Abstract- In order to fulfill user’s requirement, it is very important to manage user effectively. Many studies have shown that most of the software project fails due to the inconsistent needs of software users with the view of software developers [1][6]. Understanding user needs is not a sequential process. It involves different disciplines such as psychology, languages and communications, organizational behavior and management. This study has explored a practical approach of managing users by establishing ownership-based user groups. Each group will have its own characteristic and responsibility which will be established through policy, education and awareness program. The commitment and cooperation of each user group will be managed through identifying and managing them through cooperation based user group. The case study has been carried out in University College of Engineering & Technology Malaysia. The study has derived 4 categories of users based on ownership with its own characteristic and responsibility. As for the cooperation based user groups, it has been categorized into 4 groups. The study found that managing users through ownership-based and cooperation based user group has improved the involvement and commitment level of users during the whole software process especially during requirement engineering process.

Keywords- Requirement Engineering, Change Management, User Management, Software Development Process.

I. INTRODUCTION

Most of the process in requirement engineering demands the users to specify their specification for the new system or improvement of the existing system before the development start. Most of the time, the software developer will expect the users to know all their requirements or needs during the requirement study activities. But in the real-life, most of the users do not know what they want or do not know how to transform their existing manual process into automated process. Brooks has noted that establishing technical requirements is the most difficult part in development of software system:

“The hardest single part of building a software system is deciding precisely what to build. No other part of the conceptual work is as difficult as establishing the detailed technical requirements [2].”

Burstin found that formulating requirements for software system has been found to be very difficult for a variety of reasons; First, too many users with too many interacting requirements. Secondly, a broad communication gap between users and developers. [3] This is due to the fact that software industry is shortage of software professionals who are equipped with unique psychological skills and experience required to conduct the interviews with the users, and sort, structure and formulate the outcome into a set of requirements[3].

Requirement specification is also affected by the process maturity level of the organization. Most of the organizations have low level of process maturity. This is due to changes of staff responsible of the processes, policy changes and business changes in the organization. Incomplete requirements would cause incomplete system and affect the user’s satisfaction. This study explored the user management approach to solve these issues.

II. BACKGROUND

The challenge of getting right requirement for software development requires more strategic, soft and practical approach. This paper presented the combination of two user model to face the challenge. The first model is the ownership-based group, which has been derived from Total Quality Management (TQM) and Information System (IS) group. TQM has categorized users into Process Owner and General User [5], while IS has categorized users into Data Owner, System Owner and End Users.
2.1 Theoretical Model

In this study, we have derived a new user groups based on these two groups which is shown in Fig. 1.

![Diagram showing Ownership-based User Group Model]

Fig. 1: Ownership-based User Group Model

A. Ownership based User Group Model

The user involvement in requirement engineering process should simulate the actual operational task and structure in the organization. Beside the operational users who are directly involved with the system, Burstin also identified abstract users who provides input or use output of the system [3]. For example in Banking System, customer is identified as abstract user. He categorized the abstract users using multi-level hierarchical decomposition model. This study analyzed the user from different perspective, involving all entities related to the system including internal and external users. The process owner in actual organization structure must be given the ownership of the system. The ownership starts from requirement engineering until the maintenance engineering. The user ownership model can be derived from Total Quality Management (TQM). In TQM, organization focus, employee empowerment and participative management are the major highlight to ensure the quality product and services. The management-by-committee shall ensure all entities related to the process will give inputs and feedback for process improvement [4]. TQM user model reflect the actual environment of the organization. This study found that all users must be identified and categorized properly based on their actual operational task and organization structure to ensure every type of users are given a proper attention in term of planning, designing, developing and maintaining the system. The ownership has been extended not only for the process owner, but also the other critical users which are data owner, system owner and end-users. The category of Ownership based User Group Model is as follows:

a) Data Owner

**Definition:** A data owner is the person, unit or department who is responsible of the data in a particular system. The same data owner can exist in several sub-systems. There will be more than one data owner for a single sub-system.

