Bulletin of Electrical Engineering and Informatics
Vol. 11, No. 3, June 2022, pp. 1642~1649
ISSN: 2302-9285, DOI: 10.11591/eei.v11i3.3759

Global virtual teams management system: project manager guide

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Article Info

Article history:

Received Mar 4, 2022
Revised Apr 11, 2022
Accepted May 12, 2022

Keywords:

Functional test/white-box testing
Global virtual teams
ICT
Non-functional test/black-box testing
Project manager
Unified modelling language

ABSTRACT

Global virtual teams (GVTs) are a recent organizational adaptation created to meet the needs of globalizatized marketplace. GVTs are essentially teams that are distributed across national boundaries and concerned through advanced information and communication technology (ICT) such as email, instant messaging, and video conferencing. The research on GVTs is important in the information system (IS) field because GVTs are dependent on information communication technology and the use of other technologies; GVTs also consists of people from different cultures. This paper tried to answer two research questions. The first one is: what are the GVTs problems facing the project manager (PM). A literature review was conducted to answer the first research question. The second one is: how to develop system as a guide for PM. The system was developed by Visual Studio 2019. Online model verification was conducted within 6 experts from IT industry. After developing the system, it was validated by eleven developers (non-functional test/black-box testing) and 3 developers/programmers (functional test/white-box testing) from the same industry. The result of model verification confirmed that the model can help the PM. Also, the non-functional test/black-box testing and functional test/white-box testing was confirmed.

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1. INTRODUCTION

In global marketplace, people can work virtually anywhere any time. Global virtual teams (GVTs) cut across the borders of time, space, culture, and sometimes organizations [1]. Technological developments and global mobility have resulted in increase of the scope of teams outside the traditional collocated forms [2], [3] towards geographically dispersed and global forms of teams working virtually and connected through information and communication technology (ICT) such as zoom, google meet, skype, Microsoft teams, GitHup, and even messages and email usually known as the global virtual teams (GVTs) [4], [5].

GVTs are made up of geographically dispersed groups of people that collaborate via ICT. Members of GVTs come from a variety of cultural backgrounds and time zones, and they may (or may not) meet face-to-face to make complex choices or complete critical tasks. Though technology has enabled GVTs in practically all multinational enterprises across all industries, organizations may still have challenges in keeping GVT

members interested for the duration of the team's task or project [6].

One of the most significant issues that project managers (PMs) face while managing geographically dispersed staff is distance. Working relationship distance can be physical, as a result of location, time zone, or organizational size, operational, as a result of team size and communication opportunities, or cultural, as a result of distinct principles, past familiarity, and status [7]. Team members may face coordination challenges due to geographical distance and the lack of overlapping work hours [8] and in particular on PM geographic dispersion of GVT members limits the level of social support, which is common in traditional face-to-face teams, forcing PMs to respond swiftly to team demands if they want to increase the sense of social proximity [9].

National culture, physical location, and various communication styles and values all contribute to team diversity. Members' behavior and working methods are influenced by diversity, which can make communication, identification, and work execution more difficult [10]. PM must develop clear activities to increase team building and respond to a variety of competing requests, resolve the ambiguity of remote communication, and establish personal relationships with various team members, all of which necessitate the use of accessible, stable, and user-friendly technology [11]. PMs can address diversity by fostering a feeling of belonging, keeping virtual workers motivated [12], learning how to deal with people from other cultures [13], supporting specialized team building activities, and tailoring their language and messaging to team members with diverse communication styles. As a result, it appears that diversity necessitates certain activities and attentive conduct from PMs who want to avoid clashing circumstances within GVTs.

However, because diversity can provide GVTs with a variety of perspectives and working habits, effective PMs may be able to turn diversity-related obstacles into opportunities through the use of the correct leadership actions and behaviors. Although not everyone is a technology adept, members of virtual teams use technology to communicate with one another. One of the major difficulties facing GVT's teams and PM is technological failures—or simply non-use or underuse of technology. As a result, a system to assist project managers in managing their teams is required. On the other hand, GVTs members, leaders, and executive all agree that a main benefit of GVTs is to promote work-life balance as illustrated in Figure 1. Team members and team leaders also see GVTs as a way to increase productivity, whereas executive view GVTs as a cost-saving measure and a good way to get the right people to work together regardless of location [14].

