because they affect the largest number of people, followed by visual impairment, hearing impairment, and speech impairment, which affect the second largest number of people.

Person with Disabilities

Persons with Disabilities Act 2008 defines persons of disabilities as:

“persons with disabilities” include those who have long term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society. (Persons with Disabilities Act 2008)

In addition, Ministry of Women, Family and Community Development has stipulated specific categories of disabilities which includes seven categories which are hearing; vision, speech, physical, learning difficulties; mental and various or multiple disabilities. (MyGovernment,

n.d). Social Welfare Department, under this ministry, is one the agencies offering services to assist PWD. According to General Order (PP 16/2010), PWD are required to register with Social Welfare Department prior to apply for jobs in public services. This is to ensure that the candidate has been verified as a PWD.

Table 1: Summary of User Requirements Elicitation Methods and Techniques

User Requirements Elicitation Methods and Techniques	Motion
Brainstorming	√
Direct Observation	√
Activity diaries and cultural probes	■
Survey and questionnaire	■
Interviews	√
Group discussion	√
Empathic modelling	√
User trials	■
Scenarios and persona	√
Prototyping	√
Cooperative and participatory	√
Art-based approaches	X

√ Appropriate

■ Needs modifications and adjustments

X Not recommended

Source: (Stephanidis, 2009)

Table 2: The Number of Registered People with Disabilities (PWD) According to The Types of Disabilities in Malaysia as of 31st December 2022

Categories of Disabilities	Number	Percentage (%)
Learning disabilities	233,760	36.89
Physical disabilities	218,116	34.42
Visual impairment	54,955	8.67
Hearing impairment	42,494	6.71
Mental Disorder	52,209	8.24
Multiple disabilities	28,752	4.54
Speech impairment	3,367	0.53
Total	633,653	100.00

Source: (www.jkm.gov.my)

Methodology

This research begins with the planning phase, which includes a detailed description of the research's activities. Then, we proceed with knowledge acquisition phase with multiple data collection techniques such as face-to-face interview session, on-site observation, and similar website and literature search. Since this study focuses on disabled persons, who are defined as people who have a variety of limitations, different sources of data are necessary for a thorough understanding. During the knowledge acquisition phase, five key requirements processes were carried out. The following is a list of the procedures:

Understanding the Domain of The Research

During understanding domain of study's phase, discussions and brainstorming sessions were performed with Social Welfare Department employees to understand the actual situation and problems related to disabled people job seeking process. Any constraints and obstacles that might be possible to happen throughout this research were highlighted by the experts whom we interviewed. A preliminary interview session was conducted with one of the volunteers and a former trainer of a job coaching program for disabled people, Mrs. Sia Siew Chin at Malaysia Independent Living for Disabled.

Identifying Sources of Requirements

After conducting the activities of understanding the problems and processes related to disabled job finder in the previous phase, sources of requirements were identified from interview session with social welfare officer. Hence, a face-to-face interview session was conducted with the development officer of Pusat Latihan Pemulihan Orang Kurang Upaya (PLPP). The person we interviewed is an expert who provides the information on the needs of the disabled people related to this research as well as any information related to the people with disabilities such as the recommendations on the elicitation techniques to be imposed to the disabled people. The current organisational environment was then examined, as well as an existing job finder website, to know about the difficulties that disabled people face when searching for a job via the website. According to Zowghi & Coulin (2005), besides having expert users, existing systems and processes may represent another source for eliciting requirements especially when the project involves replacing current or legacy system. Requirements may exist in many forms and come from various types of sources such as primary and secondary sources. Guided by Zowghi & Coulin (2005), existing documentation such as manuals, forms, reports and system that can provide useful information related to this research were identified.

