FISSARE: TROUBLESHOOTING TOOL IN IMPROVING GOVERNMENT APPLICATION SYSTEMS USING SOCIAL LISTENING CONCEPT

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ABSTRACT

Government agencies deploy different application systems all over the country. Every agency has its own application systems to deploy which conform to the mandate that they have. With those application systems, implementing agencies most likely will seek help in implementation and maintenance. Same goes with the deployment agency; they must continuously support the systems being implemented to ensure that the client gets the full-function of the systems.

KEYWORDS – Knowledge-Based System, Social Listening, Sentiment Analysis, Data Mining

INTRODUCTION

Government agencies deploy different application systems all over the country to facilitate different transactions to provide efficient services to the people. The implementing agencies will most likely seek for help in implementation and maintenance of those application systems. An agency may implement two or more application systems which are very tedious to implement and maintain because one must contact the agency concerned on the particular application system. On the other hand, the deployment team must continuously support the system being implemented to ensure that the client gets the full-function of the system. Errors encountered by the users were mostly caused by human error which makes the work of the support team more tedious. Added to that is when the support team has a shortage in human resource which makes the work of the support team to expand to the extent that the response time in each incident is getting slower and slower. Another issue is that the particular incident may recur to other agencies which give additional work to the support team.

LITERATURE REVIEW

Knowledge-Based System

A knowledge-based system as defined by Turban is a computer system that employs human expertise and knowledge to resolve complex problems that will require the expertise of a human. It is also defined as a computer program that makes use of a knowledge-base that can extract pertinent and useful information for users. A typical knowledge-based system can be managed by two people, the domain or subject matter expert and a knowledge engineer. The domain expert provides the necessary knowledge and concept while the knowledge engineer converts that information to make a logic that is advanced to the actual computer system that can simulate human decision-making. However, knowledge-based system cannot think and make associations like humans so to fully utilize its use; a knowledge-based system should have contained the major components namely: the knowledge base, inference engine and the interface (user interface) [1]. Figure 1 below shows the structure of a knowledge-based system [2].

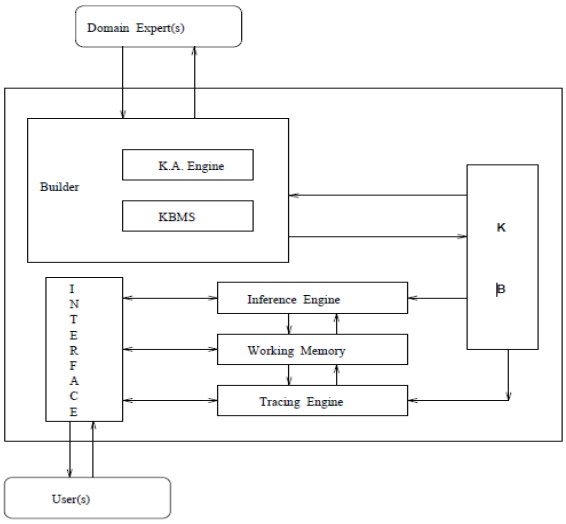

Figure 1. Structure of a Knowledge-Based System

Knowledge-Based System Development

Experts' knowledge was stored in an abstract way. The knowledge engineer's responsibility is to acquire, transfer and represent the experts' knowledge. The knowledge of the experts can be obtained from subject matter expert, domain experts and teachers. The process of knowledge acquisition includes interviews, the use of questionnaires and observation to be able to obtain accurate and clear information. But these techniques cannot be used to extract unspoken ideas that are stored on the experts' subconscious mind. Methods like concept sorting, mapping and protocol analysis are used in this instance [3].

The knowledge that has been acquired must be promptly recorded to represent knowledge. Represented knowledge can help the knowledge engineer to understand the system much better. Some typical examples of knowledge representation techniques are rules, semantic network and scripts. Selecting appropriate knowledge representation technique is one of the major tasks of a knowledge engineer [3].

