

## **2.8 How the DTCN Methodology was Created, and a Comparison of the Steplist Procedure with Conventional Procedures**

### **2.8.1 Introduction**

### **2.8.2 How DTCN methodology was created**

### **2.8.3 Considerations**

#### **2.8.1 Introduction**

In this section, we explain how the 7 basic methods of DTCN were developed, and how they differ from conventional methods.

#### **2.8.2 How the DTCN methodology was created**

The history of the DTCN methodology is depicted in Fig. 2.8-1.

(1) From 1970 to 1975, the US Department of Defense had the problem of soaring development and production costs for weapons, when compared with the average inflation rate. To solve the problem, it put forward the policy of Design To Unit Production Cost (DTC) as DOD Directive 5000.28, 1975.

(2) At this point, however, methods and procedures for entirely new development projects with cost control were incomplete. It was only conjectured that value engineering with function analysis as its core would be useful. Nevertheless, Design To Cost was put into effect in the US, utilizing existing parts and making minor changes, though lacking a well-organized DTC method. The results were the A-10 ground attack plane and F-16 fighter plane, which represented significant achievements.

(3) In Japan, the author was making a study of reasonable price, and in 1973 presented a paper "Steplist For Reasonable Price" at the proceedings of JSVE (Japan Society of Value Engineers).

The paper was further presented at the International Conference of the Society of American Value Engineers held in Los Angeles the following year. It was then when the author encountered the Policy Concept of Design To Cost. Regarding the situation in the US, the author believed that the policy concept of Design To Cost could be made into a procedure by developing the way of thinking of the Steplist for Reasonable Purchase Price.

(4) For this, the author judged it necessary to combine

i) value engineering devised by Laurence D. Miles,  
 ii) the KJ Method devised by Jiro Kawakita, and  
 iii) the NM Method devised by Masakazu Nakayama,  
 and to add new ways of thinking and further procedures. He was able to obtain permission from each originator for this enterprise.

(5) Based on the above, methods were created, presentations were made in Japan and the US, and procedures were worked out for the policy concept of Design To Cost. The process culminated in their official adoption by the Japan Defense Agency and the National Space Development Agency.

The details of the process above are given below by the papers presented. They may perhaps illustrate how a way of thinking develops.

A. 1973 Steplist for reasonable price

B. 1976 Method of steplist management

C. 1976 Mechanism of decision-making by information of difference

D. 1978 Method of Key Word (PMD Method)

E. 1978 FBS Technique (presented in 1980)

F. 1978 New Thinking and its Procedure for Design to Cost: this was applied on a trial basis in helicopter development, and was generalized in the paper.

G. 1980 3-Phase Improvement Method (later updated to 3-5 Phase Improvement Method in 1988)

The results above were officially applied to the development of a medium jet trainer by the Japan Defense Agency in 1981.

H. 1981 WBS Theme Phasing Technique

The above results were incorporated into the development of the H-2 rocket by NADSA (National Space Development Agency), long-term logistic support of the medium jet trainer, market creation of a product, establishment of a helicopter emergency rescue system (in collaboration with the Emergency Society, Anesthesia Society, Resuscitation Society, and the Fire Defense Agency), and drafts for the Next Generation Integrated Information System with some very large organizations.

I. 1988 Effective use of the questions "In order to do what?", "How to do?" and "Why" questions

J. 1988 Implementation Plan Document Method

K. 1988 Root Organizing Method etc.

(6) The author improved the method to allow its general application to market creation and information system construction, and named it "Design To Customers' Need (DTCN)."

(7) If we review the above, we can summarize the resulting system as:

- i) The basis is the DTCN and its supplemental methodologies. In terms of computer software, they correspond to the operating system (OS) in a computer system.
- ii) Based upon this (OS), there is the cost-conscious DTC using DTCN methodology as an application software.
- iii) Other applications, also corresponding to application software are expected to be developed by respective experts (as of 1992-1996)
  - The method of CIM construction using DTCN methodology
  - The construction of organized intelligence using DTCN methodology
  - Process improvement by multivariate analysis using DTCN methodology
  - Combination of DTCN methodology with the QFD (Quality Function Deployment) method devised by Yoji Akao

(8) Fig. 2.8-2 is meant to compare the scope of conventional cost management methods and DTCN methodology in a historical context, and in what phase these methodologies can effectively be used..