Identifying the Potential Stakeholders

Then, identification of stakeholders was performed using Soft Systems Methodology (SSM). There are seven steps in identify stakeholders based on SSM techniques i.e determine the objectives of the organization, search for initial stakeholders, build root definition and conceptual model, continually decompose activities and lastly the complete set of potential stakeholders were produced. SSM technique was selected because it can be used as a tool to increase an analyst's understanding of a problem and it enables the researchers on having a holistic view for the problem that need to be solved. Then, by using this technique, it will identify the key stakeholders and have two characteristics which are able to represent the key activities sets which are essential to achieve organizational objectives and able to help managers to determine the functions and roles of each key stakeholder group. Stakeholders are people who have an interest in the system or are affected in some way by the development and implementation of the system and hence must be consulted during requirements elicitation (Zowghi & Coulin, 2005). At the end of this process, a list of potential stakeholders consisting of disabled people with different types of disabilities, employers and trainers were discovered.

Selecting the Suitable Techniques

Next, a list of elicitation techniques was produced. There are various elicitation techniques available to be chosen to fit with the scope of the project, time, and costs (Tiwari & Rathore, 2017). In the context of requirements elicitation technique for disabled people, this research focuses on physical disabilities as it is the highest number of populations, visual impairment as the second highest population, hearing impairment as well as speech impairment since it is

common types of disabilities. The choice of techniques to be employed is dependent on the specific context of the project and is often a critical factor in the success of the elicitation process (Zowghi & Coulin, 2005). There are a lot of elicitation techniques available but to match it with the disabled people, the techniques that suggested by the previous studies were needed. At the end of this phase, a list of elicitation techniques is listed.

Analysis

Within this phase, the data that has been collected were analysed. Firstly, several existing job finder websites for the disabled people were explored to make a comparison based on features. Table 3 summarises the comparison of features among existing websites.

Table 3: Summary of Compared Features among Existing Websites

Features	Websites				
	A*	B*	C*	D*	E*
Job Seekers'	√	√	√	√	√
Registration					
Log-in	√	√	√	√	√
Job Search	√	√	√	√	√
Job Listing	√	√	√	√	√
Job Listing by Categories	√	√	√	√	√
Job Alert	√	√	√	√	√
Update Resume	√	√	√	√	√
Employer Registration	√	√	√	√	√
Employer Log-in	√	√	√	√	√
Employer Job-posting site	√	√	√	√	X
Resume searching by Employer	√	√	√	√	X
Additional Features	-college student scholarship -marketable skills -disability resources	-employer may specify special needs vacancy	-tools supporting job seekers	-provides sound for visually impaired people	-additional features for disabled people eg NVDA software, font and colour changing

A* - DisabledPerson.com (<https://www.disabledperson.com>)

B* - Special Jobs (<https://specialjobs.com.my/>)

C* - Toozly (<https://www.toozly.com.au>)

D* - AbilityJobs.com (<https://abilityjobs.com>)

E* - JobMalaysia.com.my (<https://jobmalaysia.com.my>)

The list of features identified were used as a reference to design the prototype of this job finder website since the prototype was used as a tool for eliciting requirements from the stakeholders. Next, a list of elicitation techniques for different stakeholders were identified from the past research, literature review and suggestion by the researchers.

Application of Elicitation Techniques with Different Types of Stakeholders

The last phase was the application of elicitation technique with different types of stakeholders. This phase shows how the elicitation technique that has been selected were applied to the development of Job Finder Website. Three steps were involved. Two groups of stakeholders namely JKM staff, employer from different company sectors, trainers of job coaching program and disabled people based on different types of disabilities. Firstly, a preparation of the materials that was used to apply the techniques were done. Then, after all the materials have been prepared, the elicitation techniques were applied to the related stakeholders. Then, a list of requirements was produced after performing 2 iterations of process.

Prototype Preparation

This prototype was designed to gather the requirements of the job finder website for the disabled people from the stakeholders which are the people with visual impairment, communication impairment, physical impairment and hearing impairment. There are few processes involve during prototype design stage:

- a. *Identifying the common features from the comparison of features on the existing job finder website for the disabled people.*
- b. *Verify the features with domain expert from social welfare department.*
- c. *Develop the prototype using HTML5 and install the NVDA software which is the software that accessible for the people with visual impairment to hear the information shown on the screen.*
- d. *Verify the design of the prototype with domain expert by demonstrating the prototype to get an approval before demonstrating it to other stakeholders.*

Questionnaire and Survey Question Preparation.

