# Web Base Project Management System for Development of ICT Project Outsourced by Iranian Government

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*Abstract*— **With the unprecedented growing of outsourcing ICT projects by the Iranian government, there is a critical need for proper execution and monitoring of these projects. It is proposed that a web-based project management system be put in place to improve efficiency and effectiveness of management processes and speed up decision making. Based on the information flow between various units involved in the complete life-cycle of ICT project management, a functional model and system architecture with various underlying structures has been designed. The functional model contains two sub-systems: process management and information service. The proposed system structure is based on a four-layer client-server computing model. As a part of any publically available ICT system through the Internet, it has to be made secure and protected against all sorts of cybercrime. It is envisaged that this system can bring efficiency in managing the projects as well as improve decision making and increase the overall management process with total accounting and management transparency.**

*Keywords- ICT project management; web-based management system; information service; accounting and management transparency; client-server computing*

## I. INTRODUCTION

The Iranian government ICT projects are growing rapidly in all forms in government businesses ranging from financial services to social and public services [1]. The government usually experiences huge problems trying to manage outsourcing of large ICT projects. Traditional outsourced project management methods are inadequate and fragmented. Project management systems are already ineffective for public projects that are causing numerous work bottlenecks, overloading workers, and inefficiencies from human-centered management systems and processes [2]. The huge variety and quantities of paper and document handling make management persons very confused, which degrades over time to the point where good personal are not readily available, resulting in over-stretched management teams and the overall smooth functioning of the institution[3]. In this day and age one would expect a web-based project management utility that is simple and offering tools to managing teams and institutions to provide optimum project management and with transparency.

Problems concerning low quality, increased cost, delay in achieving correct deliverables and avoid incompatible delivery to meet customer requirements prove to be a lack of correct communication and exchanges between user and supplier channels, varied and confusing forms of applying managerial methods which are incompatible with traditional forms experience. From the Iranian experience, corruption and failing of many serious public projects not only resulted in loss of national resources and investment, but also generated negative social influence and bad mouthing of the government and its policies.

Furthermore Iran's General Policies affirm constitutional and twenty year principles which refer to developing modern technologies, creating an effective IT system, using advanced technologies in education and research, and emphasizing private sector development. The Iran Strategic document on Information and Communications Technology affirms the need for balanced development in all dimensions of the Information Society with emphasis on ICT's function in facilitating, enabling and improving [4]. According to these policies, the Iranian government is outsourcing the projects to private companies regardless of boundaries. Control and supervising of the projects outsourced to third parties is a big challenge due to slow information flow and decision making process between different units and serving a knowledge network to various units.

This paper proposes a framework which applies management methods and processes based on integrated governmental project management information systems and information flows between various parts and departments. This is to analyze and design the construction of a web based project management system aligned with Iran's Policies and *"Twenty Year Principles"* to overcome all the problems mentioned in the previous paragraphs regarding development of ICT projects outsourced by the government agencies. Furthermore, it illustrates the system structure and supporting mechanisms.

## II. PROJECT MANAGEMENT INFORMATION FLOW

There are three levels in doing a project: strategic level, tactical level and operational level [5]. Major units who are involved in a public project according to their levels are shown in Figure 1.
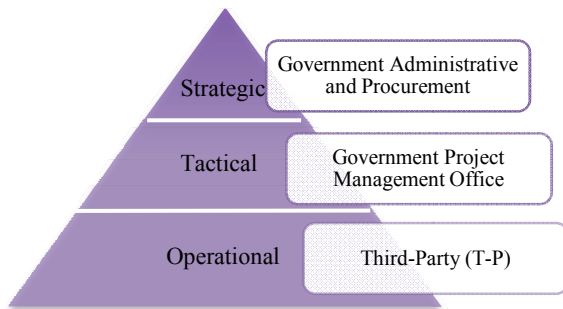


Figure 1. Public Project Team

Government Administrative and Procurement (GAP) departments have a key role in constructing and directing the execution of ICT projects. This department is the sponsor of public projects: therefore they directly supervise all kinds of projects. Moreover, monitoring work in progress at regular times, assigning funds and assessing quality of work already done are part of its responsibility with checks and balances. It is a complete project management life-cycle.

