Chapter 3

Establishment of Factors-Criteria-Metrics Structure
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This chapter identifies the structure of factors, criteria, checklists and metrics for the characteristics of the products and processes in the development of management information systems (MISs) by adapting and enhancing McCall’s Factor Criteria Metric (FCM) model. McCall’s FCM model is explained in Chapter 2.

This project defines the following terms before the structure is established:

i. Management Information System (MIS)
A software that manages data in the database.

ii. Product
An artifact or deliverable which is produced at the end of a development phase in the development of MISs. For example, software requirements specification and design specification.

iii. Process
An activity involved in the development of MISs. For example, preparing a software requirements specification and performing unit testing.

iv. Characteristic
An attribute of a product or a process in the development of MISs.
3.1 Factors

In this project, a factor is defined as a characteristic of a product or a process in the development of MISs that cannot be measured directly. A factor has two or more criteria that affect its score. The measure of the extent to which a factor is satisfied can be obtained by combining the scores of all the criteria for that particular factor. A factor is graded as excellent, good, acceptable, poor or very poor.

3.2 Criteria

In this project, a criterion is defined as a characteristic of a product or a process in the development of MISs that can be measured directly. A criterion can be either a normal criterion or a compulsory criterion. A compulsory criterion has a strong impact on the factor score. If any of the compulsory criteria for a factor fails, the factor would fail. Each criterion is assigned a weight to indicate the importance of the criterion to the factor. A weight is a positive number.

3.3 Checklists

Each criterion for a factor has a checklist. Each checklist has one or more statements. A statement of a checklist can be either a normal statement or a compulsory statement. A compulsory statement has a strong impact on the criterion score. If any of the compulsory statements for a criterion fails, the criterion would fail. Each statement of a checklist is also assigned a weight to indicate the importance of the statement. Similarly, the weight is a positive number.
For an MIS development project, a statement can be of the following types:

i. a fulfilled statement

ii. an unfulfilled statement

iii. an unavailable statement

If an MIS development project fulfils a statement, the statement is a fulfilled statement. If the project does not fulfil the statement, the statement is an unfulfilled statement. If the statement has not been checked by users of the project, the statement is an unavailable statement.

### 3.4 Metrics

The general formula for the score of a statement of a checklist is as follows:

If a statement of a checklist is fulfilled

\[
\text{Statement Score} = 1
\]

Else

\[
\text{Statement Score} = 0
\]

End If

The general formula for the score of a criterion is as follows:

\[
\text{Criterion Score} = \frac{\sum_{i=1}^{S} (\text{Statement Score}_i \times \text{Statement Weight}_i)}{\sum_{i=1}^{S} \text{Statement Weight}_i} \times 100\%
\]

where S is the total number of statement of the checklist for the criterion.
The general formula for the score of a factor is as follows:

\[
\text{Factor Score} = \frac{\sum_{i=1}^{C} (\text{Criterion Score}_i \times \text{Criterion Weight}_i)}{\sum_{i=1}^{C} \text{Criterion Weight}_i} \times 100\%
\]

where \(C\) is the total number of criterion for the factor.

### 3.5 Structure

Figure 3-1 shows the structure of and relationships among a factor, its criteria and checklists. This structure is adapted from McCall’s FCM model.
Figure 3-1 Factors-criteria-metrics structure