This questionnaire and survey question were prepared for the employers to establish the needs of the job finder website for the disabled people and get additional requirements on the features of the website. The process of preparing the questionnaire are as follows:

- a. *Design the draft of questions according to the objectives of the questionnaire and survey with supervisor.*
- b. *Convert the questions into Google Form and generate QR Code.*
- c. *Print the QR Code on paper to distribute the survey to the employers since the employers can just scan the code to get the questionnaire*

Face-to-Face Interview Question Preparation.

Face-to-Face interview was conducted with different types of stakeholders which are the normal stakeholders who are the social welfare department staff and trainers as well as the disabled people who are visual impairment and physical impairment. The process of preparing the interview are as follows:

- a. *Set up an appointment with the related stakeholders two weeks before the session.*
- b. *Draft the interview questions according to the objectives of this interview session with the supervisor.*

- c. *Print the final interview question to be bring along when attending the interview session.*

Persona Template Preparation

This technique was applied to the disabled stakeholders with hearing, communication, and physical impairment. The preparation of this technique are as follows:

- a. *An outline of the details was designed using Microsoft Words for the stakeholders to fill in.*
- b. *The details of the persona were extracted from the past research.*
- c. *Then, the outline was printed out to be distributed to the stakeholders.*

Involving User for Designing the Prototype

This technique was applied to the disabled stakeholders who are people with visual impairment, hearing impairment, communication impairment and physical impairment. The preparation of this technique are as follows:

- a. *The prototype was designed and ready to be demonstrated.*
- b. *The user feedback form was designed and verified.*
- c. *The user feedback form was printed and distributed to the stakeholders.*

Validate Requirements Elicitation Techniques

Prior to applying the suggested techniques in Table 4, an informal discussion was conducted with JKM staff since they have more experience in handling the special stakeholders. At the same time, the existing job finder website for the disabled people were explored to extract some significant features. The list of features was used as a reference to design the prototype in obtaining requirements from the stakeholders.

Subsequently, the selected elicitation techniques were applied.

Results and Findings

Identifying Stakeholders

A problem situation and stakeholders involved in job finder website is presented in a form of rich picture. Figure 1 shows list of stakeholders identified from the first two steps of SSM, which are situation considered problematic and problem situation expressed. The stakeholders for Job Finder website are as follow:

1. Staff/ Trainer/ Volunteer
2. Employer
3. Normal People
4. Disabled People

(People with hearing impairment, people with communication impairment, people with physical impairment, people with visual impairment)

Actions to improve the problem situation were expressed after completing the remaining steps in SSM. The following is the situation considered problem.

“The disabled people find that it is inconvenience for them to use current job finder website to find jobs since current job finder website is inconvenient for them to use as for public job search website, they found that they need to compete with other ordinary job.”

After expressing the problem situation, a discussion with Malaysia Social Welfare Department officers was held, and as a result they are aware of the problem and agreed that the website need an improvement.