Social Listening

Social media sites like Facebook, Twitter, Instagram, etc are like a public forum for expression where billions of people share their experiences views and opinions about everything [4]. Social listening or social media listening is the process of tracking discussions around specific matter that can be used to discover new opportunities or to even make new content that can be used by the audiences [5]. This lets you know what is being said about a particular brand real time. It also involves tracking of social media mentions in every platform [6].

Mention tracking and notifications is the most important key to have an effective engagement strategy. Context analyzation from ambiguous trends and discussions can give important insights to be able to serve the target audience much better. This is where listening comes. With the help of social listening, we do not need to look on every conversation or tweets or posts but instead we look into the aggregate collection of social media messages. Social media listening makes us view things in a larger scale. There are many uses of the data being gathered in social listening like tracking of overall brand health, creating content for audience cravings, generate ideas that can be used in marketing campaigns and customer experience improvement [5].

Sentiment Analysis

Sentiment analysis is a set of procedures to determine whether the data is positive, negative or neutral [7]. This is the major technique used in many social media monitoring systems and trend analysis applications [8]. Sentiment analysis may involve different areas of research such as natural language processing, data mining and the likes [9]. Specific information about people, products, etc. can support different activities including prediction of stock movements,

determining market trends, analyzation of product flaws and management of crises. Methods such as word counts or counting of how many times a product has been mentioned, the use of polarity lexicons; a list a positive and negative words that will be counted when used and semantic methods which will compute the lexical distances between product names to be able to identify sentiments about it are some methods that can be used in sentiment analysis [8].

Data Mining

Data mining is a process which is meant to explore data to look for stable patterns and relationships between variables and to validate the results by using the patterns that are detected to the new subsets of data [10]. It works on a set of operations to return desired outputs [11]. Data mining also refers to the revelation of hidden and relevant information from the data as a result of the set of operations [12]. It is also defined as the analyzation of data sets to look for relationships and summarize to be useful and understandable by the owner of the data [13].

Data mining can be used in various ways. First is in trend prediction and behaviors and discovering patterns that are previously unknown. Finding predictive information in large databases can be used in predictive marketing. It can also be used in forecasting of bankruptcy and also identifying portion of a population that will most probably to respond correspondingly to given events. It can also be used to mine social media thoughts and conversations which can be used by the organization in sentiment analysis, product and business strategy enhancements [14].

METHODOLOGY

Sources of Data

This study used homogeneous purposive sampling as the sampling technique. Homogeneous sampling is a type of purposive sampling where the candidates are chosen based on their common characteristics or traits [15], in this case, the common characteristics of the respondents were they are employees of any government institution and users of any government application system.

Respondent's Profile

Table 1. Frequency and Percentage Distribution of Respondents as to Government Sector

	Frequency	Percentage (%)	Rank
National	20	55.56	1
Local	15	41.67	2
GOCC	1	2.78	3
Total	**36**	**100**	

Out of 36 respondents, majority were in the National Government Sector with the frequency of 20 and percentage of 55.56%.

Table 2. Frequency and Percentage Distribution of Respondents as to Government Application System the Respondents Are Currently Using

	Frequency	Percentage	Rank
Electronic New Government Accounting System (eNGAS)	31	86.11	1
Electronic Budget System	18	50.00	2
Unified Reporting System (URS)	3	8.33	5.5
Annual Financial Reporting System (AFRS)	8	22.22	3
Enhanced Public Financial Management Assessment Tool for Local Government Units (PFMAT for LGUs) Software	4	11.11	4
LGU Integrated Financial Tools (LIFT)	3	8.33	5.5
Others: HRMIS	1	2.78	7

Out of ten (10) application systems listed in the survey questionnaire, Enhanced Electronic New Government Application System is used by 31 of the 36 respondents, thus 86.11% of the respondents resort to this system.

Data Case Analysis

The data collected from the survey questionnaire were recorded, analyzed, interpreted and summarized. Techniques such as frequency count, percentage and weighted mean were used to interpret the collected data.

