Research on Development Process Methods of Management Information System

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Abstract—While introducing briefly the development process of management information system (MIS), the thesis depicts three kinds of development methods which in common use, such as the Structured Development, Prototyping Development and Object-Oriented Development. On the base of this, it puts forward the problem of oneness about them by comparing three development methods through two approaches.[1] At first, it discusses their oneness by comparing the development process of three kinds of development methods. Secondly, it depicts their oneness by comparing the development width and depth and brings forth the development process model, perfect degree function \( H(t) \) of the three kinds of development methods.

Index Terms—MIS; Development Process; Development Methods

I. INTRODUCTION

Along with the unceasing progress of science and technology, the development of market economy and the need of our country’s economy reform, it’s now urgently needed that we should stand on the existing foundation, summarizes the experience, research the current problem, in order to set up an information system model, which forms from the whole by the single item to the synthesis, from disperser to centralism, from partial to overall situation, from the management style to the decision supporting style, establishes enterprise sharing and netted database management information system model. With this model, from the simulation present management system to the impetus present management system reform, the enterprise's management information modernization can be accomplished. Therefore, it’s extremely essential and urgent to develop the management information system method of exploitation and the urgently needed, economical, standardized management information system.[2]

II. GENERAL PROCESS OF MIS DEVELOPMENT

The MIS development is quite a systematic work. Its developing process involves the suitable organization, dispatch and the use of human resources, money, materials and so on. It involves the organization supervisory work improvement and working pattern viciissitude. To every project, there’s a process which including the question proposed, proves to the question analysis, the plan design, until the plan implementation and appraisal, so as the process of MIS development.

The system development is a dynamic concept. The previous step’s output will be took as the next step’s input in this system, at the same time this output takes as the previous step’s dynamic feedback. The system carries on a dynamic alignment in this kind of dynamic process, unceasingly enhancing and consummating.

III. THE COMMONLY USED METHOD OF EXPLIITATION AND CALSSIFI-CATION OF MIS

In the early time of system development, because of the lack of system development thought, there had not been able to form the project concept, which brought to “the software crisis” so-called in 60s, but also it gave rise to a new science – “the software engineering”. The MIS worker proposed to the information system development many methods of exploitation, commonly used as the following three, Structured Development, Prototyping Development, and Object-Oriented Development.

A Structured Development

The structure Development has manifested the method of exploitation which includes: from top to foot, structured and the life cycle thought, mainly includes:
- Structured analysis design technique;
- Structured system method of exploitation by E. Yordon;
- Business system plan (BSP);
- Strategic data plan by James Martin;
- Representation model design method (RMDM) and information system designing and engineering synthesized analyze (IDEA) proposed by our country experts;
- Jackson structured program (JSP) and Jackson system development (JSD) by Jackson;
- Black box theory and its corresponding analysis design method for system development proposed by Harlan D. Mills.

The Structured Development is based on the system thought and systems engineering method, it takes the user as the principle; it uses the methods like structured and modeled to carry on the analysis, the design and the implementation to the information system. In the actual performance, to the general process, the mainly used methods include Structured Analysis, Structured Design, Structured Program.[3]
Structured Analysis is a kind of analysis methods faces to the data stream. There are two ways to use the structured analysis to solve the problem as “decomposition” and “abstraction”. In this stage we use the tools such as Data Flow Drawing (DFD), Data Dictionary (DD), Processing Logic expression (PL), Data storage standardization (NF) and the Data Immediately Access Drawing (DIAD), Through SA we can obtain a systematic and abstract logical model.

Structured design (SD) is a plannned design which based on the logical model proposed in the stage of SA. Through the SD process, it can enhance the system on the operating efficiency, the variability, the controllability and the work quality as far as possible. The SD work mainly includes the code design, the document/Database design, I/O Design, module functional design and treating processes design. SD provides a whole set design tools, principles and strategies, uses the insinuation thought to get the SC chart from the DFD chart.

Structured programming (SP) uses some basic structure controlling tools (IF...ELSE...ENDIF, DO WHILE...ENDDO, DO CASE...CASE...ENDDO and so on). It does the code design under the principle that expanding from top to foot, modeled and gradually, in order to obtain a realistic physical model.

### B Prototyping Development

Prototype Development is a tool and method of exploitation based on the new generation of system development, mainly includes:

- Prototype method and its branches(Like waterfall and fast method);
- Computer assistance software engineering (CASE Method);
- In order to establish the special environment for the information system development, the method for defining and generating actual system;
- Compared to the traditional life cycle development, the prototype Development thoroughly abandons the process of investigation, analysis, arranging documents, following with the logical design and the physical design, instead, it can get the physical model quickly.

While, that’s not to say that there’s no process of investigation, analysis, arranging documents. In fact, when the designer creating the prototype system, that has been included unconsciously or consciously. The prototype system contains the thoughts of designer’s analyzing, designing and comparison, but the designer express his understanding using the physical model, omitting massive document materials.

### C Object-Oriented Development

Object-oriented Development (OO) is a system method of exploitation developed recent years. It has something in common with the prototype Development. The difference is, the object-oriented analysis will be carried on just after the system diagnosis. It emphasizes the system analysis before system design, emphasizes taking data or information as the master line of system, it describes the system information comprehensively, systematic and exhaustively, establishes the system information model, guides the system design.

