CHAPTER V

SYSTEM REDESIGN AND IMPLEMENTATION

This chapter examines the healthcare process redesign through the implementation of the regulatory framework, to improve the existing condition as a whole. Implementation methods were taken to develop the system redesign, and the research tool for this study, were a set of questionnaire and survey forms, designed to collect data and measure efficiency improvement on healthcare service quality.

5.1 IMPLEMENTATION METHODS:

The implementation methods were extensively review from the literature; how industrial practices are adopted and implemented within quality management scope of the hospital, and combining with consultations from hospital management professionals and hospital information system experts, who suggested for manufacturing system to be applied in the hospital. After that, implementing the proposed regulatory framework and its procedures (Figure 5.1), to the front reception, by training of personnel to consult with regulatory framework in companion with checking patients' priorities with the patients' database. And afterward, conducting of surveys by using questionnaires and different set of forms.

Figure 5.1: Training of Personnel to the Regulatory Framework

In order to provide a structure basis for the surveys' criterion and each program's process design. The first task was to observe documents and operations of each program's transaction; and identify what are the activities in series of

connections. Where some of these were accompanied from the information in the process chart and flow of activities process (Table 4.2-4.3), as to depict all value added steps.

The conclusions were drawn from the implementation methods are that some attribute of industrial practices used are closely related to the regular-basis practice of the hospital. In selecting the patients for these surveys, the main criterion was that the hospital has already implemented the regulatory framework and its related steps of block-flow diagrams of each healthcare program and also the decision-tree diagram. In developing the regulatory framework, the approach was taken with review of all aspects from empirical model, data collection, and to data analysis, in which the implemented detail processes are as shown in the schematic (Figure 5.2):

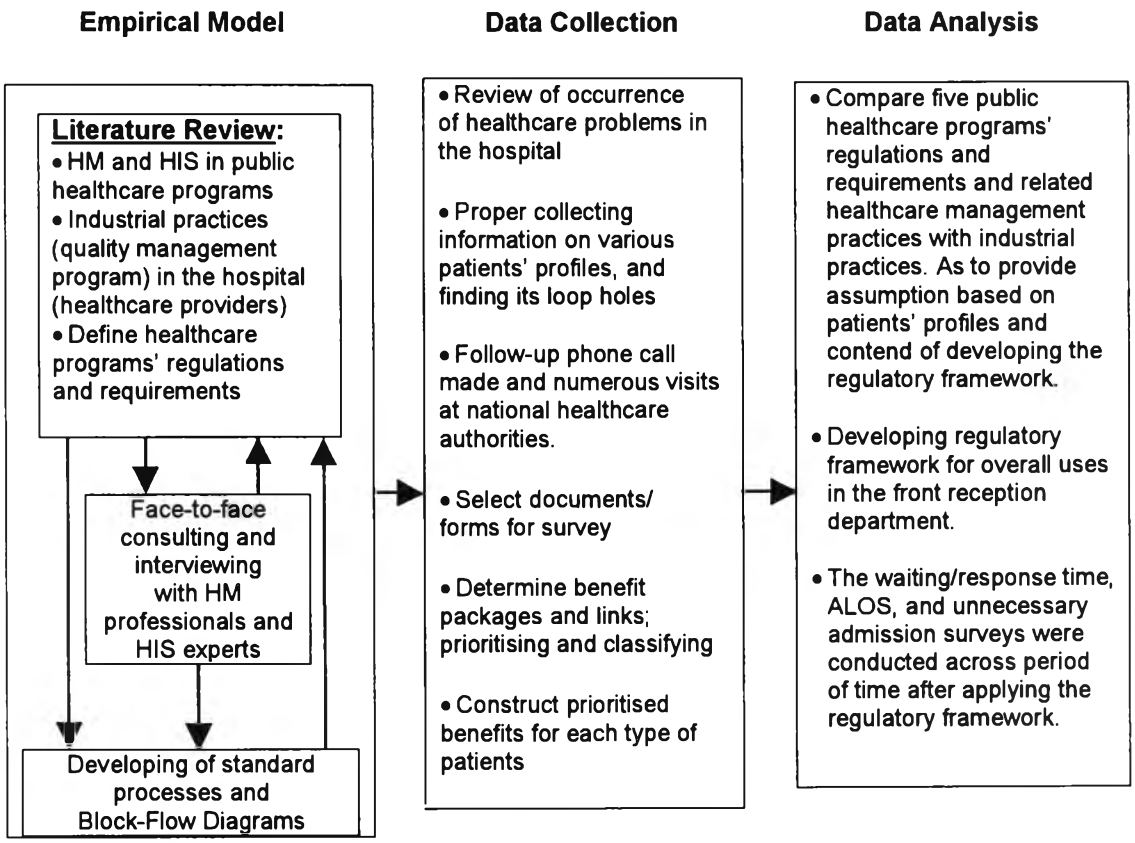

Figure 5.2: Schematic of Implementation Methods
Note: HM stands for hospital management

All set of surveys were conducted during January-April 2005, and separated in two parts. First part, this survey was performed and administered on healthcare registered patients and general patients (walking-in patients), during the January-

March 2005 with the objective to measure the reduction in ALOS and unnecessary admission (see Appendix C-D). The second survey was conducted on different set of patients, in which 200 healthcare patients were asked to partially fill out the waiting/response time questionnaire (Appendix B) before registration in the front-reception counter. These survey forms were designed for the purpose of testing the hypothesis based on that the implementation of regulatory framework. And its results will be set to indicate the improvement of the existing condition throughout.

5.2 IMPLEMENTATION ACTIVITIES:

Four weeks in April 2005, were spent conducting waiting/response time survey and assisting the implementation of the regulatory framework. Generally, the waiting times of the process that delivers the service along workstations and information flow are associated with the patients' routes (Direction of production flow: Figure 4.3). This means that the personnel activities were not specified, as to simplify the process transactions. As the first task was to identify series of activities in connection with the whole process, in three workstations.

During the implementation period, four personnel are on shift, either one of personnel can process new patients case and transactions whenever patients come in, then, the other personnel could check on patients previous profiles. And handles all other duties so that the filing personnel can retrieve OPD card. Then the filling process begins, this calls up the OPD card, by retrieving of the OPD card. Then, the personnel pick up the OPD card and enter it into the filing process. And once, the patient enters workstation # 1, set of OPD card with programs colours labeled is to be printed in the reception area (printer 1). Thus, the OPD card labeled '*new patient*' would go out from the reception area, and to the filing room (workstation # 2). When the OPD card is transferred to the workstation # 2, the card would be placed in the normal delivery shelf to notify the gatekeeper nurses (workstation # 3) that the patients are waiting in the reception area.

Therefore, when the gatekeeper nurses received the OPD card, she/he will notice that OPD card is filled with archival copies of descriptions from previous patient visits and doctors' prescriptions, and be appended. After that, gatekeeper

nurse picks up the appended OPD card and used them to pick with the admission assessment form and admission form (Appendix D) from inventory shelf. The nurses would see that the appended OPD card listed on the doctor's orders. Apparently, it is common practice for the gatekeeper nurse unit to resend OPD card, if they feel that the process is taking too long to arrive. This situation shows that how the flow of activities chart could address unspecific activities, which resulting in poor interaction between the patient and the hospital personnel. The process chart can reveal these entire steps from register to deliver the patient to gatekeeper nurses workstation # 3 take about 37 minutes of work per typical healthcare patient, under existing condition.

Under the new designed process, all front reception units will use colour-coded label attaching to the original files (includes the appended OPD card). This makes the program's type clearer to the front personnel, gatekeeper nurses, and other medical staff. Thus, these detail procedures will be corresponded in block-flow diagrams for each program operation and standardised for specified activities, and make connection between the overall workstations. Noting that even during business peak hours, four personnel are on duty to process OPD/IPD cases orders, and calculated other information (number of survey forms) regarding implementation activities.