1. Percentage – this statistical technique was used to know that ratio of distribution corresponding to the respondent's profile.

$$\boldsymbol{p = \frac{f}{n} \times 100}$$

Where:
p = percentage
f = frequency
n = total number of respondents

2. Weighted Mean – this statistical technique was used to weigh the answers of the respondents pertaining to every question that was asked on the survey questionnaire except from the respondent's profile.

$$\boldsymbol{\sum = \frac{fx}{n}}$$

Where:
f = frequency
x = corresponding verbal interpretation
n = total number of respondents

RESULTS AND DISCUSSION

1. The difficulties and challenges the respondents encountered in the use of the application systems in terms of 1) Hardware Requirements; 2) Application System; and 3) Support.

The respondents' chose from the given statements on what difficulties and challenges they encountered in terms of hardware requirements, application system and support. On the category, hardware requirements, "Hardware requirement requires a significant budget." ranks first garnering a frequency of 31 with a percentage of 86.11%. On the category, application system, "Patches and versions take time to request and implement." ranks first garnering a frequency of 30 with a percentage of 83.33 %. Lastly, on the category, support, "The agency that developed the systems only supports during office hours." ranks first garnering a frequency of 29 with a percentage of 80.56 %.

2. The respondents' perception on the level of importance of having troubleshooting tool for all the application systems available to assist without the help of the support team.

As per the respondents' level of agreement on the challenges encountered in the use of the application systems, "troubleshooting on my own" got an overall weighted mean of 4.39 and that has a verbal interpretation of Very Important. On the other hand, the "One-stop troubleshooting website" has a computed overall weighted mean of 4.56 and with the corresponding verbal interpretation of Extremely Important. The computed overall weighted mean on the category of "Faster resolution of the issues and concerns" was 4.67 and a verbal interpretation of Extremely Important. Omitting the need to contact different support team for the different application system gathered an overall weighted mean of 4.25 that has a verbal interpretation of Very Important. Finally, the computed overall weighted mean on the category of "The system/s becomes easier to understand because the users get to install patches or corrections themselves" was 4.50 which have a verbal interpretation of Very Important. The overall weighted mean of all categories was 4.47 and that has a verbal interpretation of Very Important.

3. The respondents' level of acceptance on the troubleshooting tool (FISSARE)

For the Efficiency of the application system, it has gathered an overall weighted mean of 4.44 that has a verbal interpretation of Moderately Acceptable while the category of Reliability gathered an overall weighted of 4.36 which corresponds to the verbal interpretation of Moderately Acceptable. The category of Usability has an overall weighted mean of 4.60 that has a verbal interpretation of Highly Acceptable. Lastly, the computed overall weighted mean on the category of Functionality was 4.53 which corresponds to a verbal interpretation of Highly Acceptable. The overall weighted mean of all categories was 4.48 and that has a verbal interpretation of Moderately Acceptable.

4. Suggestions offered by the respondents to improve the developed software

The respondents have given the freedom to give suggestions for the further improvement of the developed system and such suggestion are (1) The portal should be more user friendly so less technical people can understand and this suggestion ranked 3rd and has a frequency of 19 and a percentage of 52.78. (2) A dashboard for each agency user placing ranked 4 and has a frequency of 12 and a percentage of 33.33. (3) Demo process (movie like) should be available via YouTube and this became the 2nd in the rank and has a frequency of 28 and a percentage of 77.78. (4) A chat feature in the portal should be available, being ranked 1st having a frequency of 29 and a percentage of 80.56. (5) The system should not allow uploading/attachments of windows libraries/files which may become a source of potentially unwanted programs, harmful files, or viruses. This option ranked 6.5th and has a frequency of 1 and a percentage of 2.78. (6) Log-outs automatically without the manual command of the user and this suggestion as well ranked 6.5th and has a frequency of 1 and a percentage of 2.78. Lastly, (7) FISSARE should also cater private systems so that government systems can have a basis on what is new in the private companies it will also give more options on some troubleshooting problems. - This option ranked 5th and has a frequency of 2 and a percentage of 5.56.