The Iranian Government Project Management Office (GPMO) represents government administrative departments and performs tactical responsibilities like bidding, contract management, evaluating project progress, funds, consistency and quality management. This unit is in charge of integrating management and supervising the accomplishments. According to the defined levels, Third-Party (T-P) performs the project processes. Most of the time private companies are the third parties. They are in command of making conformation on quality and project progress, provide deliverables, and report work progress to the GPMO. Vendors for designing, supervising and constructing are identified in bidding. After selecting the vendors and negotiating the contract, the contractors are supposed to accomplish their tasks and receive payment according to their legally signed contractual agreement and schedule of work. Figure 2 shows the main information concerning public projects. The difficulties existing in public projects are due to the great volume of information and high interrelation between information services. Information provided by services should be supplied to various people with different needs, from government administration to the public domain. The information flows becomes very complex when it involves one or more *subcontractors* and *other government departments.*

## III. FUNCTIONAL MODEL

The only way to overcome traditional non computer or web based project management is to specify and make one that is integrated as a whole inter-locking system of subsystems which execute various critical aspects of the project

management functions [6]. In general, the aim of Integrated Management (IM) is the understanding and effective direction of every aspect of an organization.
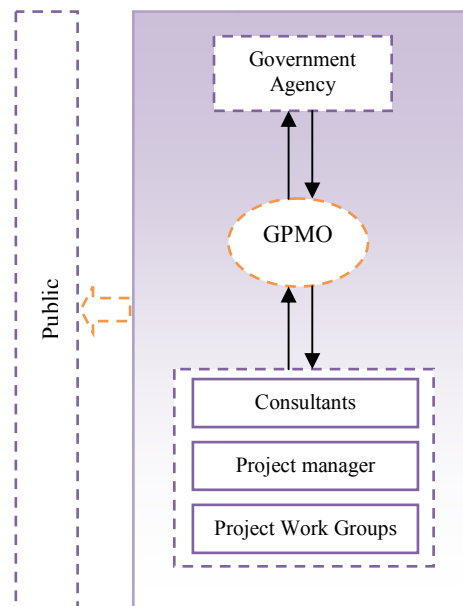


Figure 2. Public Project Information Flow

This concept can be applied and expanded to many management areas which include the concept of integrated cost management, integrated quality management, etc. Based on this definition, public project management uses project resources properly, improves management ability and by directing, satisfies all the various groups. Viewing from the government aspect, public project management communication and coordination have a significant role in the success of the project. At this point, the government faces two problems:

1. The first problem is co-operation and control of integration management in the different project process, such as bidding and working process management.

2. The second problem is to realize these process tasks, project information should be collected and distributed. Proposed system consists of two sub-systems to meet the mentioned requirements: process management sub-system and information service sub-system.

The proposed web-based project management functional model is shown in Figure 3.

### A. Process Management Sub-System

The process management sub-system, as depicted in Figure 3, is of concern to all of the activities related to managerial project processes like contract management. It is primarily concerned with three areas: Information management, management standard and process control.

Project departments, GPMO unit and work groups need to be multitasking information system from the beginning until the end of the project. It has four components which include Document Management (DM), Workflow Management (WM), Team Communication (TC) and Task Assignment (TA).

Figure 4 is about a multitasking information system which enables easy information management with standardized and monitored processes. Document Management System can be viewed as three main layers: input layer, document process layer and storage layer. The main function of the input layer is to upload files. In uploading files, metadata of the file which is saved in XML format, such as author, date and description are required [7, 8].

