Web based Project Management Systems for small to midsize businesses

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Abstract—Web based project management system provides communication and various project functionalities for small to midsize businesses. The proposed system integrates communication and organizational tools which utilizes PHP, JavaScript, CSS, Bootstrap, MySQL, HTML and SSL. The proposed system is designed to allow for expansion and development for businesses to improve efficiency and user engagement in terms of usability and flexibility. The system will provide organizations with an application platform to develop a project environment to analyze business functions and employee participation.

keywords— Project, Management, Communication, Project Development Platform, web based system

I. Introduction

The system is an application platform combines popular project management functionalities with desirable communication tools which automates management tasks, and records detailed actions from all users. The system measure and analyze user's activities based on participation and performance. In addition, the platform is designed to be modular and dynamic to suit a wide range of company requirements while still retaining its reporting and management capabilities. The proposed system also improves the business efficiency by providing project managers and organizational management a detailed and accurate view of the exact usage of company time, resources, and users; which allows users to adjust and redirect resources to maximize efficiency.

Utilizing competitor research and past development experience, the functionalities implemented in system seeks to improve the organization by increasing information clarity and understanding between users and organizational structure. While maintaining the current user's needs, it also improves the permissions, approvals, automating management activities and reporting tasks. The System fulfills these requirements through implementing automated management and reporting, a layered collaboration style, and various communication forms in a web based platform for all users in an organization. A multi-layered communication style that combines audio, video, and text communication to each individual level of an organization's project, increases transparency horizontally through an organization, improves information clarity, and fosters teamwork between users. Simultaneously, the implementation of visible and distinct collaboration layers and task ownership roles will improve organizational consent and structure between project levels.

In addition, to improve the organization's communication, the application's platform ability to automate managerial tasks and reporting project results will eliminate the micromanagement behavior, while still maintaining a high standard of productivity. In rewards, it will promote organizational participation, unity, and positive relationships by relinquishing control and granting users considerable freedom to use the application platform as they require for completing tasks. The application platform was initially designed and implemented with research on the ideal communication style to optimize organization cohesion and transparency, and prioritize user and client usability and functionality. However, changes and compromises were made to the initial design to better fit business functional requirements and program limitations.

II. Background & Research

The main purpose of this systems is to design a modular communication and management application platform that promotes user participation, accountability, and relationships. The system will provide users the ability to communicate using multiple mediums throughout an organization, while automating management and reporting tasks.

Through the identification of potential problem and areas of improvement with communication and participation in projects in business organizations. A design solution was proposed to handle and solve key weaknesses in the communication and management systems. In this research there were sixteen popular project management and communication tools available in the market had been reviewed. Namely are Products G Suite, Microsoft Office Suite, WebEx, Skype, Communifire, BlueJeans, GoToMeeting, Unified Meeting 5, Fuze, Asana, Do, Wrike, Mavenlink, Teamwork Projects, Liquid Planner, Project Manager.

978-1-5386-7266-2/18/$31.00 ©2018 IEEE

In conclusion, the sixteen most popular project management and communication tools available in the market do not sufficiently fulfill nor support the application of Tudor's (2016) ideal managerial communication style vertically or horizontally in the organization.

In Tudor's (2016) analysis, the best managerial communication style was to have upward and downward communication directed at consensual decision making and clarity of organizational structure. Meanwhile, focusing on horizontal communication that improves information and data clarity is necessity. The current available market products do not sufficiently provide enough features and functionalities to promote vertical structure through group and user management. Another limitation the task and workflow management does not promote the horizontal information and data clarity through various audio, video, and text communication. Some products circumvent these disadvantages through integration with third party applications, this requires that the native applications to be solely cloud or web based. This limits the information control and flexibility of the application that makes the applications unsuitable for some organizations. In order for an application to support Tudor's (2016) most efficient communication style, it must provide various communication forms between each individual in the organization. It also allows structured communication and notifications between each layer and task of a project. While, it must provide automated management reporting and notifications functionalities to match its market competitors.

It was identified that the communication systems used in these businesses had too many internal policy restrictions regarding usage and functionality, as well as limited customization and reporting available throughout all technical systems. In addition, management was regularly bound to the enforcement of communication rules, user roles, and project tasks because the communication system, management system, and reporting system were not correctly integrated with each other.