### 2.8.3 Considerations

Considerations on the nature of DTCN methodology are given in various chapters, but here we compare the Way of Thinking and Procedures of Steplist and conventional methods, the former being the starting point of the development and the matrix of other methods.

Fig. 2.8-3 shows a comparison of steplist procedures and the phase division of conventional scientific methods and value engineering. The following are comments derived from it.

- (1) Scientific methods are suited to research natural phenomena and the mechanisms of already existing things, and the phase division is constituted to do that.
- (2) Value engineering is useful for reanalyzing what is truly necessary, and proposes a more cost-efficient version. (Because this method starts with the question "What is it?") And since the methodology shows only up to the proposal phase, it has a mechanism of possible rejection.
- (3) In the method of steplist management, the subject name is clarified at the start point by the parties concerned using the method of Key Words; the basic function and intended result are clarified; and then the objective is realized. Therefore,
  - i) unlike the proposal of value engineering which can get rejected, the steplist procedure always proceeds with agreement from the beginning. Also, since it follows phased decision-making up to the final goal,

unfeasible plans can be readily aborted.

ii) The steplist procedure is not only a method of improvement and review, but is also a method of creating things without precedent by creating direction of value among the people concerned. Therefore, it is a task-realizing method, which can accept new challenges, in contrast to the scientific method, which is concerned with the verification of hypotheses. Since the DTCN methodology including the steplist procedure utilizes the results of the scientific method to create new things, we can say that it is an engineering method.

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Fig.2.8-1 How DTC and DTCN thinking and procedure were born