**Characteristic:** Responsible, Sense of Ownership, Committed and Pro-active [12].

**Responsibility:** In integrated-enterprise environment, the data owner will be to the actual or real data owner. The data will be updated by the actual data owner directly into the main database. There won’t be any transfer of data from one person to another person in the process of data updating. Every data owner will be responsible to enter, update, delete and maintain the data.

b) Process Owner

**Definition:** A process owner is the unit or department who is responsible of a particular process in a particular system. A system owner is the unit who will be in-charge to the overall system, but process owner is the unit who will be responsible to design and finalize the process flow, policy and procedure of a particular process in the overall system.

**Characteristic:** Responsible, Sense of Ownership, Committed and proactive.

**Responsibility:** Process Owner shall design the technical requirement of the process owned by them. They are responsible to conduct process re-engineering together with the software professionals to transform the manual process into automated process. They will also improve and enhance the process from time to time.
c) **System Owner**

**Definition:** A system owner is the unit or department who is responsible of the system starting from planning, designing, developing, deploying until maintaining. In most of the conventional system development, the role of system owner will be done by the Computer Center. This approach may cause a major problem since the main task of the Computer Center is the system development. This situation also will cause an unbalance workload in the organization. Unbalance workload may affect the productivity of the departments. Computer Center should only concentrate and focus on technical issues, but not the business processes.

**Characteristic:** Responsible, Sense of Ownership, Committed and proactive.

**Responsibility:** The whole coordination of the system development and implementation must be done by the system owner and supported by the software professional.

d) **End User**

**Definition:** End user is the person, unit or department who use the system. Different level of users should be provided with different type of system. A Transaction Processing System is only suitable for Operational Worker, an Automation System is only suitable for Operation Managers, a knowledge worker Support System is only suitable for Knowledge Workers, a Decision Support System is suitable for Middle Managers and Executive info system is suitable for senior managers.

**Characteristic:** Sense of Belonging to the organization, Positive and Committed.

**Responsibility:** Always give positive feedback on the system and be proactive in testing and using the system.

**B. Cooperation based User Group Model**

Ownership based user model will ensure the smoothness of the development process. Another strategic approach to ensure the success in the deployment and implementation phases must be derived. The study found that the users can be categorized by their level of cooperation and appreciation to the system. Each type of users must be managed properly in ensuring the success of the implementation. The approach is identified by cooperation-based user model. The model of cooperation-based group was derived based on the study done in management and psychology [7]. The relationship between both user models is shown in Fig. 2 below.

![Fig. 2: Ownership-based and Co-operation based User Group Relationship Model](image)

The category of Cooperation based User Group Model is as follows:

a) **Very Corporative User**

**Definition:** A very corporative user can also be considered as a champion of the organization. This type of user is usually a system owner. They really understand the vision and mission of the system. They can feel the maximum benefits from the electronic environment. They will be a very responsible system owner or users especially in stabilizing the system by doing thorough testing, managing the project effectively and giving response and feedback as soon as possible. They also have the sense of belonging to the system and feel proud about the system.

**Strategy:** Respect and always support them. This type of user usually is willing to give presentation about the system, sharing their experience and benefits with the visitors. They will also promote the system to be implemented by other organization.

b) **Responsive User**

**Definition:** This type of user will give the cooperation when needed and necessary. They will get involve upon request but sometime become very corporative when it relates directly to their own operations or issues. They will give support from time to time. They will not protest on whatever has been implemented, but not
really aggressive in giving response or suggestion to stabilize and improve the system. They are much better than a non-responsive user who is not interested in getting involves with the system unless forced to do so.

**Strategy:** Maintaining a good relationship with them is very crucial [9]. Giving priority to the system related to them can improve their cooperation level.

c) **Non-responsive user**

**Definition:** This type of users will be very passive in giving cooperation, response and suggestion. They will give cooperation when enforced in the procedure and policy, but sometime try to get away with the enforcement whenever there is a loophole in the system. This type of user is reluctant to change. They are very comfortable with the existing system or manual procedure and are lazy to learn new style of working and environment.

**Strategy:** Maintaining a good relationship with them is very important. The size of this group can be minimized through promoting the very-corporative and responsive users such as giving annual awards and recognition.

d) **Very Difficult User**

**Definition:** Most of the very difficult users are the system owner. Their negative attitudes can give a very big impact to the success of the implementation. Most of them are influenced by their personal bad habits or attitudes. They do not have a proper communication or public relation skill. The relationship and communication skill are very important in dealing with users [11]. Every user is a human being which needs some level of humanity treatments.