In Tudor's 2016 paper titled "The influence of the Intranet on Managerial Communication Style", the author describes the negative effects and results of an inefficient and incompetent management when using the intranet as an internal communication channel [1]. Tudor summarizes and explains the advantages of communication and management through an intranet, is eventually offset by its inefficiencies and management's lack of understanding [1]. The communication channels in the intranet eventually become impossible for employees to use, due to poor network uptime, unequal access for users, data and message repetition, and storage clutter. Tudor emphasizes that, in addition to the eventual weaknesses that affect the intranet due to poor management, the tendency for management level user to exert control or micromanage the communication and structure of communication channels, restricts user's ability to communicate freely and openly as required to complete their work. This in turn, grows employee frustration while expending a significant portion of management's time that should be spent on improving business functions [1]. Tudor explained that these frustrations cause employees to seek alternative communication tools outside the organization, which causes other users to follow, as the need to communicate with other employee and frustration with the current system grows. This causes communication to be separated into multiple small disjointed groups, and hinders employee's capability to complete tasks, gather the required information, or communicate effectively across the organization. As users continually abandon the current communication channels for exterior communication channels, less and less users utilize the current system. With less users reachable in the current system, the problems with the current system grow larger and become more significant, causing more users to abandon [1]. According to Tudor, the security problems with communication and information distribution outside the organization and the difficulty for management to measure or enforce accountability, become significant problems for the organization. Tudor states: "Over controlling leads to the loss of control. Restrictions in Intranet professional communication leads to deterritorialization towards the internet." [1].

In the second part of the research paper by Tudor, they explain the ideal communication style that managers should employ to improve the intranet communication channels and promote user participation. Through a quantitative matrix, Tudor could find that the best communication style for managers is to have vertical collaboration focused on increasing interpersonal agreement and building relationships, while having horizontal communication focused on improving the understanding and clarity of data and information [1]. Tudor also emphasized that management, policies, and communication tools must also grant users enough freedom to complete work and tasks as they required. To do this, the intranet must employ applications and policies that support the ideal communication style, while providing the greatest number of functionalities to give users the tools to work efficiently and freely [1].

Tudor's demonstrates that a key weakness in communication systems was that users felt that information and functionality was being limited from employees, and that information was not being provided to all employees equally [1]. The constant need for management to involve themselves in the auditing of user communication, and micromanagement of time and tasks in a project, caused human errors which delayed or completely stopped communication in the organization. Because these weaknesses negatively impacted the information distribution and communication in the organizations, it caused frustrated users to find other forms of communication outside of the organization. Users who chose to communicate outside the organization with third party tools began to bring other employees out of the organization who needed to communicate with them, leading to an eventual wave of employees choosing to abandon the organization's chosen communication system. This negatively impacts the organization by drawing resources

and disjointing communication from management and other users, making information available outside the company's boundaries and making it difficult for managers and project leaders to accurately measure the time and resources spent on tasks. The workplace needed a communication tool that promotes relationships between all levels of employees, provides various communication forms for all users, and promotes thorough and equal information propagation throughout an organization. The workplace also needed an automated management and project reporting system that is integrated with the communication system, to alleviate the tasks of work and user management away from management. This is so that management can focus on improving group communication and relationship to promote business productivity and participation.

The ideal communication and management tool should have the ability to facilitate real-time communication between all members in an organization, automate user and project management tasks, create and contain levels of interconnected communication channels for projects, and generate and have clear visual representations for tasks and timelines. In addition, the ideal communication and management tool should automatically report and notify users and project leaders of changes in the project, while automatically alerting related users through an integrated user structure. These features will support and enforce the ideal communication style of vertical relationships and horizontal clarity, while endorsing user participation and supporting each user's communication needs.

III. Design and Implementation

The proposed design is envisioned as a low-cost market competitive application platform that could be applied to small to middle sized business, without modifications to existing hardware. The design of proposed Systems will support the ideal communication style through the implementation of a multi-layered communication structure, automated user reporting and project notification, and various instant communication forms. Fig. 1 describes the general system flow between web browser, web server to database of the proposed system.