5.3 IMPLEMENTATION RESULTS:

The results indicate that there is a clear link established between existing condition management with applying industrial practices and along with the effective implementation. As a result, the average waiting/response time averagely dropped by 26.5%, where the average time in each workstation was derived from the lead time table (Appendix H). However, these results substantially reduce complexity of the front reception's processes, owing to the designed regulatory framework which lead to better operational performance. Also, it appears that the establishment of direction of process flow and connection between workstations and departments (Figure 4.3) contributes to better operational performance.

However, the short-term measure is to shorten the waiting/response time, and the long-term measure is set to monitor the ALOS, so that the medical stuff would no longer have to be cautious on controlling the LOS of each patient case, since it can be substantially handled by the front reception and also the administration (in term of billing collection). This results were made clear that the applied industrial practices has improved the healthcare management condition, in term of reducing priorities errors and effectively transform existing operational processes to better design operational processes.

5.4 **DESIGN OF PROGRAMS'PROCESS:** Creative process redesign (BPR)

In this section, design of operational process identifies the opportunities for improving the quality of healthcare service, we emphasises on how decision analysis can be used to solve overlap, equity, and interconnect problems as quick as with a limited number of decision alternative. Decision analysis is used to determine optimal guideline, especially when the patient is faced with several priorities. The concept of system design can provides illustration of the maximum benefit packages approaching decision making of the patients.

In addition, we will need information on the benefit packages associated with each combination of a decision alternative and events. Given the five programs, which guideline should give the most benefit packages, in order to answer this, we refer to the outcome resulting from making a certain decision associated with the benefits, using structuring decision system table (Table 5.1) to estimate all possible events that can occurs. The notation used in this design system is derived from decision analysis (Anderson, 1991) and is denotes with decision alternative (d_n) and events (s_n). The intersection point of the decision tree is denoted by '*node*'. Then, it is called event node, which is denotes by circle. We will begin to structuring decision system by considering overlapping of the healthcare programs.

Structuring Decision System: Possible priorities of a general patient

These possible events are shown below, to explore every possible priorities (nodes), and it can be associated with the patient's information. In order to illustrate the optimum decision approach, the first step is to identify five decision alternative where denotes by d_n. The second step is to identify the five possible events that might occur, denoted by s_n. These events are referred to the multiple of priorities as shown:

Events (s_n) Decision Alternative (d_n)	$s_n = 1$ UC	$s_n = 2$ SSF	$s_n = 3$ IN: RAA HI PA	$s_n = 4$ WCF	$s_n = 5$ CSMBS
$d_n = 1$ UC					
$d_n = 2$ SSF					
$d_n = 3$ IN					
$d_n = 4$ WCF					
$d_n = 5$ CSMBS					

Table 5.1: Structuring Decision System Table; showing 13 possible events of priorities
Note: The shaded areas (black) indicate mutually exclusive of priorities

To arrive at all the possible events, the management views them by using *IF-THEN* rules. By setting public healthcare regulations as existing information, and using the rule to obtain derived new information. In order to design this decision system, we will need to interpret information on the regulatory framework (Table 3.4) associated with each combination of the d_n and s_n.

Develop Decision Making Process:

A decision making process is a decision rule that is to be followed by the patient. What benefit would the patient received, these can normally be viewed as '*IF-THEN*' scenarios which are often used to represent the empirical consequences of a given condition (O'Brien, 1999). Only five if-then scenarios shown, and in this case, we refer it to suggested maximum benefit nodes in the decision-tree diagram:

i. IF UC ∩ IN then which node to follow?
ii. IF SSF ∩ IN ∩ WCF ∩ CSMBS then which node to follow?
iii. IF IN ∩ SSF ∩ WCF ∩ CSMBS then which node to follow?
iv. IF WCF ∩ SSF ∩ IN ∩ CSMBS then which node to follow?
v. IF CSMBS ∩ SSF ∩ IN ∩ WCF then which node to follow?

Since the selection of the best benefits program from various of requirements, when the patients are faced with the complication of multiple priorities. Therefore, the overall objective is to improve the patients' ability to make their sound decision in using the healthcare programs. The medical care personnel must make decision of proceeding operations on the patients, this decision analysis could represent by a decision tree, in which the hospital can be certained about the cost of its medical conditions, since incorrect choices will lead to the unnecessary admission.

Moreover, for the estimate HIS, the centralised system mention in the first chapter will be planned. Then, the CPDB schematic which showing its both transaction systems between patients and the hospital as shown below (Figure 5.3):

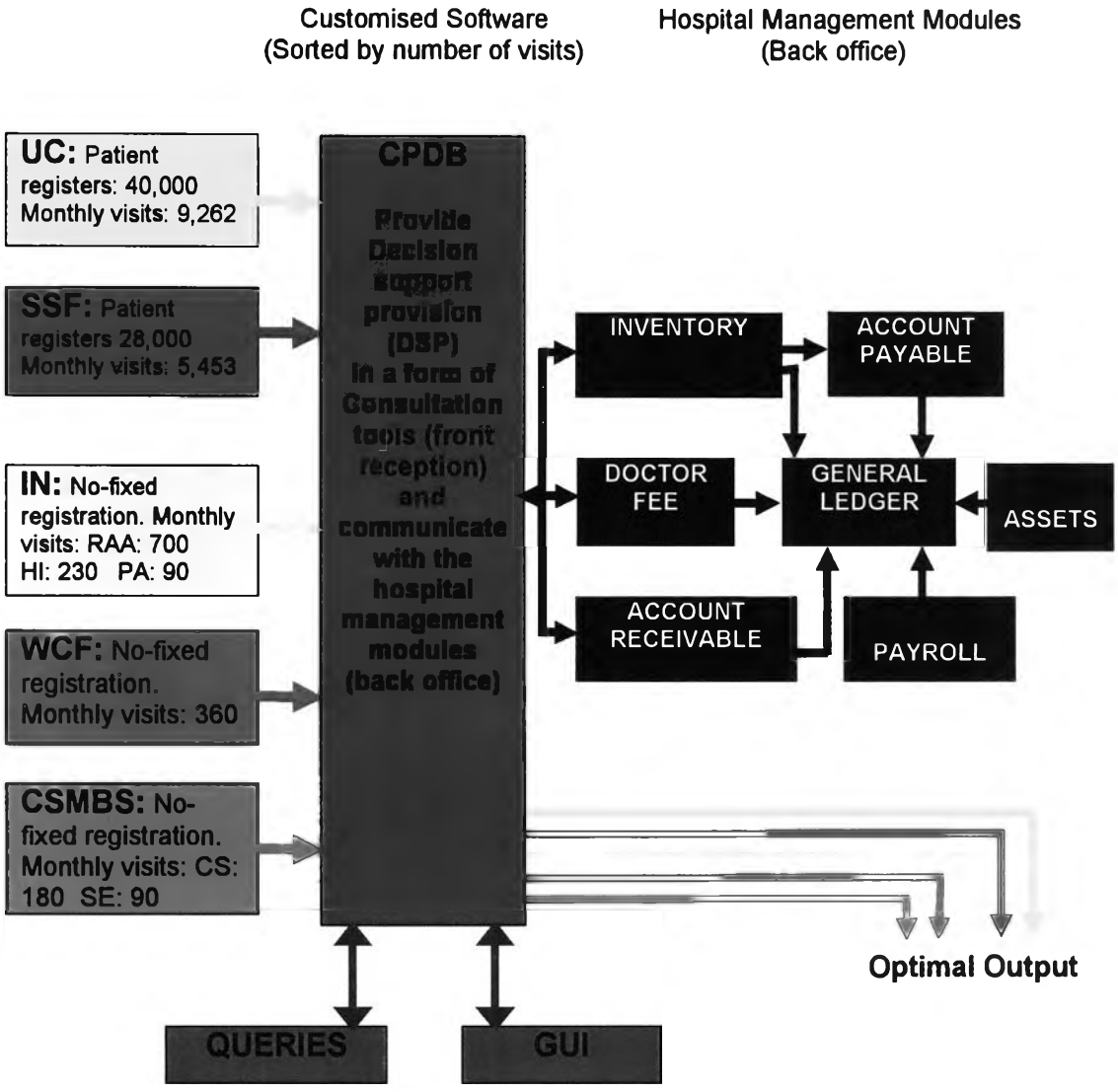

Figure 5.3: Schematic of the CPDB system: Classifying inputs, prioritise by number of patients visits