CONCLUSIONS AND RECOMMENDATIONS

1. The proponent concluded that the most challenging issue in terms of hardware requirements was that the application system requires a significant budget when it comes to hardware; the proponent recommends that the agencies should be briefed on the budget requirement of the systems to be implemented when it comes to the hardware requirements. The proponent also suggests that the systems being deployed can be move to other platforms where the hardware cost will not cost as expensive as the current one. The respondents perceived that the most challenging activity on the application system is the patches and versions that take time to request and implement. The proponent recommends that the deployment agency should develop an implementation strategy that can be used by the implementing agencies. The proponent further recommends that the deployment team should have a library of issues and concerns that can be accessed by the users even after office hours.
2. As to the need for troubleshooting for all the application systems, it is recommended that a troubleshooting tool will answer the issues and concerns of the application systems to enable the implementing agencies to resolve the issues quickly, troubleshoot on their own, and lessen the need to contact different support team for the different application system be provided.
3. The developed software FISSARE was perceived to be moderately acceptable by the respondents, thus, the proponent recommends the use of the proposed system as it addresses the need of the respondents to have a troubleshooting tool that will enable them to resolve their issues quickly.
4. The proponent recommends adapting the suggested improvements for FISSARE such as the chat feature, the demo process on how to use FISSARE that will be available on YouTube and to improve the developed software to be more user-friendly for less technical people to understand; and
5. This system can also be adapted by the Department of Information and Communications Technology since as the supreme information technology institution, it can be the one to host, administer and maintain FISSARE.

REFERENCES

[1] "A Guide to Knowledge Based Systems | Smartsheet", Smartsheet, 2018. [Online]. Available: https://www.smartsheet.com/knowledge-base-systems-and-templates. [Accessed: 21- Feb- 2019].
[2] "Expert Systems", 2018.
[3] P. Sajja and R. Akerkar, "Knowledge-Based Systems for Development", 2018. [Accessed 21 February 2018].
[4] The Fundamentals of Social Media Analytics. Crimson Hexagon.
[5] "Social media listening: Your launchpad to success on social", Sprout Social. [Online]. Available: https://sproutsocial.com/insights/guides/social-media-listening/. [Accessed: 21- Feb- 2019].
[6] P. Whatman, "A Beginner's Guide to Social Listening", The Mention Blog, 2018. [Online]. Available: https://mention.com/blog/social-listening/. [Accessed: 20- Feb- 2018].
[7] "Sentiment Analysis | Lexalytics", Lexalytics. [Online]. Available: https://www.lexalytics.com/technology/sentiment. [Accessed: 21- Feb- 2018].
[8] W. Fan and M. Gordon, "The power of social media analytics", Communications of the ACM, vol. 57, no. 6, pp. 74-81, 2014. Available: 10.1145/2602574.
[9] E. Rolland and M. Farhadloo, "Fundamentals of Sentiment Analysis and Its Applications", 2016. [Accessed 21 February 2018].
[10] "What is Data Mining (Predictive Analytics, Big Data)?", Statsoft.com. [Online]. Available: http://www.statsoft.com/Textbook/Data-Mining-Techniques#mining. [Accessed: 21- Feb- 2018].
[11] "What is the difference between big data and data mining?", Technopedia. [Online]. Available: https://www.techopedia.com/7/29678/technology-trends/what-is-the-difference-between-big-data-and-data-mining. [Accessed: 21- Feb- 2018].
[12] H. Bayer, M. Aksogan, E. Celik and A. Kondiloglu, "Big data mining and business intelligence trends", Journal of Asian Business Strategy, vol. 7, no. 1, pp. 23-33, 2017. Available: 10.18488/journal.1006/2017.7.1/1006.1.23.33.
[13] L. Torgo, "A Brief Introduction to Data Mining", 2017. [Accessed 21 February 2018].
[14] "Learn Data Mining - Data Mining Tutorials - DataFlair", DataFlair. [Online]. Available: https://data-flair.training/blogs/category/data-mining/. [Accessed: 21- Feb- 2018].
[15] I. Etikan, "Comparison of Convenience Sampling and Purposive Sampling", American Journal of Theoretical and Applied Statistics, vol. 5, no. 1, p. 1, 2016. Available: 10.11648/j.ajtas.20160501.11.

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