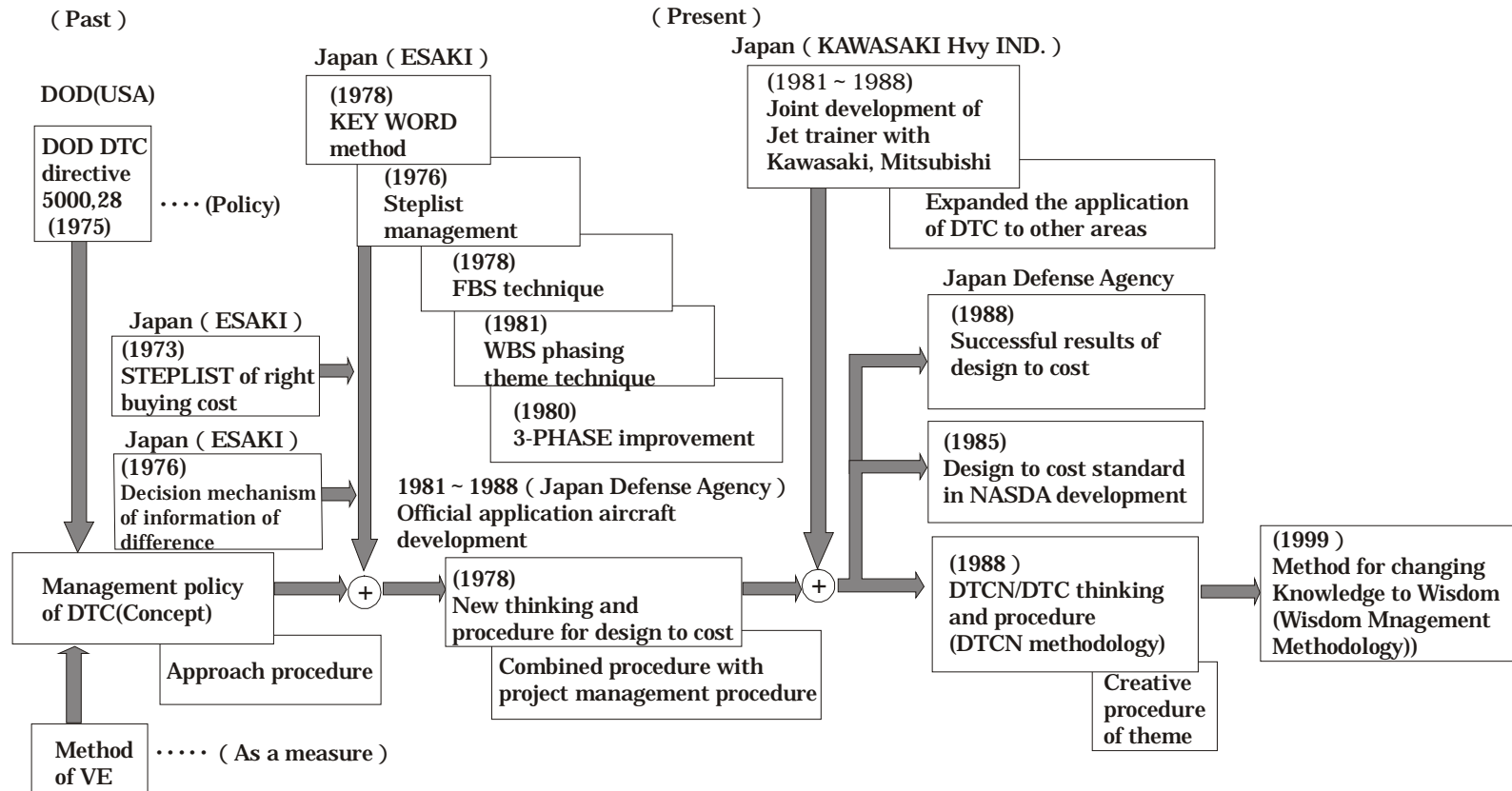


Fig. 2.8-2 Historical development of methodology in each phase of lifecycle since Taylor's Method