The proposed system to replace or work in conjunction with the business current application to provide the best service to the employees of the organization. The system designed as a web based application that would implemented in the organization's local or cloud based web servers. The platform design features are scalable, easy to deploy onto all forms of web servers, databases and small file size. Meanwhile, maintaining the features of easy to learn basic user's functionality and financially responsible in costs and maintenance.

A. Database

The proposed system database uses MySQL which have been integrated with both the communication and management tools. The database handles all aspects of account creation, login authentication and authorization, data integration and data storage. Database designed to manage database relationship uses PHP script as an interpreter for web server communication request and responses.

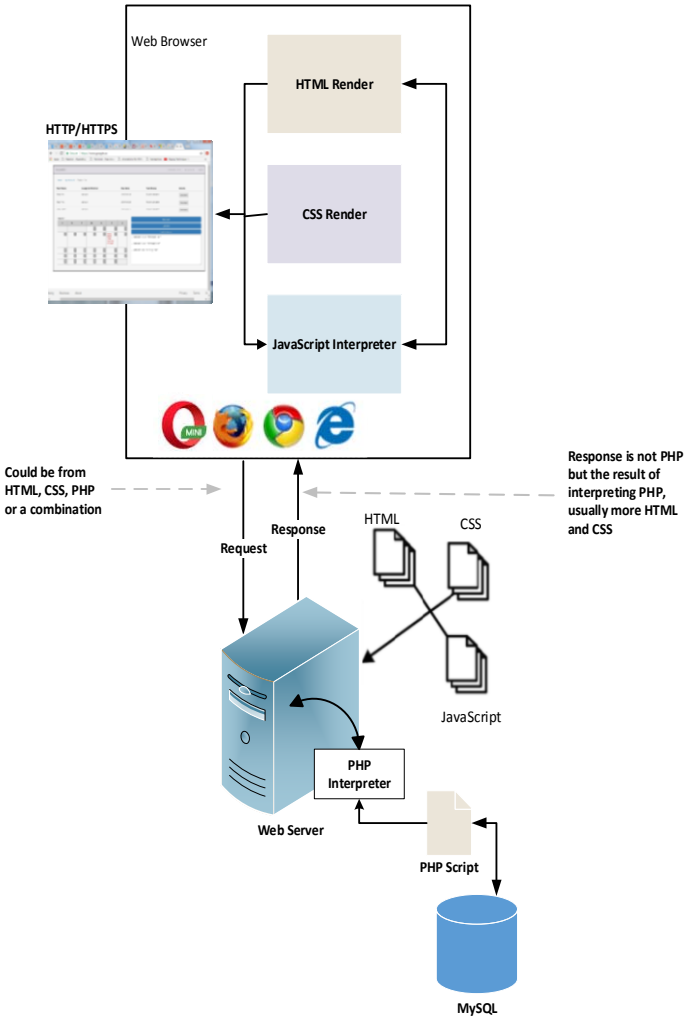

Fig. 1. Proposed System

B. Account and Login

The application platform utilizes the database to handle login, account creation and authentication, and stores all information and data about the user within the database. When login is prompted, the information is checked against the information taken from the database and the server determines the correct route to direct the user. The same process is applicable to all users in the system.

Furthermore, the application platform accounts are separated within two categories; organizational roles and project roles. Organizational roles represent a user's position within the exterior company, where access to user information and general controls might be provided with a higher security clearance. Project roles represent a user's position within each project, whether they are a project leader or a project member. A user can only have one organizational role, while having many different project roles.

C. Project Management Design

The project management design functionalities for management system. The general manager can perform all background tasks to handle user and project requirements, as well as generate accounts and roles for each user. These users are assigned the roles of project leader or project member depending on the requirements set by a general manager. Each user is given access to projects they were assigned and approved for, and have full access to contribute and modify the deliverables. However, only project leaders within the project can approve and modify projects to adjust for organizational changes. Fig. 2, illustrate the general manager profile page main functionalities, were it list all the project names, tasks linked to individual projects and edit and add tasks, view all project due dates, join conference calls and view project calendar.

