How to extend an Traditional Medical Process Modeling

2016. 1. 19.

Chae-Yun Seo
Hongik Univ. Selab
Advisor : R. Young Chul Kim
In this paper, the traditional medical engineering focused on the Medical Process Modeling, which is modeled with two ways such as Activity Centric Approach and Artifact Centric Approach. Most of medical systems focus on Disease Centric Medical Process. There are also difficult to develop and manage an efficient medical system. To solve this problem, we suggest to map medical process modeling with business process framework, which consists of five layers based on a closed architecture.
I. Research Motivation

Disadvantages of Traditional medical process model: Activity Centric Approach
- Result IN, have Cure process & Patient’s Data
- The Relation is lacking, While running the data and process

Traditional medical process
- Traditional medical engineering focus on medical process modeling.
- Modeling is divided into Activity Centric Approach and Artifact Centric Approach

=> It is difficult that is developed Effective Medical Support System.

The proposed method

- We proposed patient centric Medical process
  - Traditional business process framework[seochaeyun2011] + medical process modeling
  - Method of patient centric is better than traditional disease centric system
  - Developing Support system is better than medical decision system
  - One of Medical Business Process proposed Especially Medical Service Modeling Method
II. Related Work – Business Process Framework

1) Business Policy Layer: Contents are rule, role, policy

2) Business Process Layer: business process

3) Service Layer:
   Execution level make the several components

4) Component Layer: Implementation level is concept of dynamic workflow

5) Data Model Layer: store in physical layer
III. Medical Business Process Framework

Medical Service Layer Modeling

1) Notation
2) Service Type
3) Condition Type
III. Medical Business Process Framework

❖ Medical Business Process Framework

- Business policy
- insurance policy
- Each process in accordance with this rule is to influence, the process carried out in accordance with the rule

❖ Traditional Medical Process

- The purpose of treating a particular disease being focus on Activity & Artifact centric
- Based on Business Process
- BUT, It is focused on a specific disease
  - Not interworking between process layer and data layer
  - If there is a patient with multiple disease, Each go through a different process

❖ To Solving, proposed “Patient Centric Medical Process”

- Patient Centric Medical Process make a Artifact of service according to Patient centric flow (ex: prescription, Test results sheet ect…) Possible interworking between processes and data
- Confirming medical process and patient flow about Patient
- Patients in the treatment process and easy data management
III. Medical Business Process Framework – Service Layer

Medical Service Layer

- Service: Multiple Artifacts make service, services make business process
  - Being name and descriptions, include of datas
  - Execution under medical business process

- Medical Service Layer Rule
  - It can be separated from the new service according to the service type
  - Create new service
  - Communication is possible with each of the services through the service interface

ex)
① A certificate issued by a registered patient is moving (s9) and prescription (s10) in the treatment process (s8) and undergo a medical examination.
② According to the medical type and also return back to multiple services
## III. Medical Business Process Framework – Modeling Notation

<table>
<thead>
<tr>
<th>type</th>
<th>notation</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>service</td>
<td><img src="image" alt="Circle" /></td>
<td>A number of service/ A small unit that carried out within each process</td>
</tr>
<tr>
<td>Initial state</td>
<td><img src="image" alt="Diamond" /></td>
<td>Start service</td>
</tr>
<tr>
<td>flow</td>
<td><img src="image" alt="Arrow" /></td>
<td>Flow direction</td>
</tr>
<tr>
<td>End state</td>
<td><img src="image" alt="Circle" /></td>
<td>End service</td>
</tr>
</tbody>
</table>