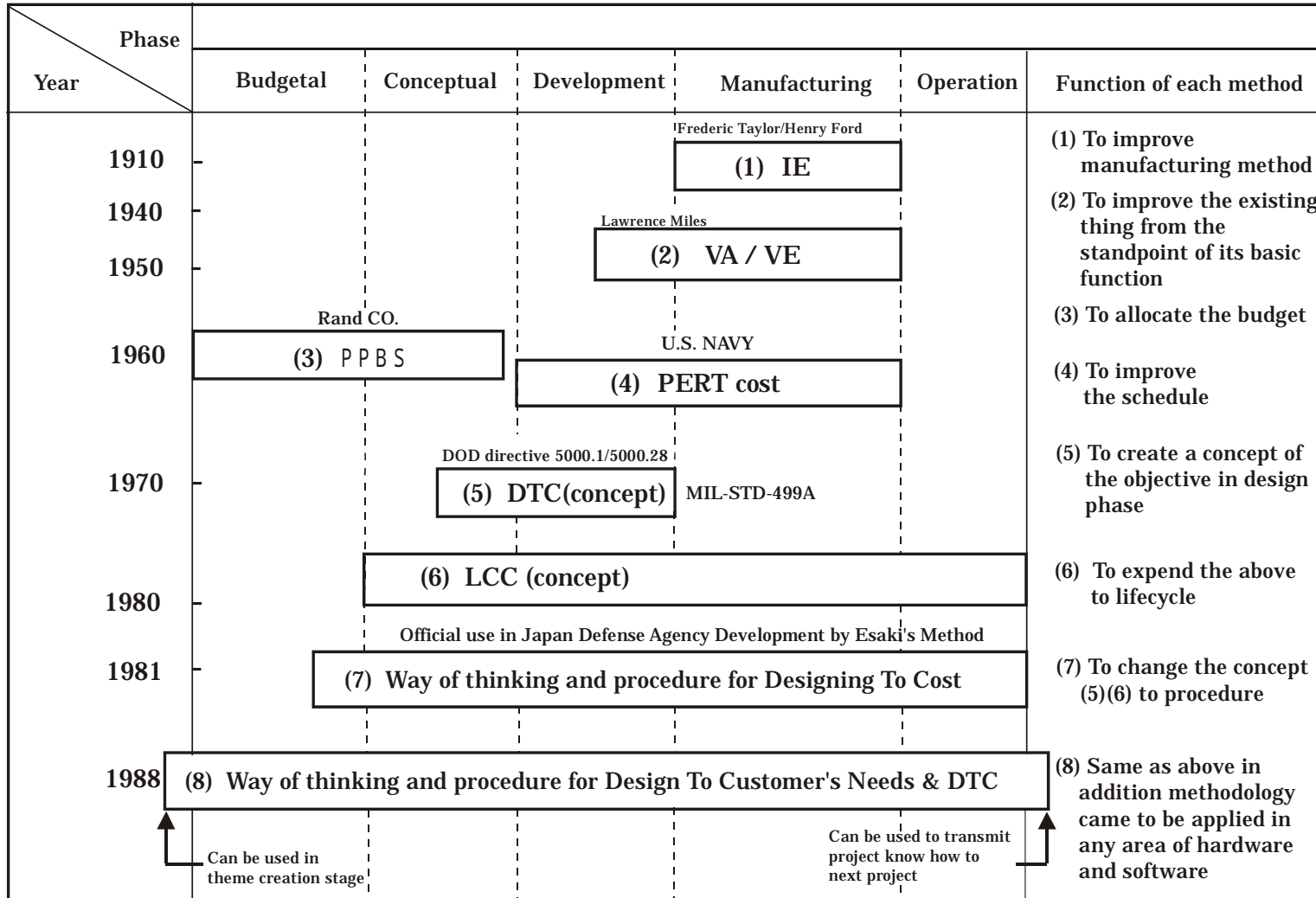
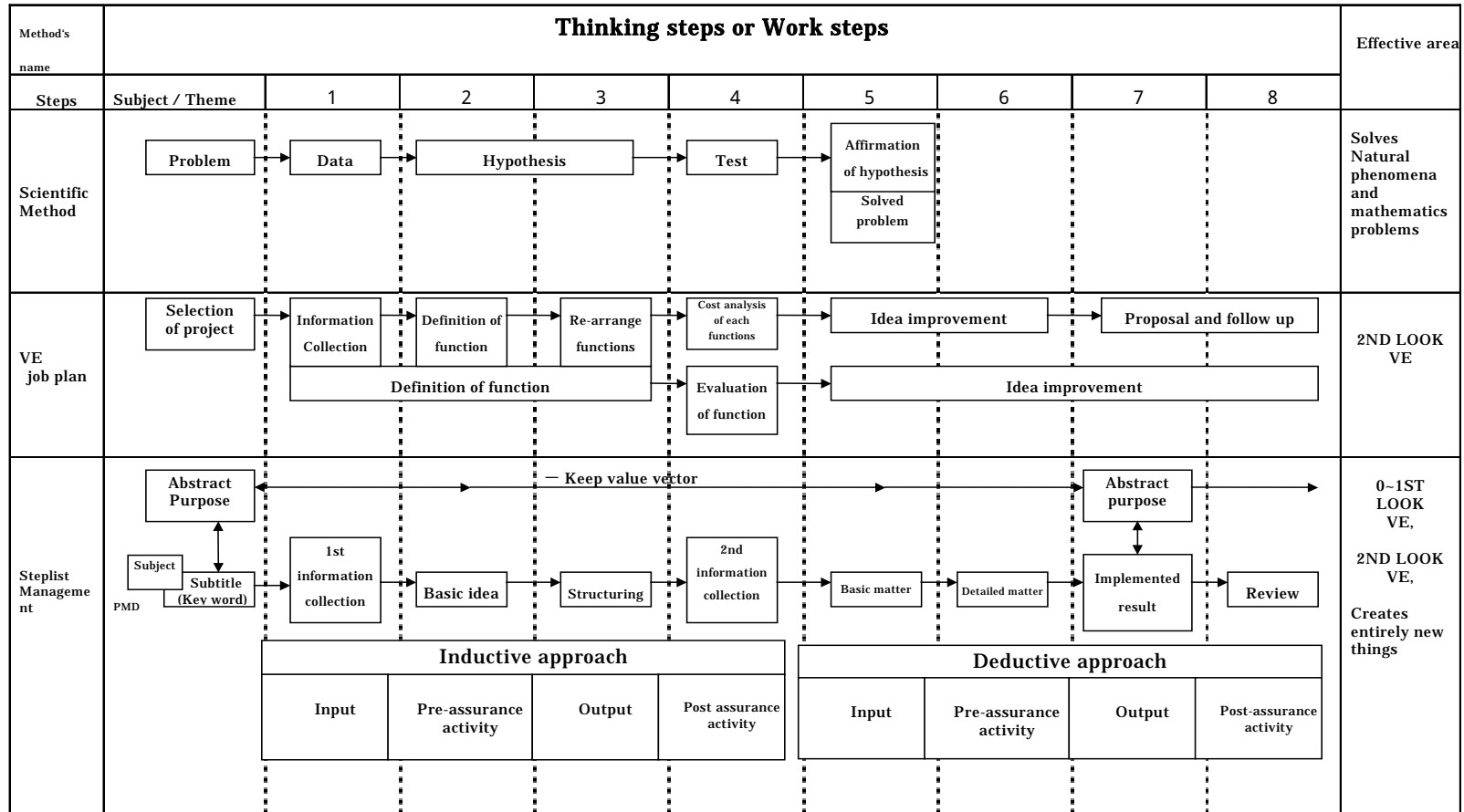


Fig. 2.8-3 The comparison of steplist management process with conventional management process



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