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Using the internet of things (IoT's) to gain elicitation results

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ABSTRACT

Elicitating with Employees help a Business Analyst understand whether the mindset of a workforce is in sync with the Stakeholders, hence, helps determine a healthy working environment. They mostly use methods like Collaborative Games, Mind Mapping, Focus Groups, Observation, etc. These methods rely on the communication skills of the Business Analyst more than data, which could be a drawback, as it may not give accurate results and make the job of Business Analyst, a lot harder. Analysts and employees, or even clients, often speak in different general languages, with analysts often being more technical in nature, while clients will often speak more from a business perspective. This makes common understanding difficult. To make this process easier, this paper has come with a solution using Internet of Things (IoT), which could show Employee performance in the form of data, and can be used to gain clearer insights on Employee opinions and characters.

Keywords: *Business Analytics, Business Intelligence, Internet of Things, Machine Learning, Big Data, 5G Network, Embedded Systems, Sentiment Analysis, Elicitation and Collaboration, Opinion Extraction*

1. INTRODUCTION

In recent years, the amount of data generated by the global population has reached an all-time high. Humans now produce **2.5 quintillion bytes of data per day** through the use of smartphones, social media, and websites like Google, and 90% of that total data worldwide has been created within the last two years alone. With these increasing numbers has also come an expanding reliance on the use of such quantifiable information in business. Enterprises across a variety of industries are using consumer preferences, habits, and other data insights to help make decisions. In business, 81% of organizations have come to rely on the population's data when trying to "gain greater customer insights" and identify trends.

Mostly because of the Covid Pandemic, Businesses across the world have functioned online, and with the introduction of network technologies like 5G, the numbers are predicted to rise higher and faster than ever before. In this paper, I will be discussing a method where Data/Business Analysts will be able to assess "Employee performance" as well using technologies like Internet of Things (IoT) and Embedded Systems, to help them make better strategies to run businesses.

2. CURRENT SCENARIO

According to the US Bureau of Labor Statistics (BLS), Business Analysts recommend ways to improve an organization's efficiency. They advise managers on how to make organizations more profitable through reduced costs and increased revenues. Out of their many responsibilties, one of them is to analyze Stakeholder Engagement and Elicitating with Employee workers. Elicitating with Employees help a Business Analyst understand whether the mindset of a workforce is in sync with the Stakeholders, hence, helps determine a healthy working environment. This is the first task in any Business Analytics project and it is essential that the information gained is as accurate as possible. It also helps a Business Analyst strategize solutions using the different perspectives of all the stakeholders, and the employees.

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Requirements Elicitation is one of the most difficult stages of analysis, with numerous communication barriers existing between the analyst and client that make eliciting requirements difficult. Analysts and employees, or even clients, often speak in different general

languages, with analysts often being more technical in nature, while clients will often speak more from a business perspective. This makes common understanding difficult. To make this process easier, this paper has come with a solution which could show Employee performance in the form of data, and can be used to gain clearer insights on Employee opinions and characters.

3. RESEARCH ON WHAT ALREADY EXISTS

Appan and Browne focused on the issue of memory recall during requirements elicitation, as they noted that "past research has shown that users often do not recall all the relevant information they have available". Appan and Browne point out that a client who only recalls requirement A in the first interview is likely to only focus on A and not B or C in subsequent interviews as well. It is inevitable that when clients and analysts are unable to recall all relevant requirements, the project will inevitably run into problems further down the line. This problem is referred to as Retrieval-Induced Forgetting, and is highly prevalent during requirements elicitation.

To mitigate these issues, the authors took 60 college students and divided them into 3 groups, and elicited requirements from them for a theoretical grocery system after learning about the system for a real company. Group 1 had no cues used, and two rounds of free recall, group 2 had directed questions and then a chance to freely recall any relevant requirements (Immediate recall treatment), and group 3 received directed questions and then, after 24 hours, was asked to freely recall relevant requirements (delayed recall treatment). Appan and Browne proposed six hypothesis for the above mentioned control groups.
Various statistical measures performed on the results indicated all 6 of the hypothesis were correct. The authors concluded that requirements previously recalled are significantly more likely to be the most emphasized recalled items, particularly during iterative processes.