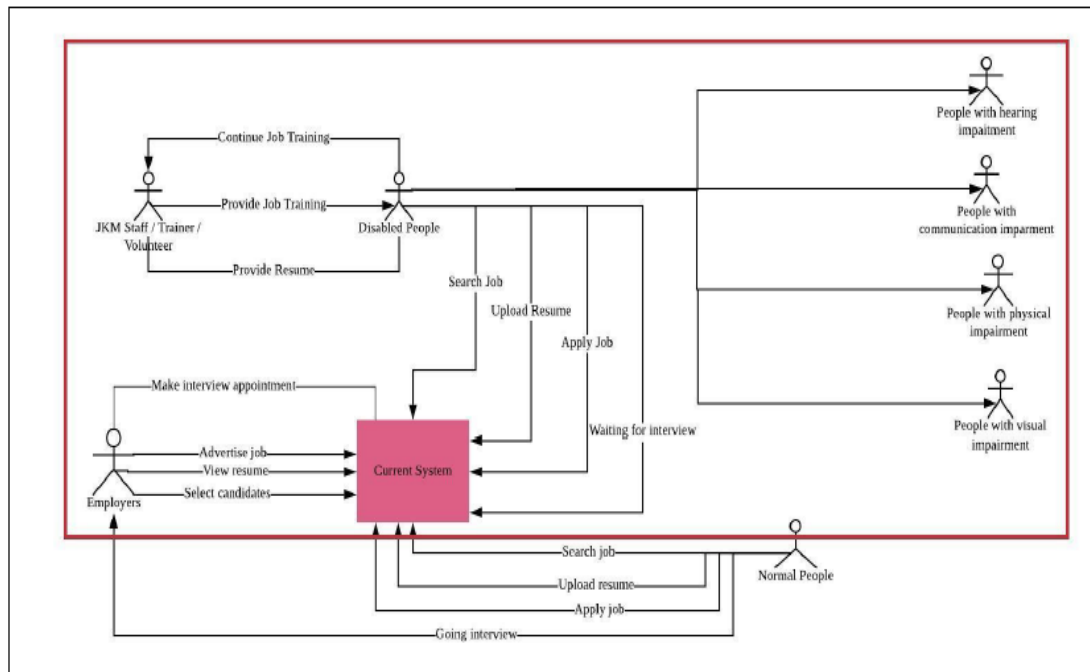


Figure 1. Rich Picture to Express the Problem Situation and Stakeholders Involved

Selection of Elicitation Techniques Based on Types of Stakeholders

Requirement elicitation techniques and tools are used to elicit the requirements and the selection of techniques depends on several factors such as types of system that being developed, present status of the project, survey on literature prove which shows the pros and cons of the techniques available and many more (Ahmed Abbasi et al., 2015). Hence, according to Ahmed Abbasi (2015), in order to gather correct requirement and experiences matter in requirement elicitation process, the techniques available need to be combined with other elicitation techniques since every technique has its own features and limitation that can support by other techniques. The techniques then were selected based on the expert recommendation by the Development Officer of Pusat Latihan Perindustrian dan Pemulihan Orang Kurang Upaya according to the suitability and the reliability to the JKM scope. From a discussion with the officer, he suggested the techniques relating to the ability of the disabled people in handling the situation and also the techniques that ease the practitioners to conduct the elicitation session. Then, as for the elicitation techniques chosen to be conducted with the employers, the techniques must be able to be conducted in a limited time since the requirement gathering activities were held at the job fair with large number of participating companies. Next, for the JKM Staff, the techniques chosen must be suitable due to their availability to provide the requirements.

Table 4 shows a summary of Suggested Requirements Elicitation Techniques for Identified Stakeholders.

Table 4: Suggested Requirement Elicitation technique for Identified Stakeholders

Types of stakeholders	Suggested Elicitation Techniques					
JKM Staff, Trainer and Employees	Direct Observation	Interview	Prototyping	Questionnaire & Survey	Group Work	Domain Analysis
Visual disability user	Face-to-Face Interview	Direct Observation	Prototyping with NV Access	Questionnaire & Survey	Group Work	
Communication disability user	Photo Elicitation Interview	Direct Observation	Prototyping with NV Access	Persona		
Hearing disability user	Interview with assistance of translator	Online questionnaire & survey	Design Workshop - Prototyping	Persona	Direct Observation	
Physical disability user	Direct Observation	Interview	Group Discussion	Persona	Prototyping	

Source: (Output from mapping of type of stakeholders and requirement elicitation techniques)

Application of Elicitation Techniques with Different Types of Stakeholders

This prototype was designed using HTML5 in order to make it accessible by the NVDA software which is the software that made for people with visual impairment. This prototype was meant to provide initial view for the disabled people and the employer on the functionalities and the features available for them as well as to gain the feedbacks and additional requirements. It was accessible for people with different types of disabilities as well as the employer.