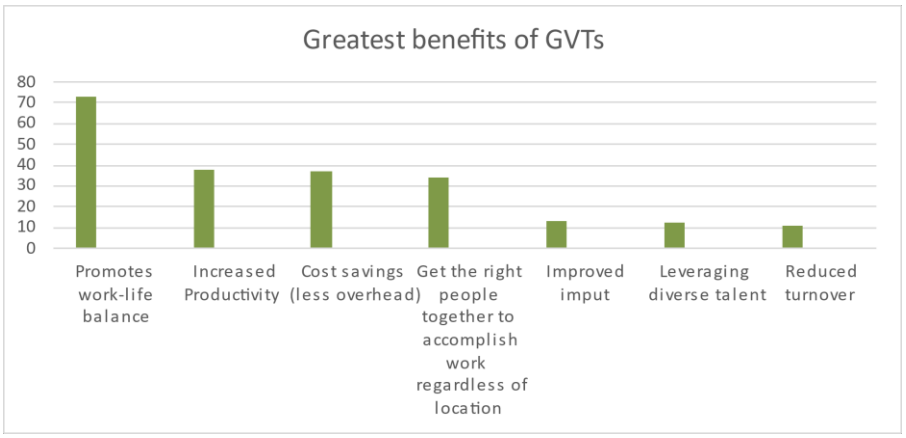

Figure 1. Benefits of GVTs [14]

The following is the format of the paper: The first section is an introduction to the GVT's work as reported in the literature. In section 2, the research technique and process are presented, in section 3 the system design are presented, in section 4 the system development is presented, and in Section 5 the results and discussions are examined. Section 6 finishes with a summary of the findings as well as research recommendations for the future.

2. RESEARCH METHOD

The first question in this paper is: what are the GVT issues that the PM is dealing with? A literature review was done to answer the first research question. The second research question is, "How do we construct GVT's management system?". The system was developed with Visual Studio 2019. Six IT industry specialists participated in the online model verification. The system's functionality was confirmed after it was developed by eleven developers (non-functional test/black-box testing) and 3 developers/programmers (functional test/white-box testing) from the same industry.

2.1. GVTs model verification

The model was subjected to an expert assessment by six IT industry experts to ensure its verification. The minimum number of expert reviews, according to [15], is three. A draft of the expert review was given to two experts (the first one in the English language and the second in questionnaire form). The expert assessment was completed, and the results were examined. Expert feedback was used to improve the model.

2.2. GVTs management system validation

Non-functional test/black-box testing conducted in software company which is related system's *utility/usability* (can I run it?), *reliability* (does it accurate all the time? and how long it takes to repair?), *robustness* (does the system informs the user with message if data do not conform to what was expected?), *performance* (is it meet its constraints with regard to response time or space requirements), and *correctness* (does it do what I want?) A questionnaire was given to 11 developers after using the GVTs system [16], [17]. Some questions of the questionnaires were adapted from [18] and initially from [19], asked developers about the system's ease of use when doing certain tasks. The questionnaire is based on a Likert scale. The tool uses a five-point Likert-type rating scale (ranging from "strongly disagree" to "strongly agree") with 10 questions to measure the Utility/usability, reliability, robustness, performance, and correctness of the system. Another 3 developers/programmers test the functionality of the system/white-box testing in the same company which is related to the implementation of the system such as: examination of the code, internal logic of the software, conditions, and loop structures.

3. GVTs MANAGEMENT SYSTEM DESIGN

We developed this system using Visual Studio 2019. The user should log in with the right username and password which is mentioned by the system otherwise, wrong message will appear. The main components of the GVTs system that will affect the interaction between GVTs system and user are: i) enter the developer's name, ii) press the nationality button, iii) press language button, iv) press country button, v) press time zone button, vi) ress ICT button, vii) press culture button, viii) choose ICT button.

3.1. The component diagram

Models are defined by the unified modelling language (UML), which includes analysis, design, and implementation models. There is, however, no requirement that you construct or maintain three models for a single application. A component diagram [20], [21] is an example of a diagram you could find in an implementation model. A component diagram depicts the finished product's components (think symbols). A component schematic is shown in Figure 2. GVTs system users and all of the GVTs system functions they do should be identified.