4. PROPOSED SOLUTION AND PROOF OF CONCEPT

Proof of concept:

Meta-analysis of the literature of Requirements Elicitation (RE) has been conducted by many authors including Hansen, Berente and Lyytinen (2009), Dieste and Juristo (2011), Appan and Browne (2012). Many other authors merely state a type of problem as an assumption underlying their study of a 'cure.' The identified problems with RE can be summarised in nine categories:

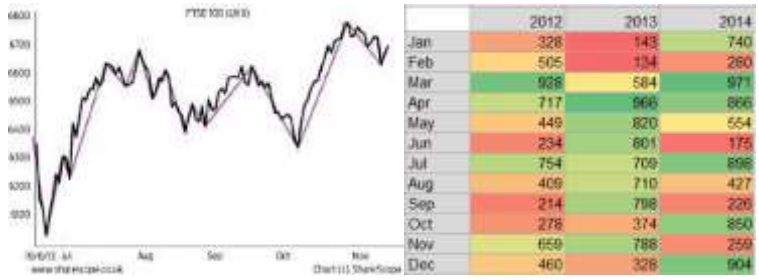
- There are human aspects of RE that preclude simple communication between consultant and client
- The language of humans is not always suitable for technological solution
- Requirements change as the project proceeds
- Clients will sometimes ask for requirements that the organization does not need
- The client cannot say what the business needs
- Some clients do not want to help you with the project
- RE failed because it was not done properly
- Symptoms that are not problems are often reported
- RE is not deterministic

Proposed solution:

With the rise of technology, Businesses have started using data to evaluate themselves. This data or "Big Data" is used to make better decisions regarding market research and consumer intelligence. Internet of Things have made it possible for day to day products to access the internet, not just computer systems. IoTs have been a very niche topic uptil now and has mainly been used for just Robotics or Smart Products for consumers.
5G promises to give a speed of approxiamately 10 Gbps compared to the 20Mbps that 4G provides. Which means, 5G would be more than 500 times faster than 4G. With the development of such faster network technologies, a lot of data can be gained and stored as well due to the advancements in Cloud Computing. With the help of these technologies, Business Analysts can use data to assess Elicitation Results, using Machine Learning (ML) algorithms. The ML models can be programmed to give results according to the six hypothesis proposed by Appan and Browne, or even other algorithms deemed fit by the Business Analyst.

5. WORKING

- A strain gauge pressure sensor will be attached on each table. Strain gauge pressure sensors rely on a measurement of the change in resistance that occurs in a material such as silicon when it is subjected to mechanical stress, known as the piezoresistive effect, which would be perfect in a situation such as this.
- Employees will come and input their names/id numbers in a number pad available at the edge of each table, so the data will be accurate, even if the employee sits in a separate cubicle on a particular day.
- The Sensor will sense the behaviour of the employees, and send the output to the IoT Cloud Server where the data will be stored.
- The data will be used to analyze the behaviour of the employees. For eg: If the sensor shows that an employee has no activity early morning, it would mean that the employee comes late to work, which needs to addressed by the management of the company.
- In order to do that, the Business Analyst will have to run the stored data through Machine Learning ,or Deep Learning models to predict outcomes. This would require the Business Analyst to have big amounts of storage space in their computer systems.
- The data used for employee evaluation will be used to generate a detailed report which would be shown through an application alongwith an autogenerated remark based on the report for the particular employee.



	2012	2013	2014
Jan	328	143	740
Feb	505	134	280
Mar	928	584	971
Apr	717	966	866
May	449	820	554
Jun	234	801	175
Jul	754	709	898
Aug	409	710	427
Sep	214	798	226
Oct	278	374	850
Nov	659	788	259
Dec	460	328	904

Conversion of Sensor Data to Output Data

6. BENEFITS

- Business Analysts will get a detailed performance analysis on each of the employees. Analysts can choose to conduct interviews or other communication methods on only selected employees, after checking the data. This would save Business Analysts, and the company a lot of time.
- Employees will get a detailed personalized performance analysis and will give them a chance to rectify their mistakes and improve their performance.
- Senior Employees will also be accountable for their work. If the data shows that all/most employees under a certain department has a dip in performance, the employee in charge can be held accountable, which is often overlooked by the big companies.
- It will also give a better understanding to the Business Analyst about the working environment of the Employees, and whether changes should be made to improve performances of all the employees, like the Lunch timings or the quality of food provided in the Canteen.

7. FURTHER APPLICATIONS

- **Weed/Drug Detection:** This device can be a means to predict weed/drug usage among students inside the Company premises.
- **Public Safety:** These can be useful in playgrounds, both personal and public, which can sense instantly if a child has fallen down or collapsed while playing and it can automatically call medical help on the location. It would also help in determing which playgrounds or public places are dangerous for children to play in, and necesary changes can be made.
- **Medical World:** The device can be helpful in measuring vacuum pressure while delivering babies, which if gone wrong could result in bleeding under the brain, skull fractures, and weakness or paralysis on one side of the body. It could also be helpful in Medical Schools as the students can learn from the data from previous vacuum delivered babies.
- **Education Sector:** It can be used in Schools around the world, to track progress of students.
- **Military Training:** Can be used in military training to analyze the hardwork of the comrades and also single out those whose training regime needs to improve**.**

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