Study on Project Management Information System of Engineering Based on WBS

Niu Bo[1, a], Chang Yi [2, b]

[1]School of Civil Engineering, Xi'an University of Architecture and Technology, Xi'an 710043, China

[2] School of foreign languages, Yulin University, Yulin 719000, China

[a]nb198069@126.com, [b]foam0713@163.com

Keywords: Project Management, System, WBS.

Abstract. The complicated trend of project management enhanced the difficulty of project management. In this paper, with the help of the overview of WBS (work breakdown structure), it describes the construction of the project management information system of engineering based on WBS, so as to meet the multi-objective and multi-level control needs of civil engineering's project.

Introduction

Since 1980's, both the domestic and overseas earthwork engineering's projects have shown more and more characteristics of large-scale, complication, at the same time, the modern project management has become more and more difficult with more and more contents are involved. Compared with the past, now the owners, the contractors or the project managers often have to participate in the entire construction of the project, the construction time of the project is extended forward and developed further, more and more kinds of information is involved in the process of the implementation, the difficulty of the construction as well as the requirements for the technology and quality is improved continuously, the demand on information interaction for each department and unit is increasingly enlarged, the exchange and transmission of information have become more and more frequent, the complexity and difficulty of the project management of civil engineering is more and more outstanding.

The Overview of WBS

Modern project is developing increasingly with the direction of large-scale and complication, which has greatly increased the difficulty of engineering's project management. Computer becomes one of the indispensable management tool. How to combine the computer technology with the engineering's project management more closely together is one of the main subjects of engineering's management research. The WBS method is an advanced, effective method for the modern project management, which a method is based on the principle of system, as well as the foundation of the project plan and control. By using the WBS method, it can very well apply the computer technology and database technology to project management more effectively, which can make the implementation of the integrated management of engineering projects, and improve the efficiency of management.

WBS is a set of all work or activities for the completion of the project's goals, the graph of WBS is the concrete manifestation of WBS. There are three main basic elements for WBS, namely: hierarchical structure, coding and the decomposition structure dictionary (specification for work package).

WBS is working through the decomposition tree structure, so as to determine all the work of project. WBS is a common basis of project's information communication system, which is the object of the system's integration and control, at the same time, it is the most important tool for project's management. The main difference between WBS and traditional schedule is that WBS is a collection of all project work, but the traditional schedule generally does not contain the elements of project's management. While the project's management elements are 100% in line with the coverage principle

of WBS, which can allow WBS to overwrite the project's management and execution work, at the same time, it can also make WBS have more broad application.

In the general project, since the target and scope can be determined, thus, the project's implementation and management work can also be determined. But in large engineering projects, it is difficult for the conventional method to deal with the project management, control and implementation, which should divide large engineering project into easily managed work-packaging model through WBS.

Work-Packaging Model

The basic unit of work- packaging model is the work package, and the work package is formed on the basis of the result of the decomposition, by using WBS after the decomposition of project. The main idea of this model is to take the "work package" as the basic object of the specific project control. A basic content of the work package is composed of one or several engineering activities or sub projects, shown in Fig. 1.

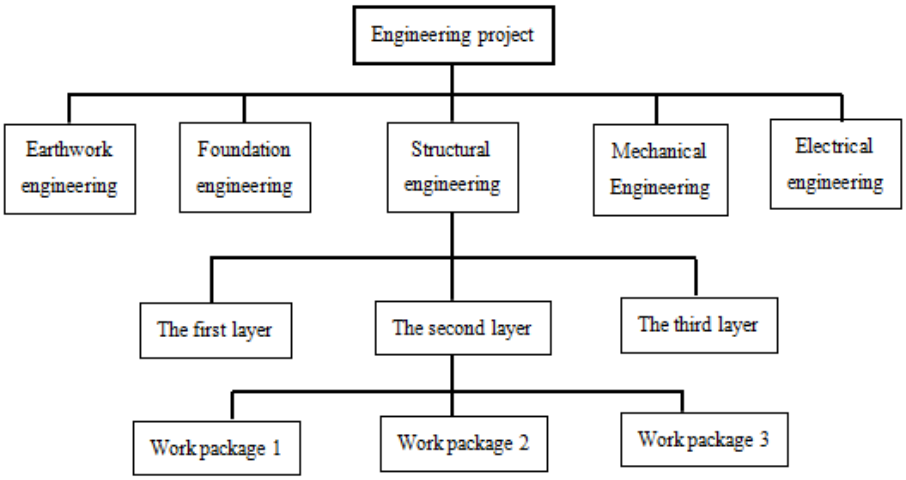

Fig. 1 The work -packaging model

Using the method of system to decompose the project of WBS from the top layer to the bottom layer, during the period of decomposition, it is necessary to ensure the independence of the task, but also should ensure the integrity of the task, so as to reduce the difficulty of project's management objectives and improve the efficiency of project's management.