Core document management functionality is performed in document process layer. Two main functions of this layer are search files and search topics. In the case of file searching, the system has the capability of offering various search results based on the user's search criteria, such as the category of the file or by text in the description of the metadata of the file that results in improving search quality. Topic search is an integrated information search and display facility which shows results as per user request at near instant response. It allows users to extract useful information from all sources in the project for analysis and decision-making by researching related information in the project website, and integrating the search result [9]. In the third layer, Data Warehouse (DW) stores all information of public projects according to their concerning topics to feed information needs to various clients.

In the Workflow Management System, by adopting standardized workflow management method through information templates and automatic execution of business rules speed up the communication and confirmation of decisions. A workflow consists of several tasks, which are assigned to different project roles. GPMO defines the main tasks of "Process definition" and "Workflow administration".

After a task is finished, the system brings out the next task to be done. Team communication is a form of less formal discussion through instant messaging as chat or buzz, online conferencing, emailing, and project calendar. It facilitates and simplifies workflow management.

Task Assignment System is a personalized tool. Each user can assign a task and view his own tasks, alarms and status relevant to his job. This enables the users' environment to focus on relevant information. After task creation authorized members should update task information.

Each public project applies different standards like obeying contractual procedures and schedules or evaluation criteria. For example, evaluation criteria for selecting a project have a different rate in each unit. So the system should be able to allow users to define different factors and scoring methods by revising predefined factors.

Project management involves a series of steps and processes that have complex relation to each other. It means that output from one activity is an input to another activity. This subsystem applies to ensure the steps sequence and relation among them.

### B. Information Service Sub-System

This sub-system (refer to Figure 3) provides information services to satisfy client's demand for information. Therefore, it enables permitted users to access a broad range of information resources by designing a data warehouse and proposing inquiry services to promote transparency of management processes.
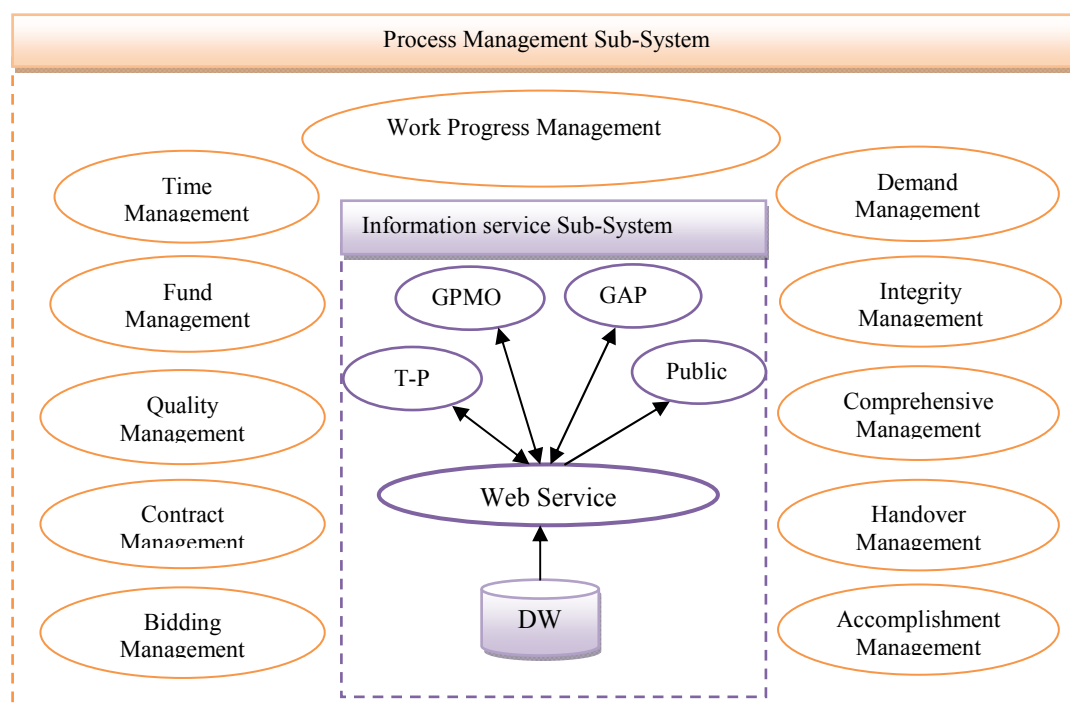