According to the general system development process, Object-oriented development (table 1) can be divided into the Object-oriented analysis (OOA), Object-oriented design (OOD) and Object-oriented programming (OOP). OOA attempts to use the object concept to describe what to do, meanwhile, OOD attempts to describes how to do. OOA and OOD mainly use Class-Chart/Template, Object-Chart and jest-Status-Chart as the tools. OOA uses the concepts like Class, Object and Data Encapsulation, and uses the inherited and multi-stated properties of the object-oriented language to carry on the procedure of establishment and debugging.

<table>
<thead>
<tr>
<th>method</th>
<th>process</th>
<th>Structured Development</th>
<th>Prototype Development</th>
<th>Object-oriented Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis</td>
<td>SA</td>
<td>PA&lt;sup&gt;a&lt;/sup&gt;</td>
<td>OOA</td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>SD</td>
<td>PD&lt;sup&gt;a&lt;/sup&gt;</td>
<td>OOD</td>
<td></td>
</tr>
<tr>
<td>Implementation</td>
<td>SP</td>
<td>pp&lt;sup&gt;a&lt;/sup&gt;</td>
<td>OOP</td>
<td></td>
</tr>
<tr>
<td>Tools</td>
<td>Structured languages DFD,DD,PL, NF,DIAD,SC and so on</td>
<td>4GLs, Fast generating machine, CASE software and so on</td>
<td>Class-Chart/Template, Object-Chart/Object-oriented languages and so on</td>
<td></td>
</tr>
</tbody>
</table>

We may see them all to have an analysis, a design and an implementation process. (Like TABLE 1 ). Using the prototype development system, the development person also has a consciously or unconsciously analysis, design and implementation process. One may see from the table 1, these three commonly used methods of exploitation have unities in certain significance. Once the designer understand the unities and the characters, no matter which method he use, it’s easy for the work to go well.

### V. THE PERFECT DEGREE OF MIS

We also may discuss the system consumption degree unity of these three commonly used methods of exploitation from another angle. Every system consumption has two aspects, one is the horizontal aspect of the development consumption, that is the...
perfect degree of the system’s overall function structure limits scope, we call it the breadth development or the level development; another is the system’s vertical direction level development to the system’s concrete detail consummation, we call it the depth development or the vertical development. Like Figure one Shows:

![Diagram of depth and breadth development](image1)

Figure 1. Depth development and breadth development schematic drawing

The depth development first chooses a representative module from the functional modules which users proposed in the system, and then carries on careful work to the entire process, making it as perfect as possible, trying to show the highest level. The breadth development first analyzes all the requests users proposed, and sets the requests as the goal, then considers each module’s function, we can use several curves to express the prototype development and the structured development in the level and the vertical directions’ performance. Like Figure 2 Shows:

![Diagram of system development](image2)

Figure 2. perfect degree of MIS system schematic drawing

Among: w- breadth; d- depth; h- Perfect degree; t- time

\[ h_0 - User	ext{ requests’ perfect degree;} \]
\[ w_0 - User	ext{ requests’ perfect breadth;} \]
\[ d_0 - User	ext{ requests’ perfect depth;} \]

If uses the breadth development pattern, the system development breadth expression is:

\[ w(t) = f_w(t) + f_{dw}(d,t) \] (1)

\[ f_{dw}(d,t) \] Stands for he depth aspect influence, When uses the breadth development.

If uses the depth development pattern, then the system development depth expression is:

\[ d(t) = f_d(t) + f_{wd}(w,t) \] (2)

\[ f_{wd}(d,t) \] Stands for he breadth aspect influence, When uses the depth development.

Then the System development perfect degree H (t) May use W, D, T to express, as:

\[ h(t) = f(w,d,t) \] (3)

In summary, the system performance can be described as:

\[
\begin{align*}
  h(t) &= f(w,d,t) \\
  w(t) &= f_w(t) + f_{dw}(d,t) \\
  d(t) &= f_d(t) + f_{wd}(w,t) \\
  h(0) &= w(0) = d(0) \\
  h(t_0) &= h_0 \\
  d(t_0) &= d_0 \\
  w(t_0) &= w_0
\end{align*}
\] (4)

From Figure 2, we may see the curve1 and2 conform to the fast prototype method characteristic. They achieve the user satisfaction separately from width and depth first, and then from the depth or the breadth consummation degree, make the user finally to be pleased in the overall system. Curve1 is the depth development pattern, from curve3 it can be seen, along with time passing, the system consummates unceasingly. But in the period of the head and middle, the system development progresses extremely rapidly in the depth, but insufficient in the breadth; to the later period it’s opposite. The same principle, in the breadth development pattern, the system development and the depth pattern are opposite. It’s not difficult to see that to curve5 it conform to the development characteristic which the structure reduction work is strict, fortifies at every step, it also pays great attention to the breadth and depth.
VI. SUMMARY

In the developing process of MIS, it’s important to keep space and link up. MIS cannot be completed in one or two days, it is a gradually strengthening and unceasingly expansion process. Like to build the building, it’s important for the MIS developing to make an entire plan, to leave enough space for the future expansion, to build the first floor, to maintain the system. Then, how to utilize this kind of thought to the system gauge and design, to the system document and the database structure definition, to the system’s functional module design, to the man-machine contact surface, these the questions now in front of us.

REFERENCES

[2] Li Meng, Peng Zhi-zhong, Interface Management in Enterprise Informationization, the fourth international EC Conference Column, 2004