Optimal Decision Making: Decision-tree; suggested nodes and process

A decision tree diagram can provide graphical representation to explain the illustration of processes. It is also provide a useful method for showing how the problem can be decomposed, as well as showing sequential events of the decision process. According to Anderson (1991, p. 600), "*there is no one correct way to develop a decision tree for a specific problem.*", owing to that, in our case, decision maker views the same problem from different application. The decision tree diagram is as shown:

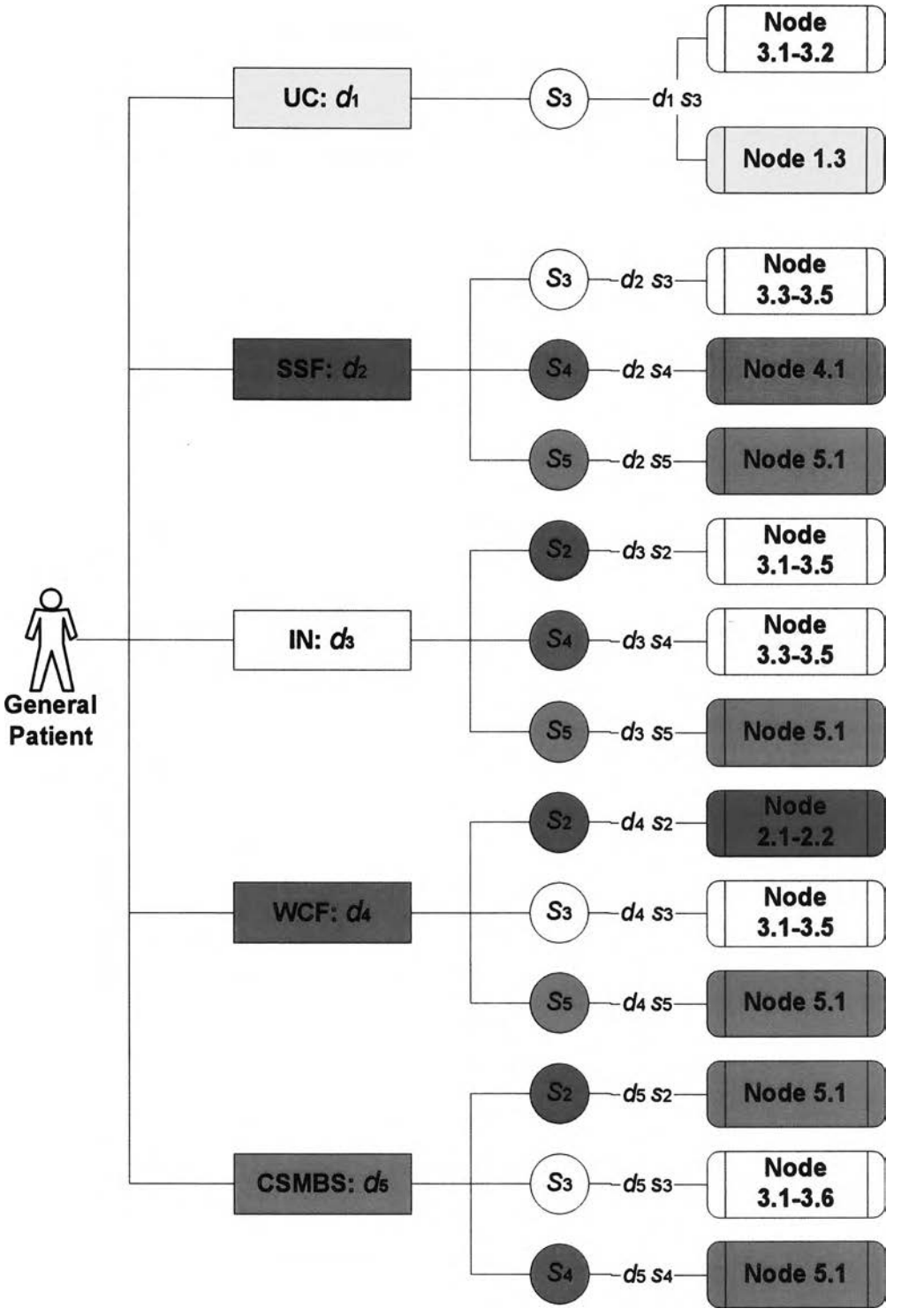

Figure 5.4: Suggested Nodes of General Patient's Priorities
(Only two priorities combination shown)

Programs' Procedure: Flowcharting (BPR)

In this section, we develop standard process of each program, by transform unstructured processes into routinised processes, as for steady flow of information that generates each program's node description. Each node contains block-flow diagrams and corresponds to the decision tree diagram, and defining as nodes-labeling procedure (Figure 5.5-5.15):