The establishment of working model can be combined with project's management organization structure, the establishment of the matrix of the assignment of authority, which can solve the problem that the task assignment of engineering project team is difficult, at the same time, it can improve the project's management level of the enterprise.

Organizational Structure

In accordance with the different positions and functions of programme management office in the organizational structure of programme management, this paper divides the organizational structure into tactic type and strategy type.

Organizational structure of tactic-type programme management

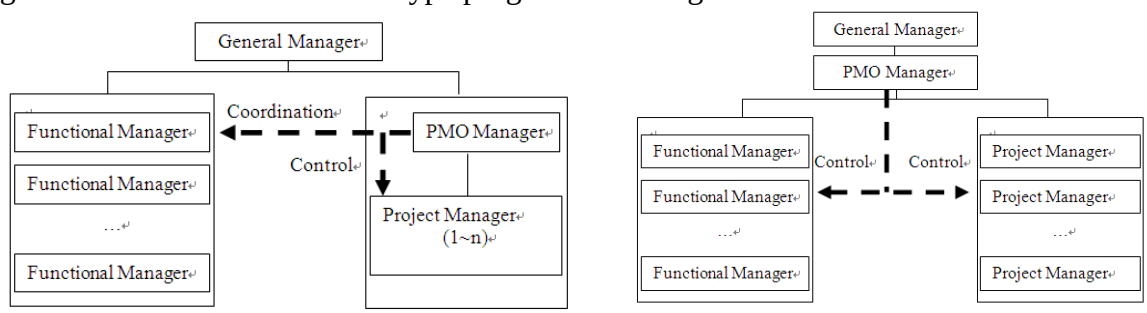

Fig 2 .Organizational structure chart of tactic-type programme

Fig 3 .Organizational structure chart of strategy-type programme

Taking the characteristics of tactic-type programme management into consideration, such as clear objectives, expected earnings easy to be measured and appraised and small adjustment range in response to changes, and comprehensively weighting its organizational level and span, its organizational structure is shown in Figure 2. From the lateral section, the programme management office is responsible for coordinating with other functional departments on affairs conductive to successful programme management and reporting to general manager on its work. From the longitudinal section, the office is responsible for directly managing its projects, optimizing the distribution of resources and mediating the contradictions between projects to provide supports for the successful implementation of projects. Project manager directly reports its work to the programme management office which is in charge of the successful implementation of programme.

Organizational structure of strategy-type programmer management. In strategy-type programmer management, the strategic objectives of organizations are often obscure and incomplete, their implementation methods are also changeable with environmental changes, their expected earnings are difficult to be forecast, and they need control and certain flexibility. Under such a circumstance, in order to avoid the confusion of responsibilities caused by the decentralization of power and too many requirements on managers and enhance the effectiveness and efficiency of programme implementation, it is necessary to set up an integrated and powerful centralized control unit to complete the four main tasks including coordination, control, support and appraisal. The organizational structure of strategy-type programme management is shown in Figure 3. The programme management office lays out the strategic objectives comprehensively to determine the implementation methods and action tactics. From the lateral section, the office can mobilize resources of each department, and allocate and optimize these resources according to the priority of projects. From the longitudinal section, the office is in charge of dividing the objectives, defining the priority, analyzing the constrained relation and interface, and launching and ending the projects. Moreover, the office also needs to monitor and appraise the programme dynamically during the implementation, bring the implementation of programme into correspondence with the objectives throughout, and analyze and evaluate the earnings received.

The Realization of WBS Structure Tree

In this system, since the decomposition of WBS is the core module of the whole project, which is also the platform for the project management staff to have communication, interaction and management, moreover, the other functional modules have close relationship with this Module.

Because the displaying method of WBS project's decomposition is a tree structure, which is displayed on the left frame browser of the screen, thus the establishment of the project tree becomes the core part of this function module.