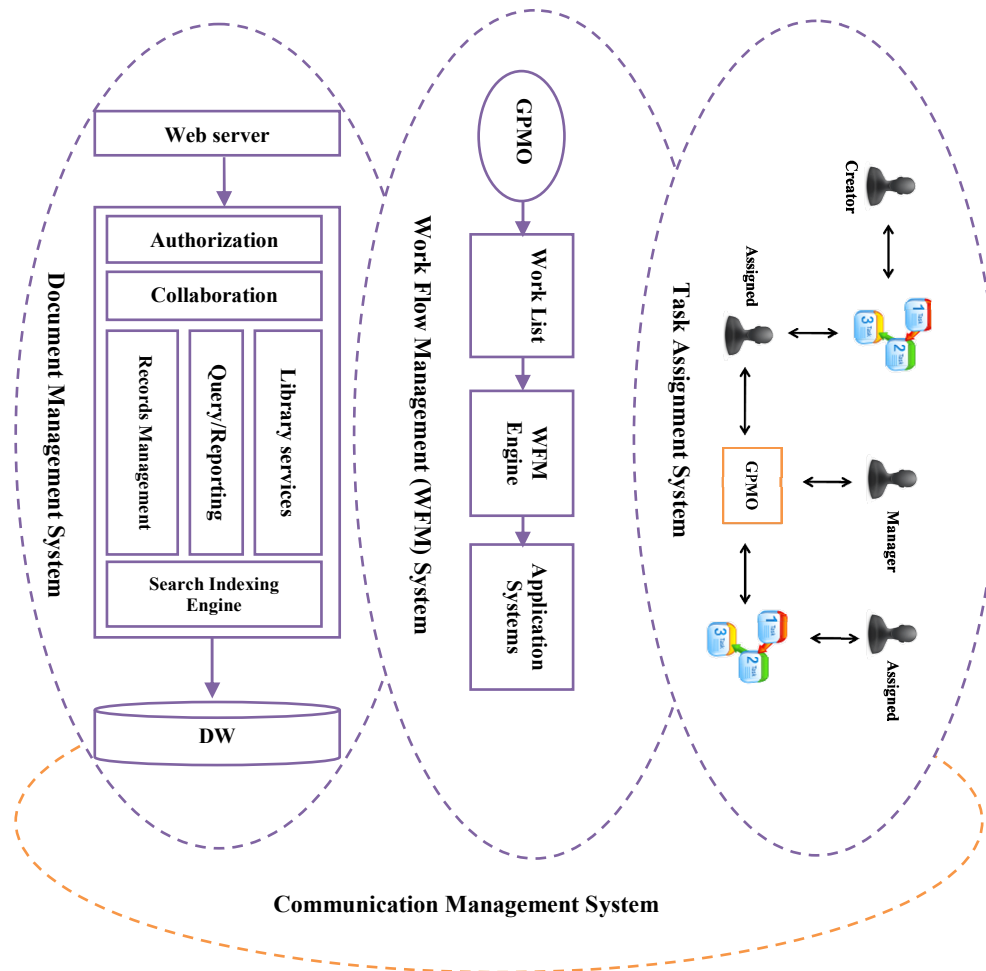Figure 3. Web-based Project Management Functional Model

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Figure 4. Process Management Sub-System

The data warehouse is the repository of all data from which information is derived that is meaningful in the context of its use. It is capable of comprehensively serving information for various client groups. For example, it offers to government administrative departments development project progress information inquiry services, actual and budget cost and schedule information services, and payment accounts services to facilitate both technical and financial auditing of projects in real-time.

In our model the public is informed about project news such as work-in-progress of projects through the inquiry services on different project items and relevant information in a layman understandable manner.