Figure 2 shows the interface of login form for the disabled people to get into the website. In order to use the functions available for them, the disabled people need to insert their OKU Card Number and as for the registration, the disabled people just need to insert their full name, email address and OKU card number in order to register themselves to the website. Then, all their details will be generated based on JKM database, so they do not need to insert many information and their details will be generated as their resume as shown in Figure 2. Hence, they do not need to do and upload their own resume. This is to ensure that this website easier to be used by the disabled people especially the people with visual impairment so that they do not need to insert much information.

Summary of Elicitation Techniques Applied to Different Stakeholders

Table 5 shows the summary of the elicitation techniques that have been applied to the different types of stakeholders - employer from different companies, JKM staff and trainer, people with visual impairment, people with hearing impairment, people with communication impairment and people with physical impairment. The techniques that have been applied were direct observation, questionnaire and survey, interview, including the stakeholders in designing the prototype and persona technique.

Based on Table 5, it is obvious that the direct observation technique gets the highest feedbacks as compared to other techniques for most of the stakeholders (except for visual, hearing and

communication impairment). It is suggested to combine the observation technique with interview technique since most of respondents prefer to give direct feedback rather than writing the feedback on paper. This is because interview technique tends to give more detail information. In addition, for the direct observation made with the employers, it is effective when they were not aware that the session was being conducted. As a result, researchers were able to capture the feedback in a natural setting.

JOB SEEKER ACCOUNT
Log into your account by inserting your OKU card number

Account Log In

OKU Card Number

Remember me
[Forgot password?](#)
[Sign Up](#)

Submit Clear Cancel

Alice Hasley
Deaf and Mute

Hello I Am Alice Hasley and I am deaf and mute. I am interested in looking for job as cashier. I can calculate well and can work well.

Personal Details

Name	Alice Hasley
Oku Card Number	D123456
Marriage Status	Single
Disability Category	Deaf And Mute

Contact Information

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Education Information

High Academic Information	Diploma / Advanced Diploma
Year	2018
Institute	Institut Kemahiran Malaysia

Figure 2: Sample of User Interface Screen of Prototype for Communication and Hearing Disability User

Source: (Prototype developed to validate the requirements elicitation technique used)

Next, for the questionnaire and survey techniques, it is good to use within this data collection because it offers a way to gather vast amount of data in limited time. Besides, the process of distributing the questions was much easier by using the QR Code. However, this technique is not recommended for the disabled people because they tend to avoid answering the questions. Then, for the technique of involving the stakeholders in designing the prototype, the approach is getting good feedback because the stakeholder gets the idea of what the project is about, and they can get initial view of the website. From that, we can get comments and observe the way they use the website that will be developed. Nevertheless, this technique is not applicable to the employers and JKM staff since they lack time to view the prototype.

Lastly, the persona technique is evidently suitable to be applied to people with hearing impairment because they can ask questions on the things that they do not understand in the outline. On the contrary, this technique is not suitable for people with communication impairment since they refuse to answer the questions. As for suggestions, it is good to have interview with help from translator to get requirements from the people with communication impairment rather than using this technique.

Table 5: Summary of Elicitation Techniques Applied to Different Stakeholders
Techniques

Stakeholders	Direct Observation	Questionnaires & Survey	Interview	Include stakeholders in designing prototype	Persona
Employer	√	√	X	X	X
JKM Staff & Trainers	√	X	√	X	X
Visually disability	X	X	√	X	X
Hearing disability	X	X	X	√	√
Communication disability	X	X	X	√	X
Physical disability	√	X	√	√	X

√ - Succeeded Elicitation Technique X - Failed Elicitation Technique

Conclusion

This study explored the requirements elicitation techniques of Job Finder website for disabled people. The results obtained showed that selection of requirements elicitation techniques based on literature reviews and experts' interviews can be achieved by integrating the dimensions of structure and description. Successively, the requirements gathered through the identified elicitation techniques need to be analysed to be used in the design and development phase of Job Finder Website for the Disabled People.

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