Mid-Term Project Electronic Integration Clinic Service Reengineering

Group 5

Leader: Betty Lin (林孝臨)

Member: 保羅 Chen (陳柏任)

Sam Lin (林哲丞) Barney Liu (劉柏宏)

1. Background Introduction

Since 1989, Gakki Clinic has provide medical treatment with satisfaction to each patient as well as to ourselves. It is our pleasure to see the patients' smile and satisfaction.

Gakki Clinic major provide Pneumonoultramicroscopicsilicovolcanoconiosis (火山肺矽病)treatment and other physical /magical heal treatment.

Goal: We hope provide high quality treatment process for the patients, but not earn more money

Even patients who are "too busy with work to go to the clinic only in weekends" can visit us. The Clinic are open on Saturdays, Sundays, and national holidays as well. Close on Mondays. From 9am-12am, 14pm~17pm, 18pm~21pm every opening day.

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Morning	✕	◯	◯	◯	◯	◯	◯
Afternoon	✕	◯	◯	◯	◯	◯	◯
Evening	✕	◯	◯	◯	◯	◯	◯

It have three divisions: 1. Division of Urology 2. Division of Pediatrics 3. Division of Obstetrics and Gynecology for service patient, each branch service at a period.

To ensure the high medical quality and observe the health insurance policy, at most we only offer ninety patients treatment services per day.

Address: Paragraph 7 on the 26th Engineering one way Tsinghua Valley Hsinchu City

| Times/day	Minutes
Move Time	720
Takt time	8
Max Probability(Patient)	90
Max Order list(Patient)	90

Parameter (Per Day)

2.DMAIC Method

2-1.Define: Define the Problem

Gakki Clinic have been developing for decades and we have a high evaluation of clinics. However, we are faced with the electronic generation. In order to provide better services and scope, we must reengineer ourselves into an information electronic clinic. For example, medical record of paper goes online into an electronic medical record. In order to rise customer satisfaction, we want to improve medical process through as-is model to create the new system.
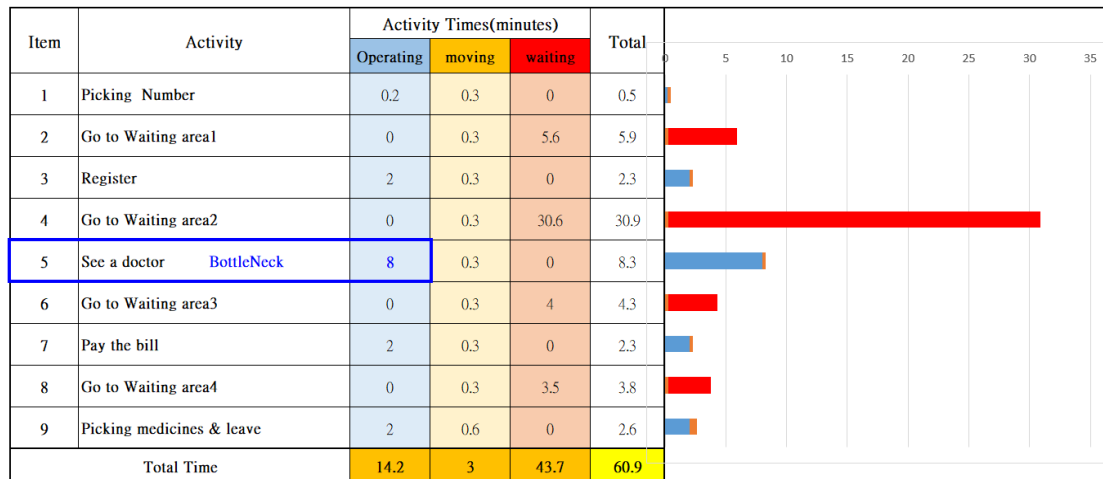
2.2 DMAIC –Measure (As-is Model) We use two re-engineering method: DMAIC Method as a system, and VSM diagram. Before making a VSM diagram, there are two chart should be made: Service Blueprinting and Time analysis

Through the Service Blueprinting diagram, it would more easy to figure out the whole picture process. Medical process is a service process that hard to distinguish service projects, through the service blueprinting, we can understand the client-server interaction, as well as the operational onstage of the backstage desk.
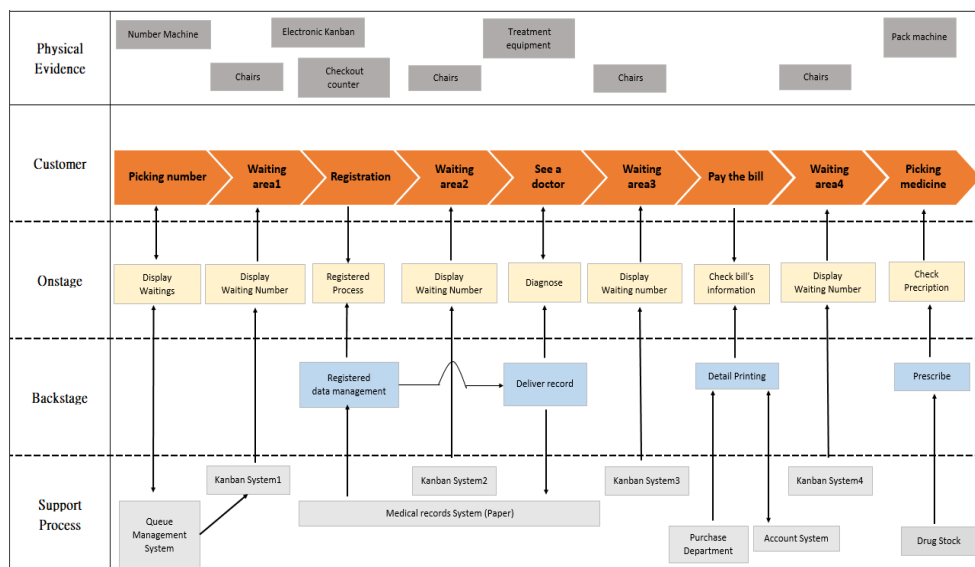