The information service sub-system can adopt various methods for providing the platform to produce information from project data which is meaningful and expressed in a readily understood manner to offer direct and dramatic information services for both the client and the project contractor [10]. For example, it can show work progress by Gantt chart or make comparisons by using the histograms, pie charts and graphs besides statistics [11].

## IV. WEB-BASED PUBLIC PROJECT MANAGEMENT SYSTEM STRUCTURE

In order to support the sub-system's structure and their functions, and selecting the latest technology around in ICT since its use ensure deployment and compliance of the web-based project management system to meet the entire essential requirements, including safety measures like security, privacy, trust, audit and digital forensics this system applies Client-Server model. Proposed system is constructed based on four-layers of a typical Client/Server presentation and processing calculating model that is shown in Figure 5.

1. Computer interface is the first layer. Clients of this system are from various levels with different applications that should be considered in the user interface at design stage. Clients in government administrative departments focus on project progress and assess whether the project process is compatible with contractual obligations or not. Thus, their interface style can be of a variety of charts (like Gantt chart),figures and tables showing the reports of project

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progress, the quality evaluation result and funds' ratio and providing feedback and comments.
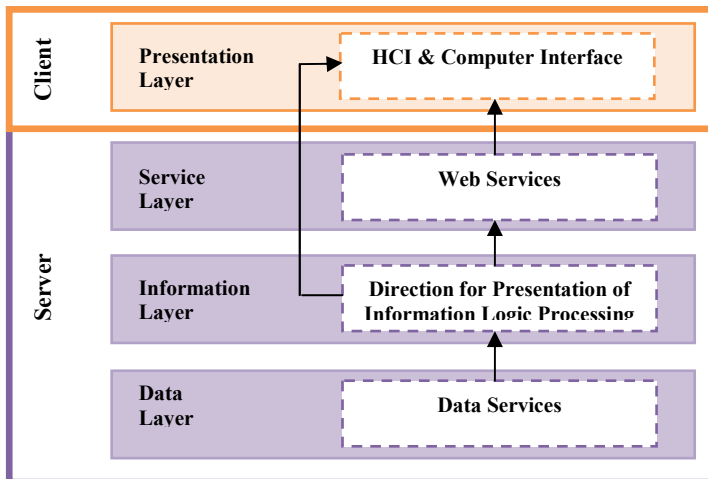


Figure 5. Web-Based Public Project Management System Structure

2. Web service is the second layer. It provides information services as well as a standard means of interoperating between different clients and applications. It means that web services share business logic, data and processes through the appropriate interfaces of the composite system. For example, when a unit needs to report a project status, a function would be chosen from the third layer, logic processing, to process the data for data-recoding and then would be processed in computer interface layer. When the work of logic processing layer is complete, feedback information reaches the web service layer, which chooses a method or function to deliver the information with the proper computer interface.

3. Direction for information logic processing is the third layer, which deals with specific logic affairs, including data maintenance for budget and quality information, contracts, bid documents, work progress, etc. It also analyzes data of funds comparison, work progress comparison, and quality records. In conclusion, it responds to client information query.

4. The forth layer is data service which goes through the data with reading, writing and sorting. Relational data warehouse is adopted as storage media for structured data such as funds, quality, etc, in contrast to unstructured content where the photo or video data file is adopted. Also a web server should be provided to deliver and support the public Internet services in a safe manner with appropriate security, privacy, trust, audit and digital forensic functions and processes to the give the overall system a very high level of confidence [12].

The adoption of a distributed data warehouse repository hosted in a distributed system computing environment with high-speed data accesses is essential to cover the whole country where the government departments are distributed in towns and cities. This requires very good security and operational safety in order to avoid the client having to visit the central data warehouse directly and also to deter hackers from penetrating the system to cause damage. The four-layered proposed model ensures integrating and extending the

capabilities of the system as well as reducing the degree of coupling in system modules to achieve connectivity, efficiency and openness in a safe and secure computing environment.