The generation of project tree can not leave without the link of database, therefore, its so first part is the link database, after connecting with the link database, it should generate the preliminary shape of the tree, adjusting the tree control, and the code is as follows:

```
List Item it=new List Item ( " All items " , "  " );
it.Selected=true;
This. drop Type. Items. Insert (0, it);
//Displaying tree structure
If (Request.Params[ " jx No " ]!=null)Project Type=Request[ " jx No " ].To String();
this. Create Tree (Project Type);
```

According to the above description of WBS, after the initial formation of the project tree, it should form the root node of the project tree, which is a general description of the project, and the code is as follows:

```
Tree Node Root Node=new Tree Node ():
Root Node.Image Ur1= " …/Resource/images/icon05.gif " ;
```

```
Root Node.Selected Image Ur1= " …/Resource/images/icon01.gif,;
Root Node.Expanded=true:
this. Project Tree. Nodes.Add (Root Node);
if (Project Type= "  " )
{
Root Node. Text= " All items " ;
Root Node. Node Data= "  " ;
Root Node.ID= " Tree View Root " ;
Init Type (Root Node);
 }
e1se
{
Root Node. Text=type:
Root Node. Node Data= "  " ;
Root Node.ID= " Tree View Project " ;
try
{
//XML the statement of data read
}
Catch (Exceptionex)
{
Response. Write (ex.To String ());
}
Init Tree (Root Node, Root Node. Node Data);
}
```

After generating the root node of the project tree, it can decompose the root node further, forming the second layer of the structure of the project tree, what this layer can show the project is a sub-project, it is also the first decomposition of the root node, which is the first task division for the project, according to the above explanation of project tree , the node of this time can be further divided into tasks, it also can be connected with the contract, so that the construction units can go on with the construction. The establishment of this layer of the project tree, the difficulty lies in the determination of the parent node and child node, however, we can distinguish between various projects according to the number of the project, without using the inheritance relationship of class, and the specific code is as follows:

```
Tree Nod tmp Project Nd;
Data Tabledt=new Data Table ();
dt=conn.Get Table( " The statement of data retrieval " );
foreach(Data Rowdr Typeindt. Rows)
{
tmp Project Nd=new Tree Node();
tmp Project Nd.Tex=dr Type[ " DB1_2 " ].To String();
tmp Project Nd.Node Data= "  " ;
tmp Project Nd.ID= " Tree View Project " ;
tmp Project Nd.Image Ur1= " …/Resource/images/icon05.gif " ;
tmp Project Nd.Selected Image Ur1= " …/Resource/images/icon01.gif " ;
tree node.Nodes.Add(tmp Project ND);
tmp Project Nd.Expanded=true;
try
{
dtbls Project=conn.Get Table(The statement of data retrieval)；
```

```
}
Catch (Exceptionex)
}
Response. Write (ex.To String ());
}
Init Tree (tmp Project Nd,Root Node.Node Data);
}
```

After generating the sub- node of the project, it should use the algorithm to traverse the node, checking whether this node is a leaf node, if it is then it can be directly generated, otherwise it should continue to traverse till it can find out all the leaf nodes of this node.

Conclusion

By using the network of WBS, it can realize the control over the project's schedule, which can make the project management of earthwork engineering become more convenient and effective, it is also conducive to the management of human resources of the project, the material management, as well as the target control and many other parts, but it doesn't mean that only paying attention to the network of WBS is a panacea. Since it is affected by the coding scalability of WBS, the constraints of the limited knowledge and capacity of the staff, the executive ability, the establishment of the rules and systems of the enterprise, the compatibility of the project and enterprise and many other aspects, thus, during the process of setting up WBS, the enterprises also need to be improved constantly, which also should constantly adjust the architecture of the executed WBS, so as to adapt itself to the need of the enterprise's development as well as the project's development.

Reference

[1]Abel, D.J. 1989, SIRO-DBMS:A database tool-kit for geographical information systems. International Journal of Geographical Information Systems, vol.3, pp103-116.

[2]David J.Abel, Kerry Taylor1.Ross Ackland & Stuart Hungerford, 1998, An Exploration of GIS Architectures for Internet Evironments. Comput.Environ. and Urban Systems, vol.22, pp7-23.

[3]MacDonald Barr, & Moyer, D.D. (Eds.). 1984, Special issue on‘Current Issues in the Development of Land Records Systems’Computers, Environment and Urban Systems, vol.9, pp 2-3.

[4]M-C. Chen. 2005, Predicting Changes in Frequently Fluctuating Time Sequences in Distributed Database, Information and Control, vol.28, pp773-781.

[5]P. Schnorr, I-T. 2002, Lam Turning Efficient Data Smoothing Techniques for Highly Dynamic OLAP Applications, Data and Knowledge Engineering, vol.23, pp103-112.