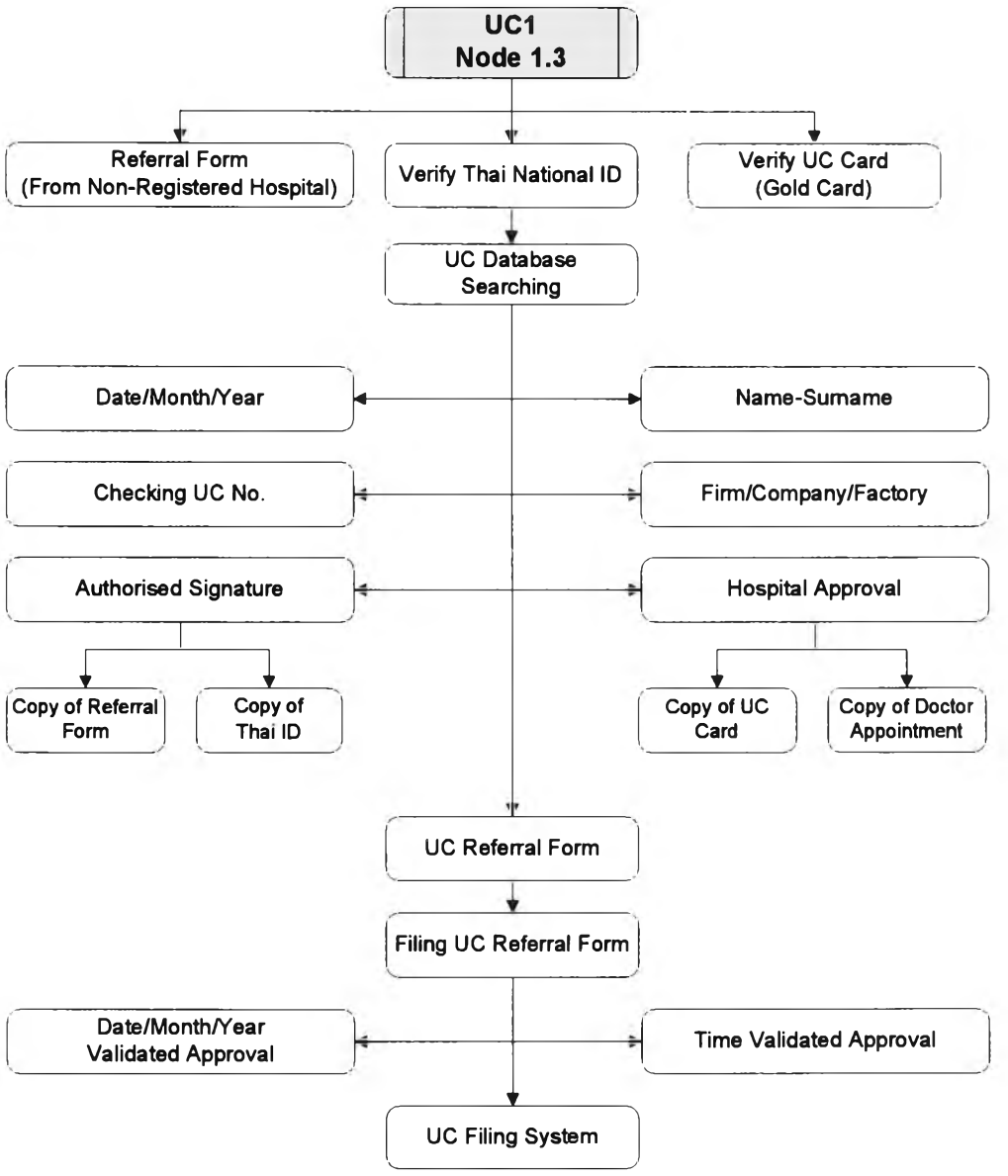

Figure 5.5: Node UC

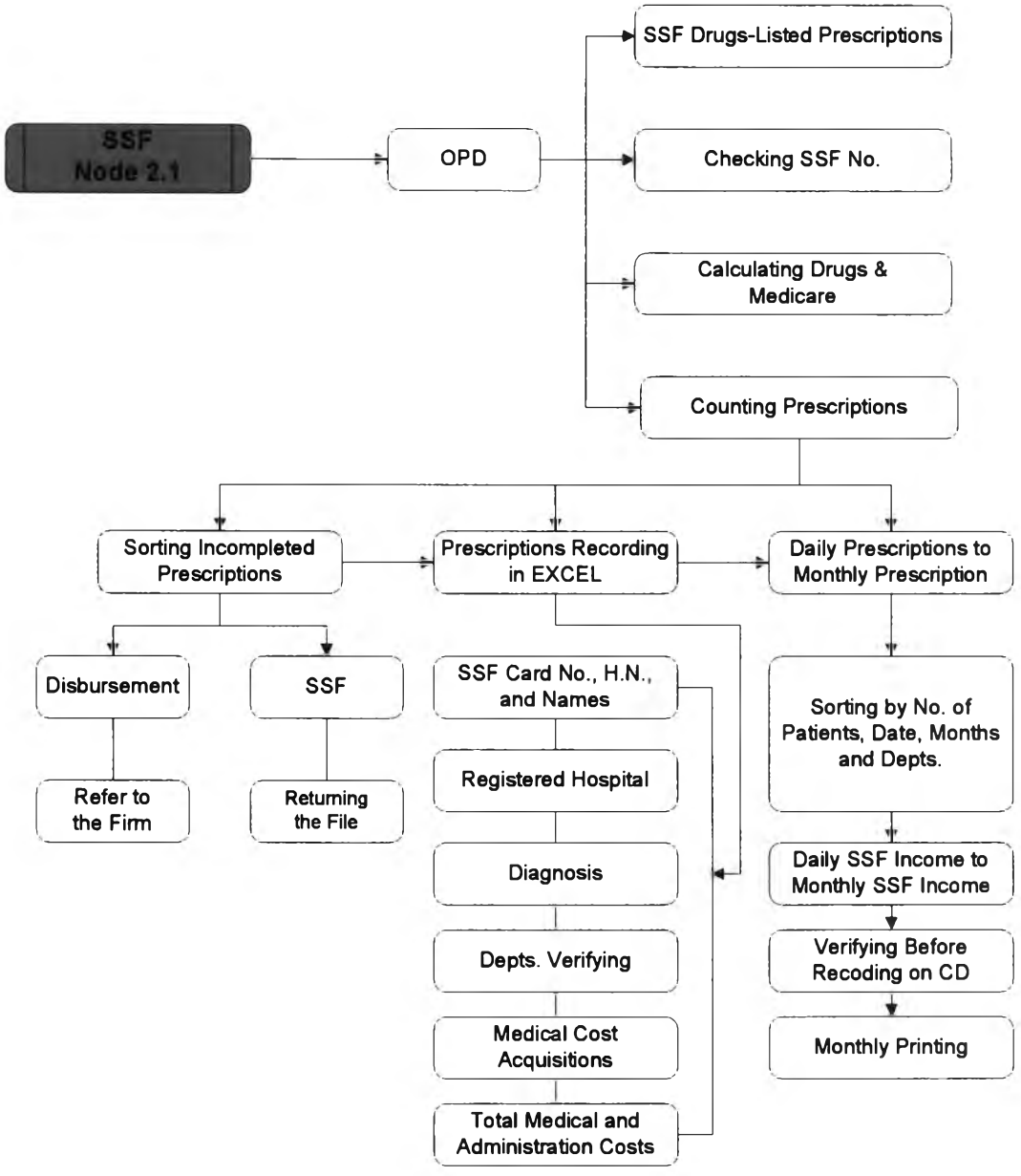

Figure 5.6: Node SSF

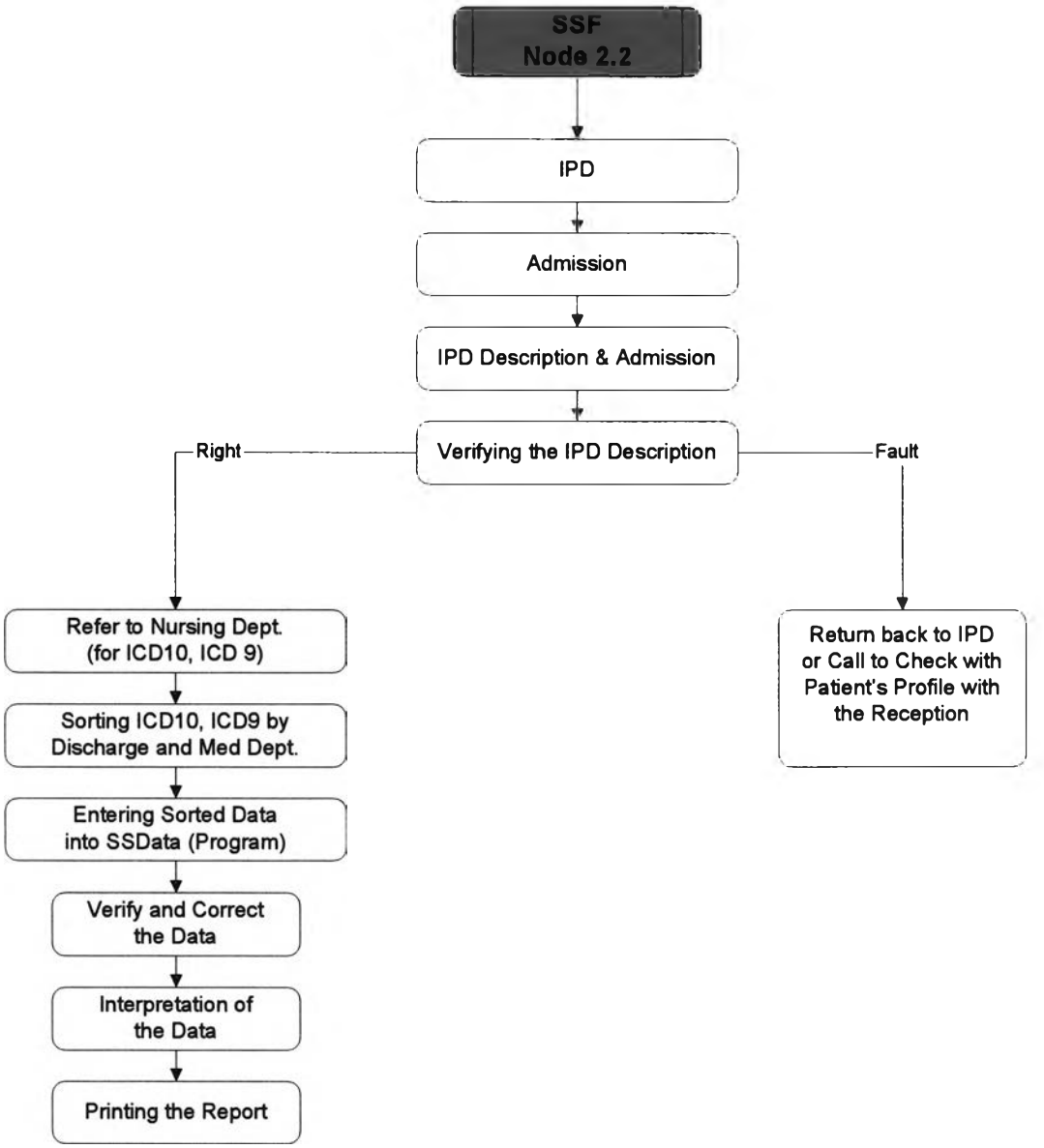

Figure 5.7: Node SSF2

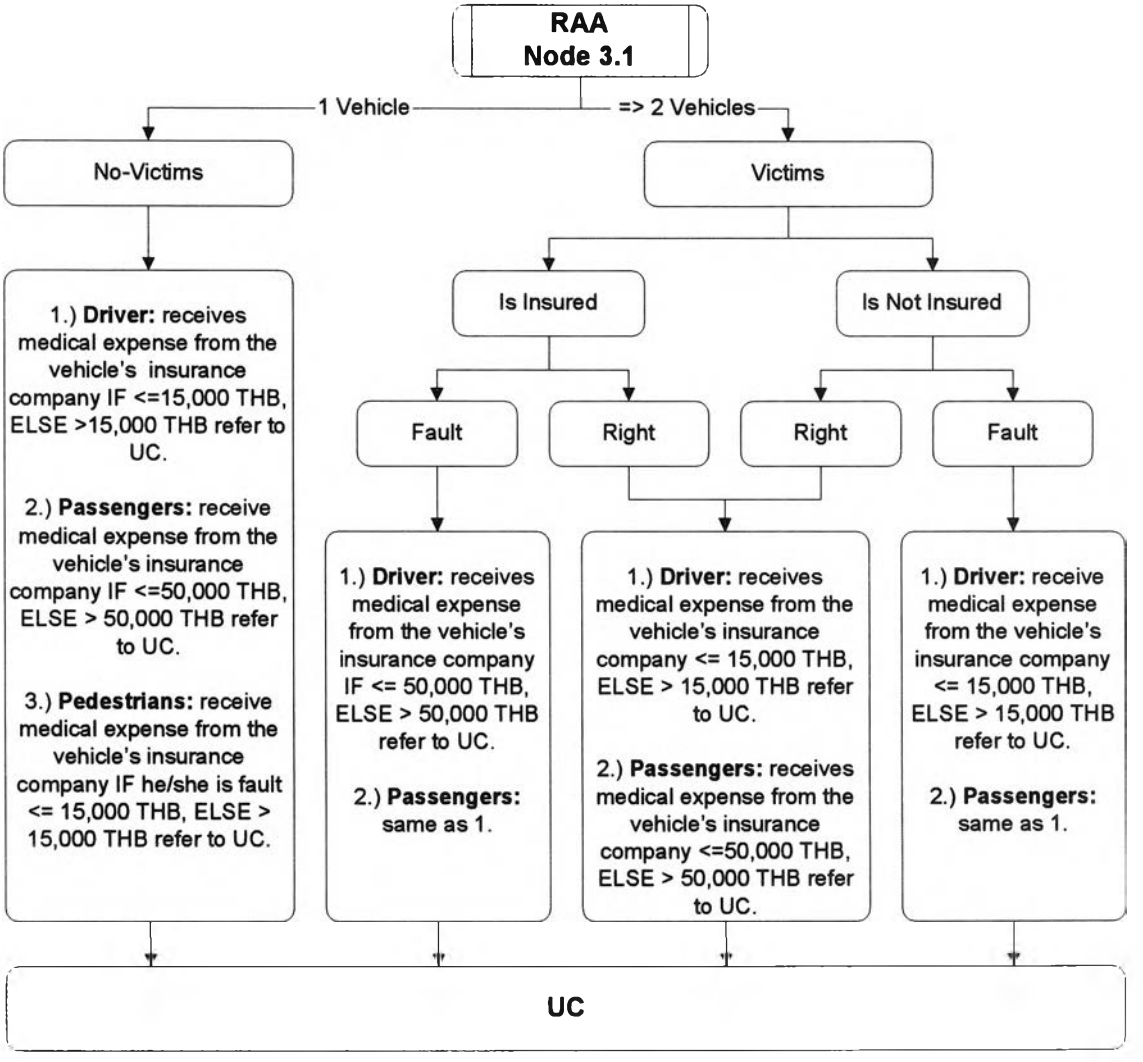

Figure 5.8: Node RAA

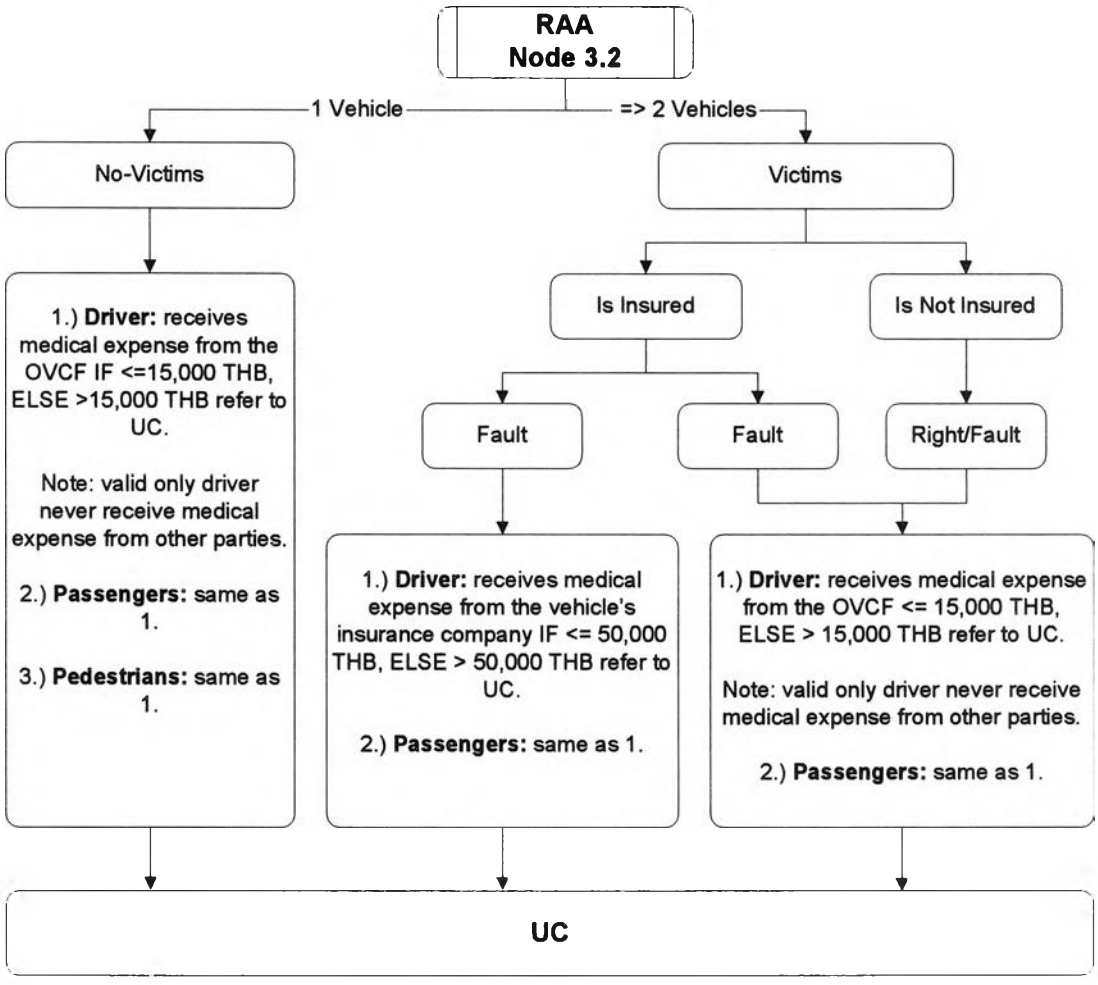

Figure 5.9: Node RAA2

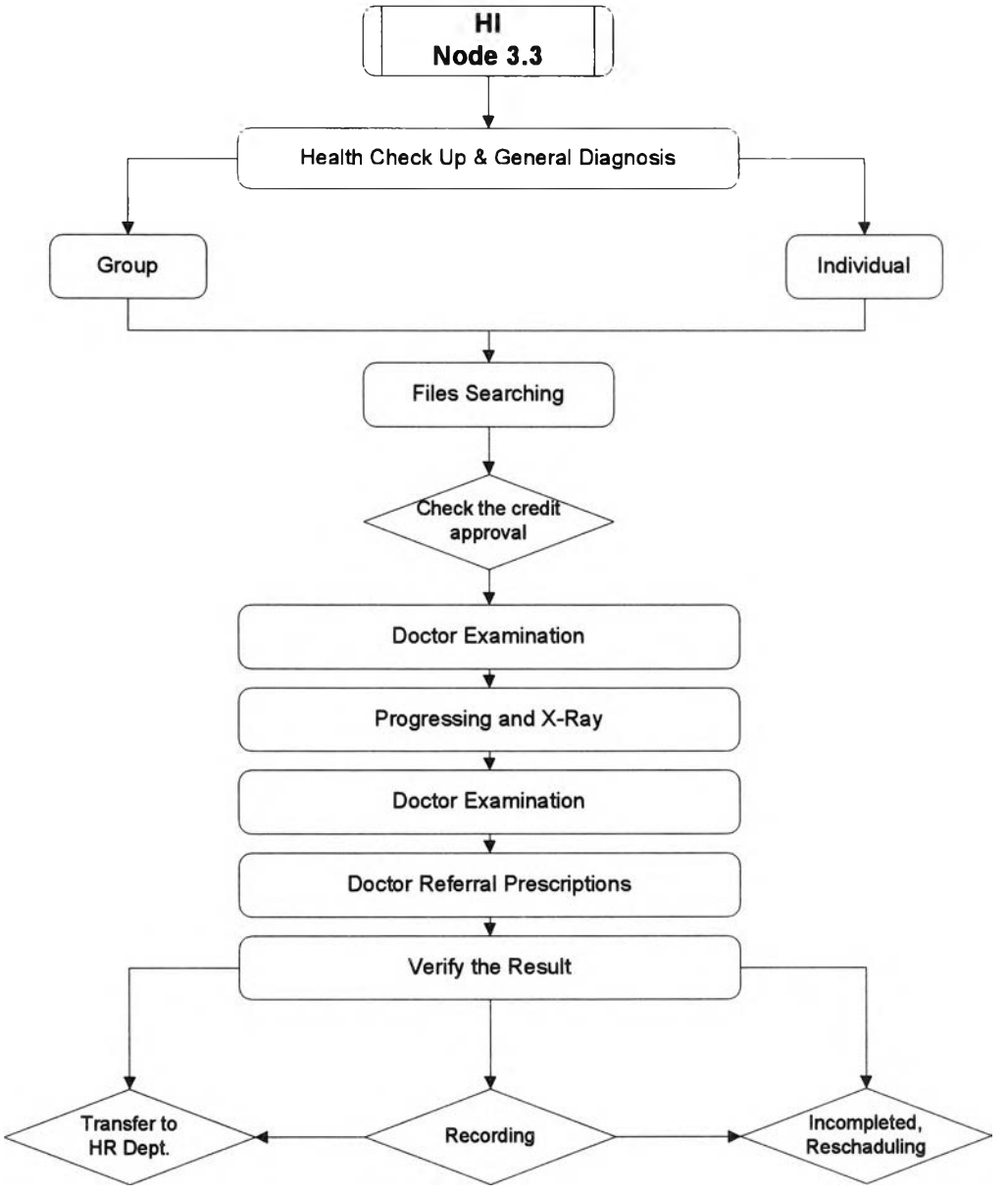

Figure 5.10: Node HI

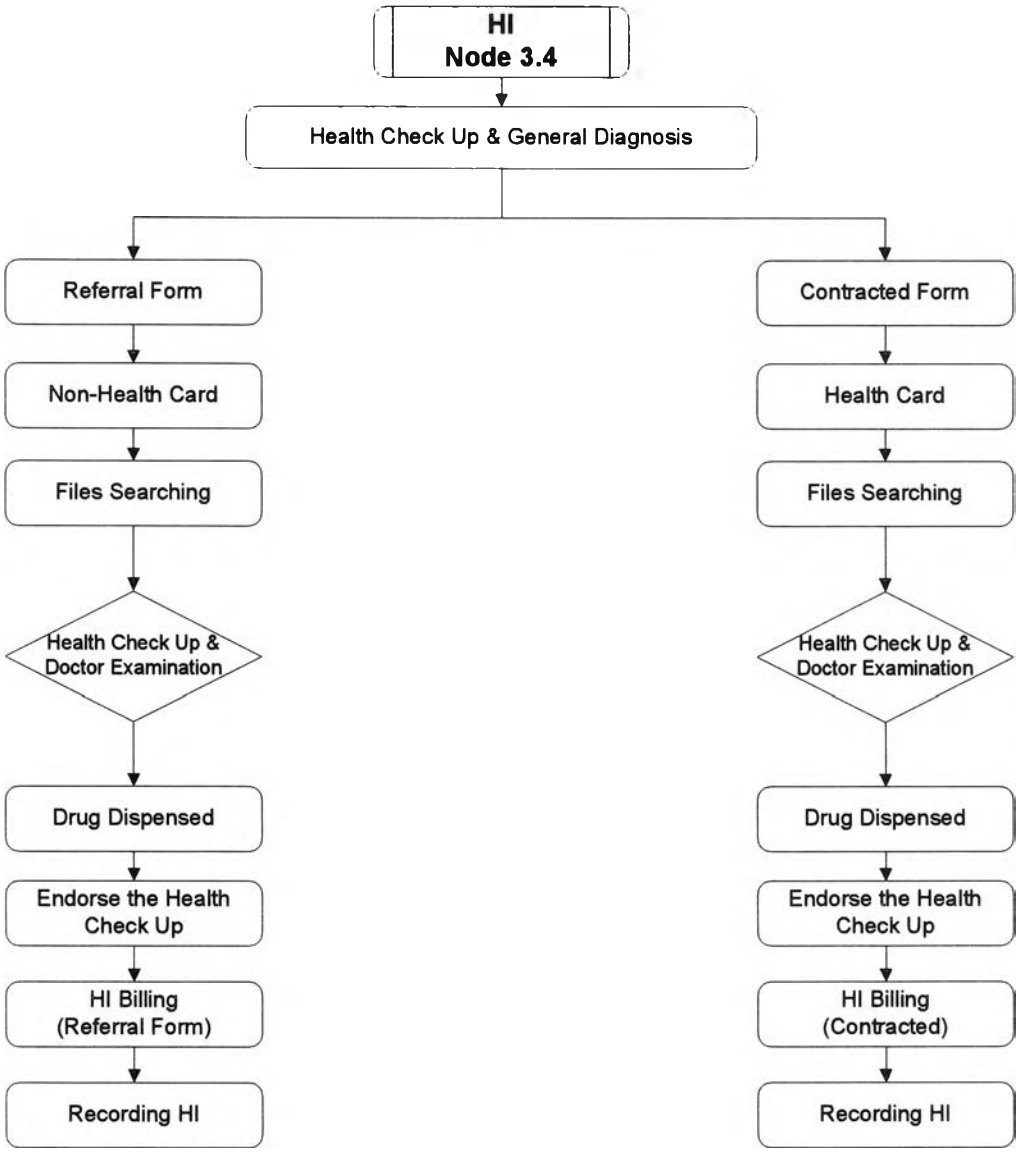

Figure 5.11: Node HI2

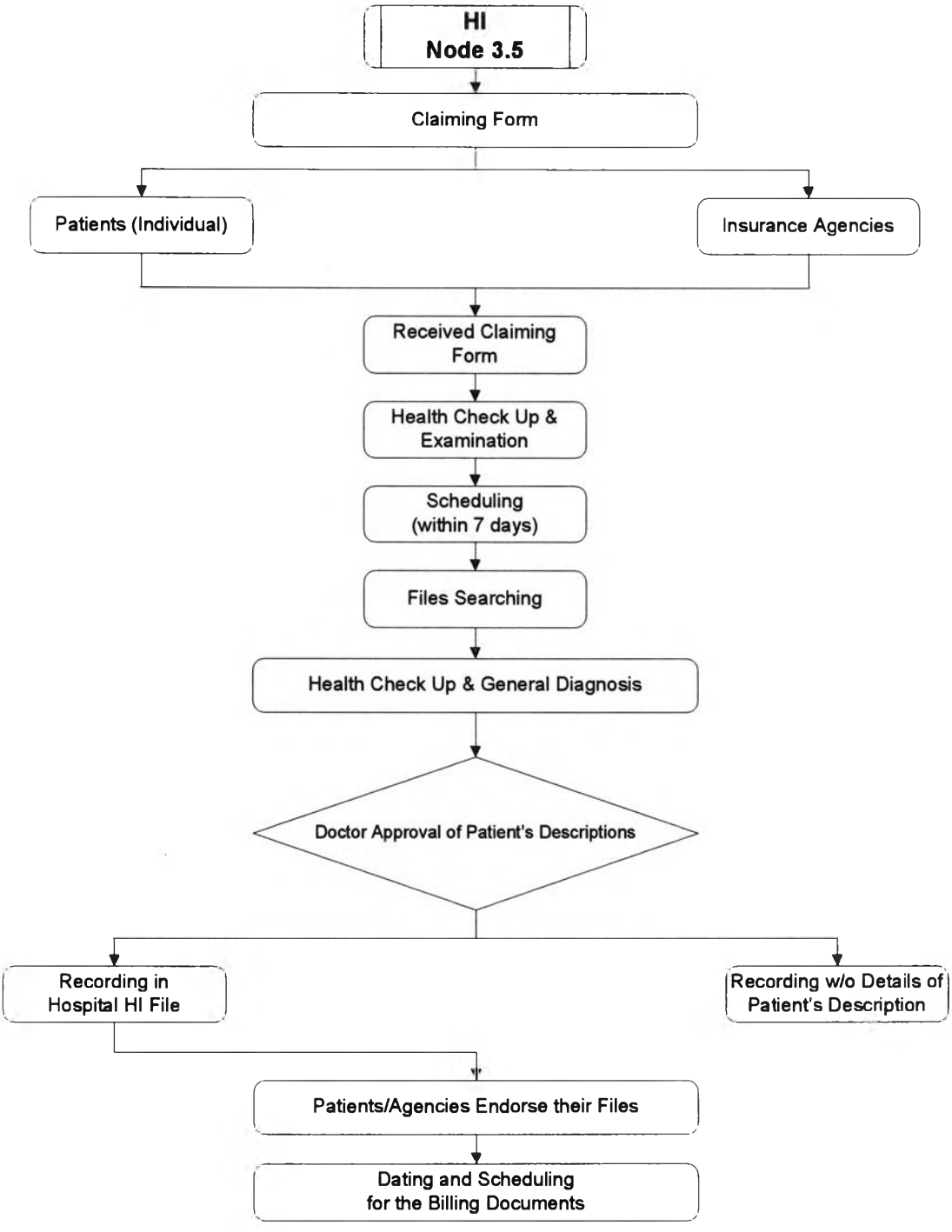

Figure 5.12: Node HI3

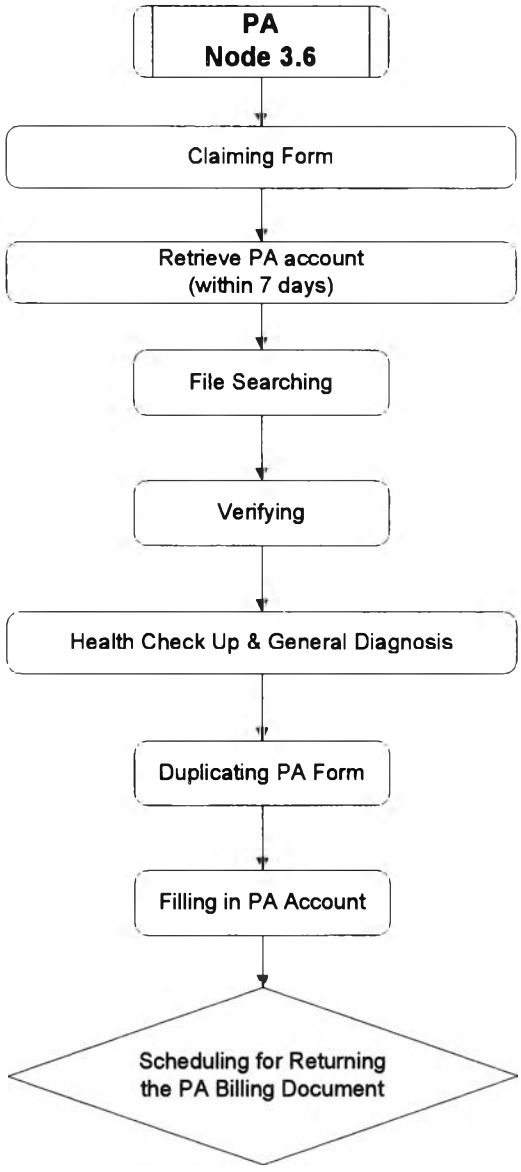

Figure 5.13: Node PA

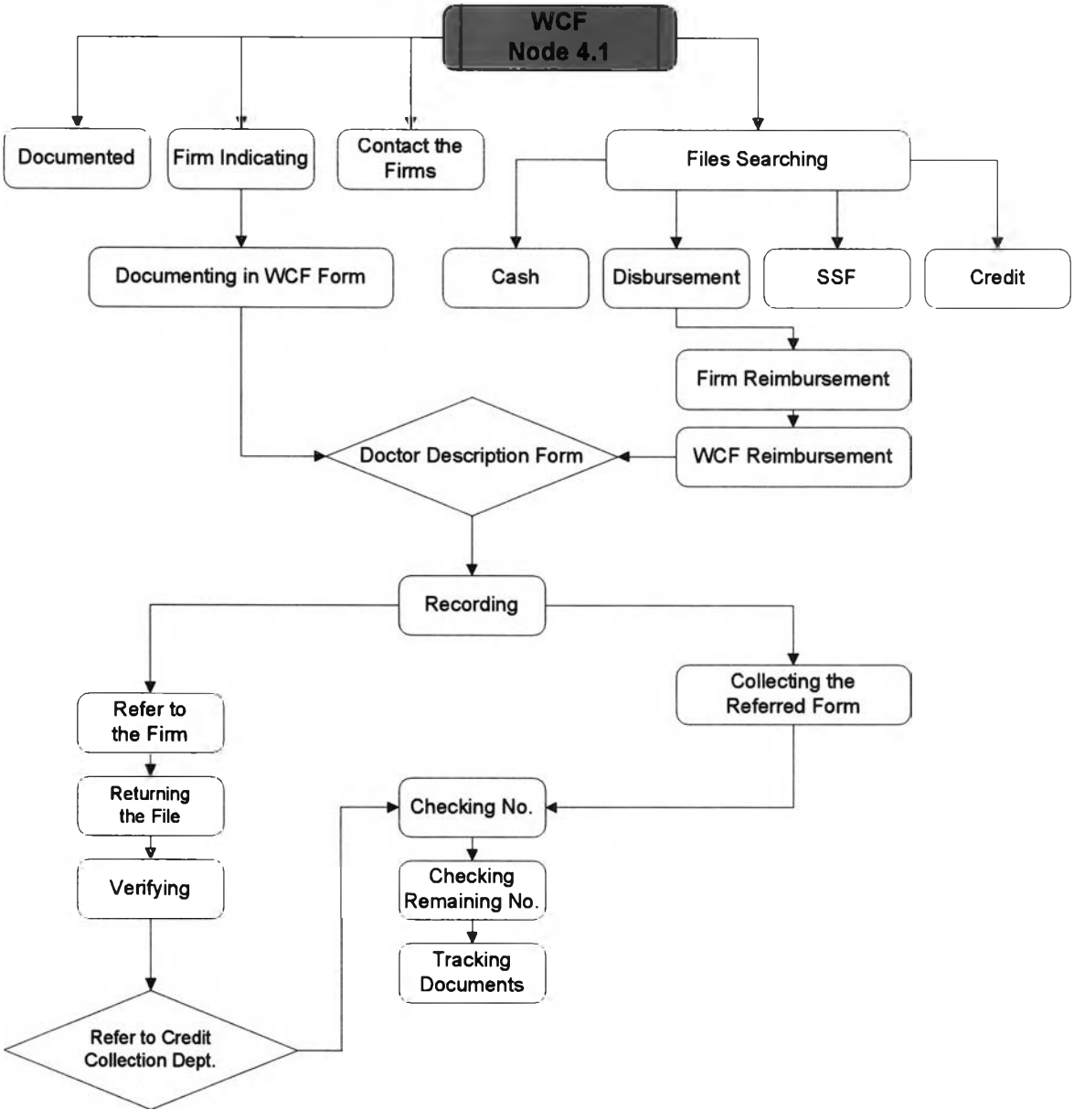

Figure 5.14: Node WCF

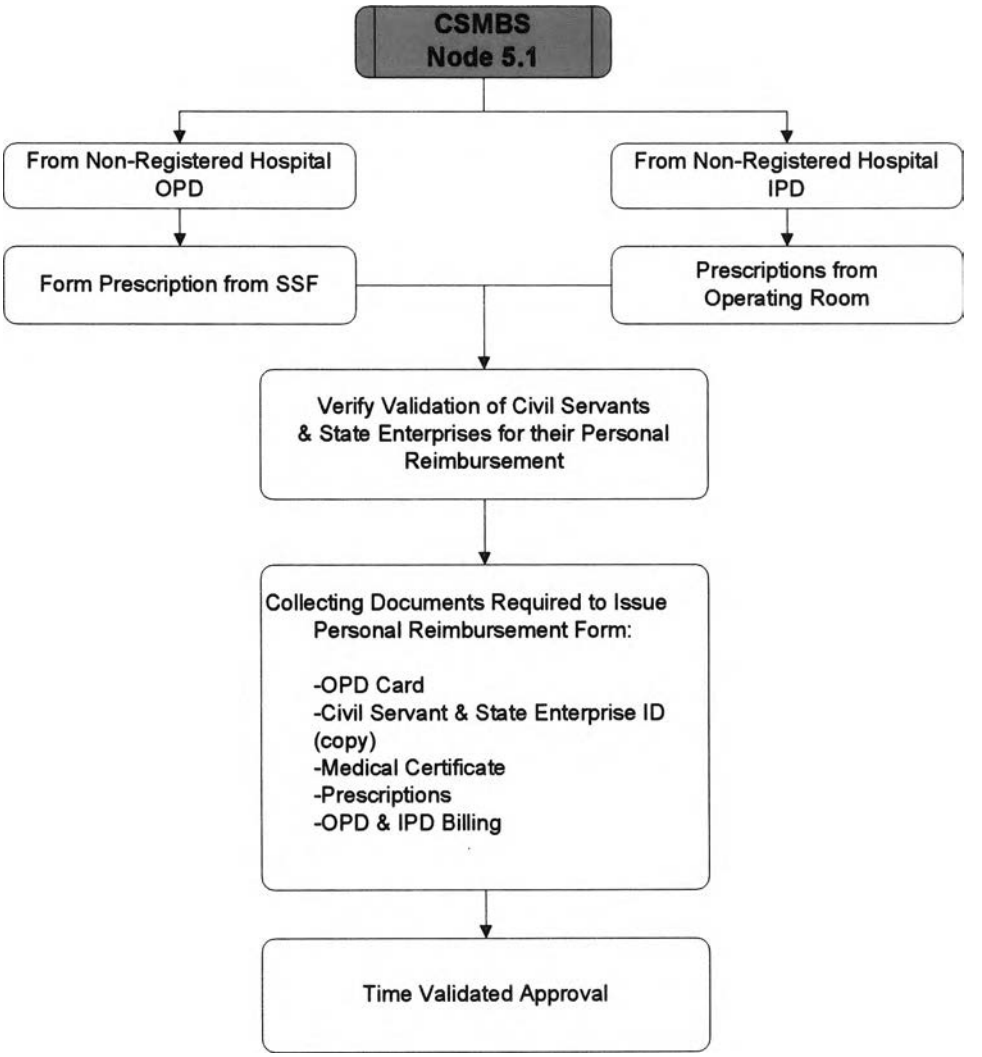

Figure 5.15: Node CSMBS

5.5 ENSURE THE SYSTEM IMPLEMENTATION:

Once the decision tree is built, it can be converted to computer languages without separate interpreter required. In concern, this program will have to process all the work of pruning into the optimal decision and initially selecting the best priorities (maximum benefit packages) for the patients, and also can provide protocols, which could improve the quality of decision made. The process of

converting from paper-based OPD/IPD data into the computerised electronic records is to be verified and signed off from paper-based record, by coordinated from each involved department's manager, and senior managers in planning process activities. The expected implementation planning process is as shown:

Implementation Planning Processes: RCMSE: ISS (2004)

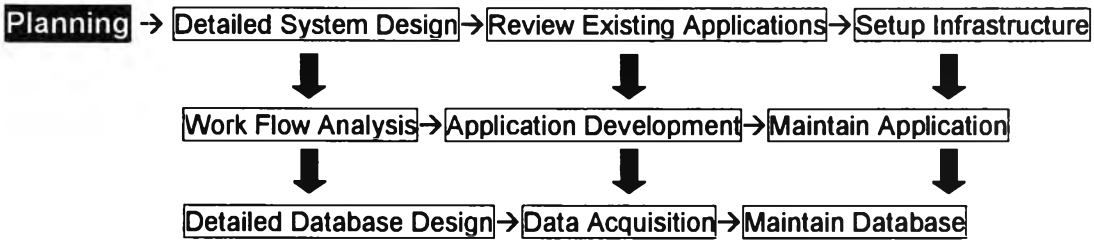

Figure 5.16: Implementation Planning Processes