## V. PROTECTION AND SAFETY ISSUES OF WEB BASE PROJECT MANAGEMENT SYSTEM

It is hard to think of all the countless ways in which today's ICT affect us every day. Our social, business and political behavior as an Information Society is based on the rapid growth, deployment and uptake of ICT. This fact alone necessitates a very high *dependency* on ICT in all walks of life. This provokes the fundamental thought and requirement that those strongly interrelated technological infrastructures, as well as the information systems that underpin them and the means of networking technologies, become highly critical that their disruption would lead to high economical, material and, sometimes, human loss. As a consequence, the protection and safety of these critical information infrastructures is a major goal for the Iranian government and companies and various other interacting organizations.

Our proposed Web Base Project Management System is architected to ensure that as part of the critical information infrastructures, it covers both data security of information content through the use of cryptographic methods and access through open networks in cyber space through a set of safety measures in the form security solutions by means of protection, control and evaluation mechanisms [13]. These solutions are increasingly using wireless networks as one of the main technological platform because it facilitates distributed control and allows the different components of the system and network to remain functional and operative, even in extremely high alert or disruptive situations.

In order to guarantee the faultless interoperability of the protection, control and evaluation mechanisms, new security services need to be created. These services integrate into a service-oriented architecture of the Web Base Project Management System with the aid of a trust management model designed for this specific purpose.

New tools are required to pro-actively protect system under illegitimate attacks while laying bate to prosecute the culprit, and also to invoke processes to trace the culprit in order to prosecute after post-event has taken place. *Systems are never perfect, and this is never more true than for security and privacy because we can never prove that a system is secure and guarantees privacy, but only discover (eventually) when it no longer is!*

Under the bane of safety measures incorporating *security, privacy, identity management, trust, audit and digital forensics* our proposed architecture of Web Base Project Management System takes all of this into consideration.

## VI. CONCLUSION

This paper proposed a web based project management system for the Iranian government to manage all its projects

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more constructively, regardless if they were ICT based or not. The import issue is to use ICT and web technology to construct such a system. This paper described a functional model and system structure which has enormous capability to achieve robustness and transparency of the management process and improve decision making in an open distributed computing environment. This is currently lacking in the Iranian government administrative departments and project management units. It overcomes all the problems associated with a central system and traditional management processes, as is currently the case in Iran.

The proposed web-based project management system can intelligently search for relevant information, extract useful data, share updated information on progress, retrieve historical data for new applications, and control the sequence relation of project management steps. It can also contribute to increased collaboration and cooperation among various roles executed either by persons or by automated processes playing the role of persons in the project management processes. The proposed system is compatible with not only the traditional manual systems but other ICT or web-based systems which are much more reliable and easily support on an ongoing basis.

The proposed web-based project management system can bring efficiency in managing projects effectively and has a key role in, enabling and facilitating improving functions align with Iranian ICT policy statement. Over time, it will simplify and improve data collection which is currently fragmented in various units and departments that do not even communicate with each other properly. This will speed up decision making in various managerial levels regardless of the exchange of official letters. In the long term, it will decrease cost and make information available in real-time for administration and other departments to improve public projects. This will allow skilled personnel more time to concentrate and deal with other more urgent and important matters. At the same time they will be able to monitor the work in-progress, quality management, funds control, technical and financial audit much more effectively which will improve the overall project management efficiency and level of trust in the system.

Now, what is required is a detailed study against very good terms of reference to determine all the requirements for the proposed system and then present it to the Iranian government for their consideration. The detailed study is an absolute requirement as it concerns Iran as a whole, taking into account the concerns of access to the Internet, level of security and user acceptance. It will also help close the gap in the digital divide. ICT is perceived to be the only enabler, which can meet the demands of a modern, forward looking Iran heading in the direction of a fully developed country or nation in the fraternity of nations of the world. This paper is a provocative action in that direction!

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