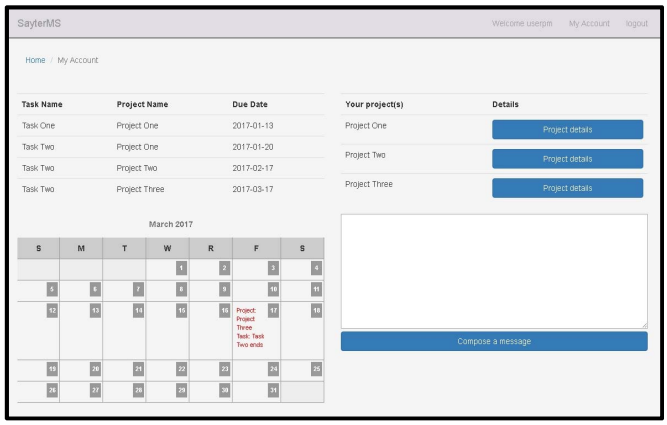

Fig. 2. general manager profile page.

Fig. 3, illustrate once the general manager selected one of the projects, the profile page will list all the functionality related to view specific project calendar, view all assigned tasks for the project, can edit task, establish new task, setup conference call, messaging project members or project leader.

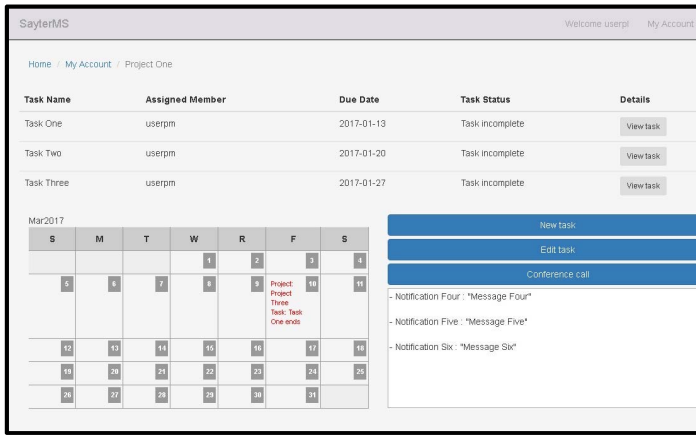

Figure 3. general manager project page.

D. Project Creation

Once the general manager created the project then set the requirements, milestones, resources required by a project, and then delegated project members and project leader. Thereafter, each project member, the general manager will grant them the ability to oversee and confirm the success of project tasks and deliverables.

E. Task Creation and Functionality

After a project leader has been assigned to a specific project, they were able to create tasks to complete and contain deliverables. Fig. 4 illustrate the project task screen. Once a task requirement is set, one project member is set as the task owner, which grants them the ability to modify tasks as well as oversee the deliverables and contributions to the task.

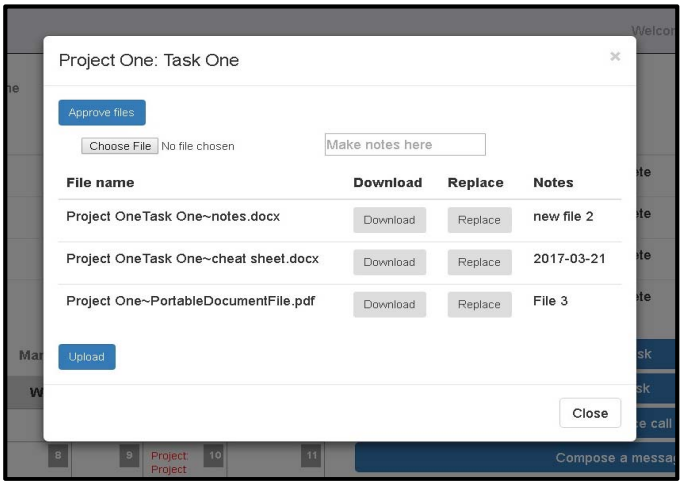

Fig. 4. project task screen.

Within the task, the assigned task owner has the ability to upload and download files to the server for all members of a project to review and contribute. Each action and file is recorded and a note can be included within each file description to keep as a change management future record for the task owner of the changes that were made accordingly. Each project leader can review to approve a task once all files are being accepted and all project deliverables have been submitted. Any changes to the task after approval will undo the approval process and the project leader must check all deliverables once again.