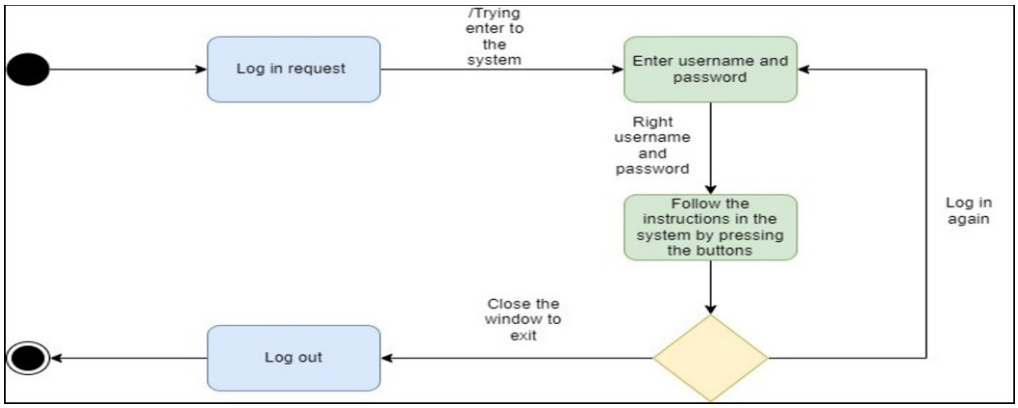

Figure 2. GVTs management system component diagram

3.2. The sequence diagrams

Sequence diagram shows the classes along the top and messages sent between those classes, modeling a single flow through the objects in the system [22]. The messages sent between the pm and the GVTs management system. A sequence diagram implies a time ordering by following the sequence of messages from top left to bottom right as shown above in Figure 3 [23].

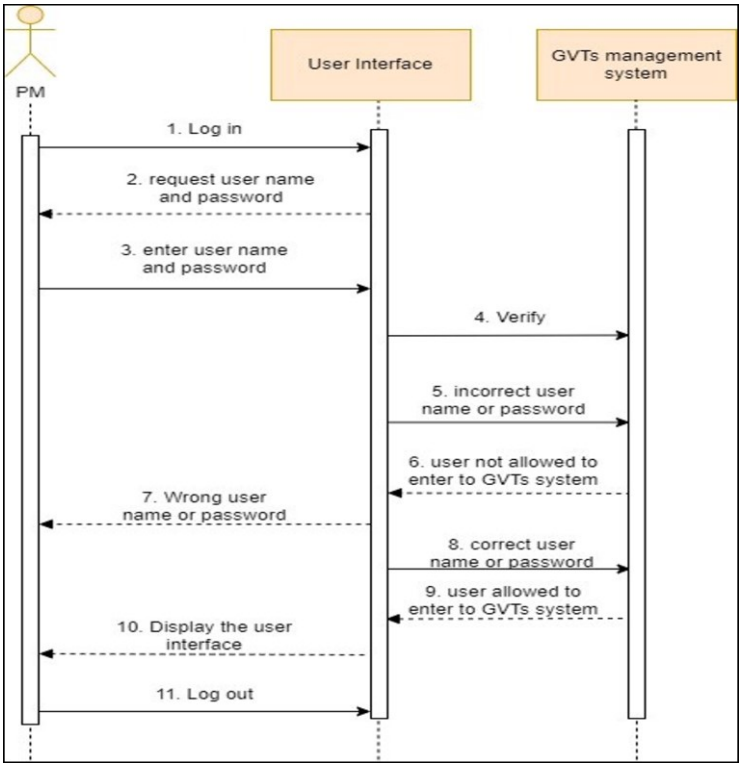

Figure 3. GVTs management system sequence diagram

3.3. The collaboration diagrams

The collaboration diagram is a type of interaction diagram. This diagram conveys the same information, employing a slightly different perspective. Collaboration diagrams use the classes and messages in which are organized in a special display. Figure 4 shows the collaboration diagram [23]-[25].

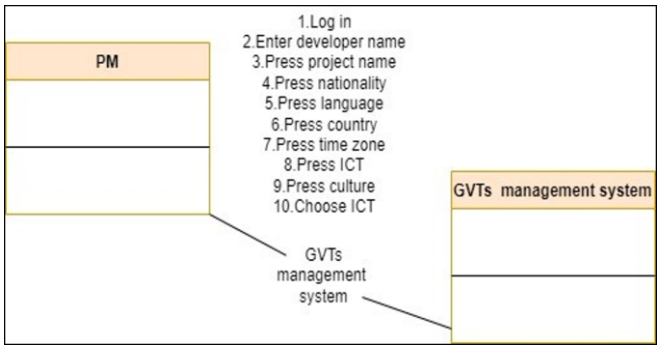

Figure 4. GVTs management system collaboration diagram

4. GVTs MANAGEMENT SYSTEM IMPLEMENTATION

The GVTs system is available in a variety of shapes and designs, with the analysis and design procedures determining which design was chosen and implemented. In order to give good support, users were invited to use the system for a test drive in order to provide feedback on accessibility testing. On the login screen, users must enter the right username and password. The GVTs system is a button-based system that can be utilized by a variety of people. The screen is depicted in Figure 5. Eight steps the user should follow to install and use the GitHub. Figure 6 presents a guide for users how to install and use GitHub as an example of ICT when the user press GitHub. Finally, Figure 7 depicts the author's code for the GVTs system.