### Patient Registration
- Patient Registration(s1), reservation, Admission(s2)

### Patient Care
- Patient Care(s3), Accrued management(s4)

### Insurance
- insurance(s5), Claim(s6)
- cut(s7)
### Ⅲ. Medical Business Process Framework

- **Modeling Notation**

<table>
<thead>
<tr>
<th>구분</th>
<th>표기</th>
<th>설명</th>
</tr>
</thead>
<tbody>
<tr>
<td>policy</td>
<td></td>
<td>insurance policy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Insurance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Health care</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Uninsured</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other Insurance</td>
</tr>
<tr>
<td>process</td>
<td></td>
<td>Steps performed for a Goal</td>
</tr>
<tr>
<td>service</td>
<td></td>
<td>Unit is performed in each process</td>
</tr>
<tr>
<td>artifact</td>
<td></td>
<td>Artifact generated according to the movement type of the patient</td>
</tr>
<tr>
<td>data</td>
<td></td>
<td>Stored data</td>
</tr>
</tbody>
</table>
### Medical Business Process Framework

#### Service Layer Notation

<table>
<thead>
<tr>
<th>service notation</th>
<th>service structure</th>
</tr>
</thead>
</table>
| notation         | ![Service Structure Diagram](image)

- **ECA rule**: When an event occurs, check the condition, if satisfied the Condition, execution the Action
  
  ECA form: On Event If Condition Do Action

#### ii) Condition

<table>
<thead>
<tr>
<th>Simple condition</th>
<th>Composite condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>simple condition</td>
<td><img src="image" alt="Simple Condition" /></td>
</tr>
<tr>
<td>(Default OR Null)</td>
<td><img src="image" alt="Composite Condition" /></td>
</tr>
<tr>
<td>Pre-condition</td>
<td>AND</td>
</tr>
<tr>
<td>Post-condition</td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td>CONCURRENT</td>
</tr>
<tr>
<td>Flow</td>
<td><img src="image" alt="Flow" /></td>
</tr>
</tbody>
</table>

- Medical service is a notation Simple Condition & Composite Condition
- When the service process to services, moving the service according to the decision of the condition
IV. Case Study – (2)

Patient

First admission → Personal information base

Hospital

Register Personal information → Search National Health Insurance → Type insurance

Type insurance →
- general insurance
- Medical pay

Final registration → Create Patient Num

End
IV. Case Study – (3)

Register Service

Search National Health Insurance

Reception Service

Medical service

Chart No.

Insurance No.

Recept No.

Social No.

Name

Add

Tel

general

inurance

Medica

pay

Others

insurance
### IV. Case Study – (8)

**Medical Patient Management Service**

- **Service**
  1. s1: register
  2. s3’-1: search
  3. s3’-2: total
  4. s3’-3: excel
  5. s3’-4: print
  6. g: end

**Patient Management**
Medical Patient registration Service(BP1→s1)

**Service**
1. a: Bp1
2. S1: patient register
3. S2: reserve/Admission
4. S3: patient Manage
5. S4: Accrued Manage
6. S5: Insurance process
7. S6: Billing Manage
8. S7: Cut Manage

**States**
1. s1`: Information S
2. s1`-1: Register S
3. s1`-2: reception S
4. s1`-3: acceptance S
5. s1`-4: treat S
6. s1`-5: Reserve S
7. s1`-6: Prescription S
8. s1`-7: X-ray S

**Actors**
- Patient person- a
- Reception Dept - b, c
- a hospital administration - f
- Bursar - d
- part - e

**Actors**
V. Conclusion & Future Works

✓ Conclusion

- Suggested for Medical Business Process Framework (Medical Service Layer Modeling)
  - Artifact Centric Approach is modeled flow a patient centric using a artifact of patient centric
  - Medical Process Framework mapping on Business Framework & Guard-Stage-Milestone (GSM)
    - **Medical Process Modeling**: result in create artifact of service accordance with the flow out of the patient-centered, Possible Interworking between processes and data
  - Therefore, it is possible to identify the medical treatment process, the flow to the patient.
  - Patients should expect to be an efficient development of the center of medical support system.

✓ Future Works

- Modeling Another Layer Except of Medical Service Layer
- Development a Tool for Medical Service Layer Modeling
THANK YOU!!