F. Conference Communication Design

Within each project, all members share the same conference space for communication illustrated in fig. 5. Illustrate real time conference communication screen. By having all real-time communication within a designated communication room, all members can join, communication, and contribute to a project while having full access to all previous conversations topics. All communication is not restricted in the conference room, and thus members are more inclined to participate.

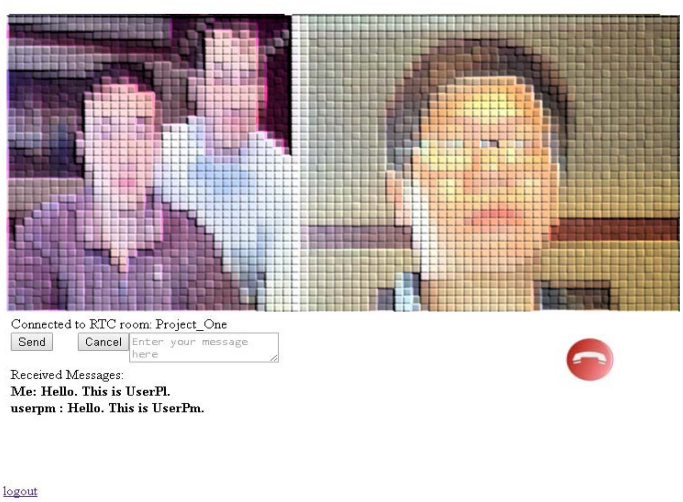

Fig. 5. real time conference communication.

G. *Message Communication Design*

Outside of project and conference rooms, users can communication with each other in real time, by sending text based messages to the project or members. This communication is open and is meant to notify users of changes or promote communication outside of projects, creating a more unified organization.

IV. Analysis and Conclusion

Following the development, production, and deployment of the application platform on a test server, System successfully created and deployed integrated communication and management functionalities within a web based server application. The application deploys the designed layered contribution system with distinct and visible roles, while employing unrestricted video, audio, text, and notification communication. Through these mediums, the application is capable of enforcing server and organizational structure, and enhancing information and data clarity in the organization.

Using the project management functions of system, users can successfully plan, organize, and structure projects and tasks to suit their organization's needs, as well as assign distinct roles to project members. Through the application, project leaders can structure and schedule each task, review all deliverables, and handle all aspects of the project through a simple to use and interactive interface. By assigning each project member as an owner responsible of a task's progress, the application builds responsibility and control into each action without the need for distinct coded restrictions or micromanagement. In addition, each user in the organization can communicate using audio, video, and text through peer to peer communication or in project restricted rooms. All task deliverables and modifications are stored in the server's dedicated database and file management solution so that users can recover and track changes throughout a project's completion.

Overall, the system provides all major functional capabilities required by users and organizations to plan, develop, and complete projects and tasks without the need for additional software or systems. The application platform compares and fulfills the same project management functionalities as its market competitors, while also being customizable and integrated with communication functionalities that are absent with competitor products. By providing an application that functions in an internet and intranet server with mobile and desktop support, system provides a flexible system and application that can better suit a dynamic business' social requirements.

For system to be an appealing market competitor, the application needs to provide businesses with not only comparable functionalities, but additional capabilities to generate value beyond the initial and unintended costs of replacing a pre-existing software environment. Deploying system to a large or established business would require restructuring and reorganizing of the business, along with training for and customization of the software and database to run optimally. The system primarily optimizes businesses through the integration of communication and project management functionalities. To replace existing software and respective methodology deployed in existing organizations for communication and management, significant tangible operational value need to be generated through the reporting and analysis features to offset the intangible and social costs. This is because large organized businesses built with competitor products will have established methodologies to compensate for the lack of software efficiency and can recall prior experience to manually collect functional information and determine the most optimal business strategies, and thus do not require nor see a need for an automated reporting system with large intangible costs. Therefore, system must target the limited market of middle to small businesses trying to optimize their business functions during their starting years, and promote itself by providing much needed reporting capabilities and an all-in-one application.

Future work must be completed for the application to be market competitive, as the current alliteration of system does not provide enough tangible value to be chosen over market competitors with greater experience and reputation.

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