Figure 5. GVTs management system user inteface

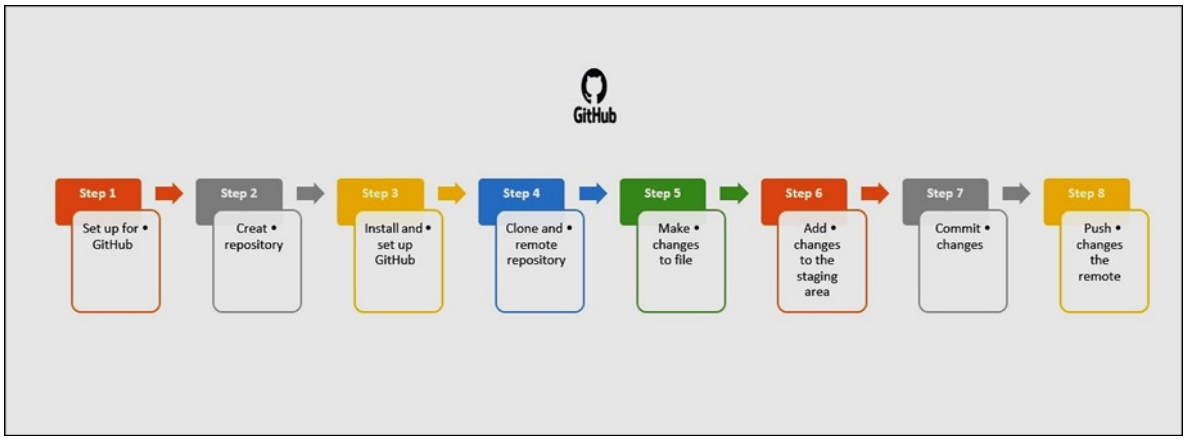

Figure 6. Install and use GitHub

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0 references
Private Sub Button4_Click(sender As Object, e As EventArgs) Handles Button4.Click
    If TextBox1.Text = "Smith Been" Then

    End If
    TextBox5.Text = "United Kingdom"
End Sub

0 references
Private Sub Label4_Click(sender As Object, e As EventArgs) Handles Label4.Click

End Sub

0 references
Private Sub Button3_Click(sender As Object, e As EventArgs) Handles Button3.Click
    If TextBox1.Text = "Smith Been" Then
        TextBox2.Text = "Car Parking System"
    End If
End Sub

0 references
Private Sub Button1_Click_1(sender As Object, e As EventArgs) Handles Button1.Click
    If TextBox2.Text = "Smith Been" Then
    End If
    TextBox3.Text = "United Kingdom"
End Sub
```

Figure 7. Sample of GVTs management system code

5. RESULTS AND DISCUSSION

5.1. Results of GVTs model verification

The draft of an expert questionnaire interview was revised after it was sent to one expert in English language and one in questionnaire design. For verification, the model and expert questionnaire interview were sent to six IT industry professionals. The outcomes were examined. Experts feel the proposed paradigm is practical, according to the findings. The experts also agree on the applicability, comprehensiveness, understandability, accuracy, and coherence of the proposed model.

5.2. Results of GVTs management system validation

In a software company, non-functional/black-box testing is done. An online survey was given to 11 developers after they used the GVTs management system. The information gathered. In response to item 1 ("The GVTs system is straightforward to use"), 81.2 percent of respondents said they would like to utilize the system after studying the data. Item 2 ("The GVTs system is accurate and takes a short time to repair") with 81.2 percent of respondents highly agreeing. Users' responses to "strongly disagree" (81.2 percent) and "disagree" (18.8%) are high because this is a negative item ("The GVTs system does not provide the user with a message if data do not comply to what was intended"). “Strongly disagree” (81.8 percent) and “disagree” (81.2 percent) were similarly used by respondents for question 6 (“The GVTs system do not do what I want”) (18.8 percent).

Finally, what happens if the system sends a notification to the user if the data does not match what was expected? The system's robustness was praised by users. Item 10 illustrates that "the system satisfies its response time or space needs restrictions." Finally, the results of the 10 non-functional test/black-boxing elements show that the system is utility/usable, dependable, robust, performs well, and is correctness. Three developers/programmers from the same company performed the functional test/white-box testing, confirming the code, underlying logic of the software, conditions, and loop structures.

6. CONCLUSION

Finally, a literature analysis was undertaken to emphasize the GVT issues that the PM is dealing with. In addition, the GVTs system was developed to assist the PM in managing his or her GVTs. Finally, more research is needed to expand GVT's management system to accommodate other functionality.

ACKNOWLEDGEMENTS

First, we would like to express our sincere gratitude to University of Baghdad for the continuous support of the research in our academic environment. Secondly many thanks to Universit Putra Malaysia (UPM) for all the knowledge we gain during our PhD and research journey.

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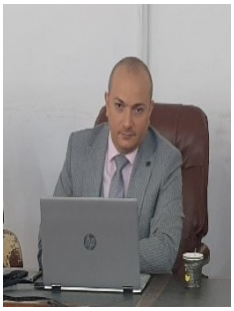

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