**Strategy:** Do not spend so much time with this type of user and sometime try to avoid arguing and discussing with them. This type of users can be managed through proactive actions such as always announce and launch new system. The size of this group can be minimized through promoting the very-corporative and responsive users such as giving annual awards and recognition.

### III. RESEARCH METHOD

In empirical study, there have been a number of different methods that have been used by researchers in the past to study user participation in IS development especially during the requirement study phase. Newman and Robey [4] identify two types of research approaches: factor research models and process research models. In Factor research model, one defines predictor and outcome variables and their relationships, then, empirically tests those relationships. With process research model, it studies a sequence of events in order to understand and explain how particular outcomes are arrived at. Both methods are considered quantitative research method [8]. Since this study involved a real-life project and the author was a Head of Computer Center during the time, it is more appropriate to apply the qualitative research method by involving, observing and analyzing in the whole activities in a real life environment. The involvement and observation have tested the user models through a real-life project activity shown in Fig. 3.

![Fig. 3: Establishing User Group during Planning Stage of Software Development Process](image)

#### 3.1 Case Study

The case study has been conducted at University College of Engineering & Technology Malaysia, while developing its first e-university application named Integrated Management System for Education (IMS education). Before the project was started, the owner of each system were identified and endorsed by the ICT council. The awareness programs for system owners then were conducted to explain their roles and responsibilities. Then, they started to get involved in the project as a project manager, guided and educated by the IT manager and IT team. Their involvement continued until the
maintenance phase. As the project running, the system owner guided by the IT manager have identified the users based on the cooperation based user group and act accordingly. At the end of each year, the award and recognition for outstanding users was given as part of the approach to minimize the number and influence of very difficult users.

3.2 Data Collection

Data has been collected through observation and interview with each user group. The observation has been done throughout the whole project lifecycle. The interview has been conducted after the project completed.

IV. RESULT AND DISCUSSION

The observation has shown that there were several success indicators which are:

- The ownership user model has improved the coordination of the requirement engineering activity, hence improve the requirement engineering life cycle and consistency of the requirements.
- The ownership user model supported by education and awareness program has improved the technical knowledge of the users especially system owner, hence allow them to specify a good technical requirement during requirement engineering.
- The establishment of ownership and cooperation user model and supported by education and awareness program has improved the software professional psychological skill and experience required to conduct the interviews with the users.
- The ownership and cooperation user models have improved the process maturity of the organization.
- The ownership model has improved relationship between users and developers, hence improve the software development and delivery
- The development life cycle has been cut by half compared to the conventional environment.
- The organization has won several recognition and awards within two years of software development and implementation. Some of the awards are Premier ICT Award for Public Sector 2004(MAMPU), APICTA Merit Award 2003(MDC) and Finalist e-Asia Award 2004(e-Asia).

The interview with the system owner and developer has been conducted at the end of the project. 80% of the System Owner agreed that the ownership based group helps users to better understand the system, and this will help them in specifying a good technical requirement. Through the ownership, they feel more responsible and committed to develop and improve the system from time to time. More than 80% of the developers agree that the establishment of ownership based group help the users to establish their process and specify the technical requirements.

This study has shown that the ownership and cooperation models could solve the three issues stated at the beginning of this paper. The issues were too many interacting requirements, lack of psychological skill among the software professional and low level of process maturity.

V. CONCLUSION

The study overall, aims to differentiate users based on organizational and operational categories and highlight the characteristic and involvement of each category in software development process starting from requirement engineering until the end of software development life cycle. This study has shown that by categorizing and managing users based on the organizational structure and functions’ ownership and specify their characteristics and responsibility, it would facilitate the requirement engineering process. The conflict and inconsistency between users and developers shall be reduced, hence producing more acceptable software for the benefits of the organization. A number of avenues for future research are suggested by our result. We only focus on user groups, however we believe that the culture development, education and awareness programs, developer’s behavior, champion development should be other important research areas to be explored to further facilitate the requirement engineering. This study also should be verified by empirical research method to further verify and improve the result.

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VII. REFERENCES