System/Personnel Training: Follow-up training need to be setup every 6-9 months at monthly period review, due to high employment turnover and low proficiency. Result of monthly review will be presented to the senior manager to evaluate the effective use of operators and system functionality to ensure daily operational uses, which will ensure the hospital quality management service.

Transaction Policies: Get hold of related personnel to be involved in cross-functional training, influencing in the development of the program, and also in contingency plan, for troubleshooting, in case when one key function absence or missing, front reception manager and involved personnel will be required to substitute.

5.6 **RESOURCES PLANNING:** Hardware Preparation

From this, programming outsource is selected to ensure implementation of the software development and hardware installation. From the starting period, existing hardware facilities is to be maintained while appropriate new system is to be underway. This is expected to understand better existing process flow and reliability of standard operational process. This will be implemented to the extent that remove barrier from the patients in term of more convenient process than condition before (no denied of service and crossing of programs). Then, if this can attract more numbers of patients to use the services. Then, the scope of resource planning is as shown:

Database Platform and IT infrastructure: *(Appendix F)*
A small scale of platform is estimated (e.g. CRM module), as also preparing for future expansion. CPDB is expected to run on PC server (Window XP, UNIX) making it practical for small hospital. Also, it is expected to handle variations of medical insurance companies.
Copy Machine, Printer, Fax, and Scanner:
General existing transaction office machines will be evaluated compatibility with the new OS type of the software. If some department's machines (e.g. administration, accounting) are not compliance, the consent of replacement or refurbishment will be utilised by senior manager.
Local Area Network (LAN): *(Appendix F)*
A LAN will be deployed to link from front reception to the rest of the processes as of the program only emphasises in classifying patients input (non-medical transactions). Six local-make PC terminals will be offered, and two flat screen panels to provide GUI.
Technical Support:
A technical support is expected to a real-time support where, the reception personnel can call in, to talk with trained support persons during business hours.

Figure 5.17: Scope of Resources Planning