As-is Model Service Blueprinting

Time measure the whole process and classify the type of the time. We can see waiting for seeing a doctor takes most waiting time. Although Activity5 has most operation time, we can't define as bottleneck. The real reason is patients go to clinic simultaneously.

Item	Activity	Activity Times(minutes)			Total
		Operating	moving	waiting	
1	Picking Number	0.2	0.3	0	0.5
2	Go to Waiting area1	0	0.3	5.6	5.9
3	Register	2	0.3	0	2.3
4	Go to Waiting area2	0	0.3	30.6	30.9
5	See a doctor BottleNeck	8	0.3	0	8.3
6	Go to Waiting area3	0	0.3	4	4.3
7	Pay the bill	2	0.3	0	2.3
8	Go to Waiting area4	0	0.3	3.5	3.8
9	Picking medicines & leave	2	0.6	0	2.6
	Total Time	14.2	3	43.7	60.9

As-is Model Time Analysis

Through the VSM diagram, we can figure out there are many wastes stations, as people medical experience, between every process, waiting is necessary. And too many system to manage the whole process, it would lower the efficiency, maybe we have to integrate systems.
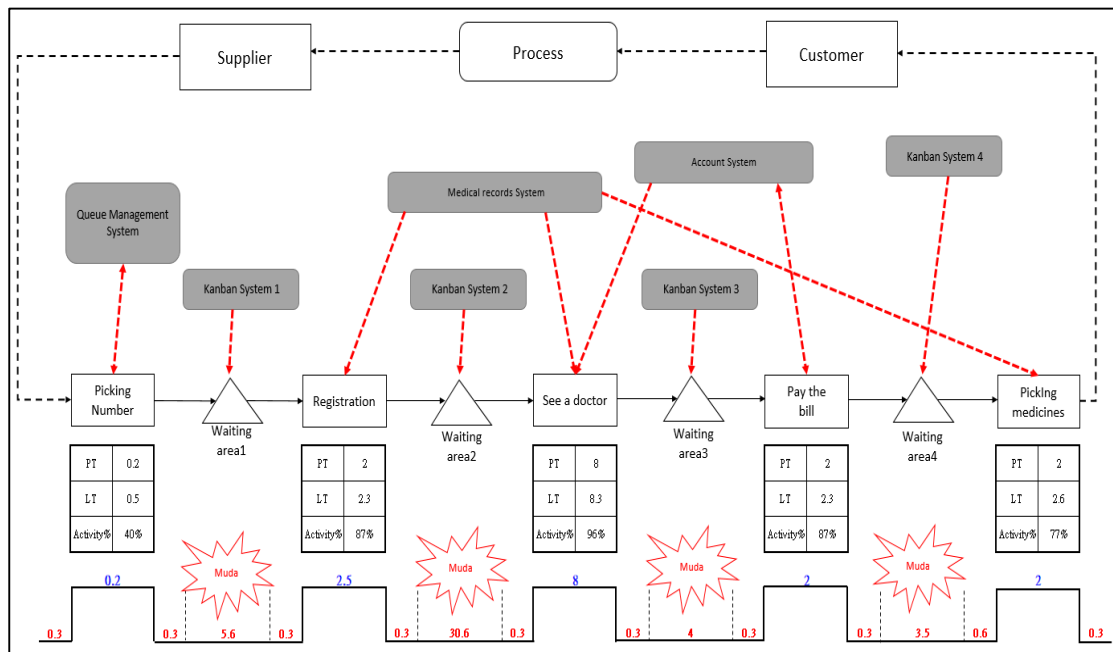
As-is Model VSM Diagram

There are two prices for two types of patients, the patients with health insurance and without health insurance. The patients with health insurance have to pay $100 dollars per person, but the patients without health insurance have to pay $500 dollars per person.

|	Prices
Health insurance	$100
No-Health insurance	$500

Price-With Health Insurance or not

The table below shows the salary calculation, including how much salary they have per month/day, and how much they earn per patient.

	Department	Payment(m)	Quantity	$/Day	$/Patient
1	Management	60000	1	2400	27
2	Medical	60000	2	2400	27
3	Nursing	35000	1	1400	16
4	Finance	35000	1	1400	16
5	Administer	22000	2	880	10
6	Pharmacy	35000	1	1400	16

The cost of the clinic process

And to evaluate the as-is model, we use income software to simulation the whole process. There are Object-Model, Organization Model and Behavior Model.

The graph below shows the concept of ER-model in our clinic system. There are total 5 data table includes patient information, appointment information, doctor information, prescription information, and drug information. Each table is connected by primary key and foreign key to make sure the system works well.
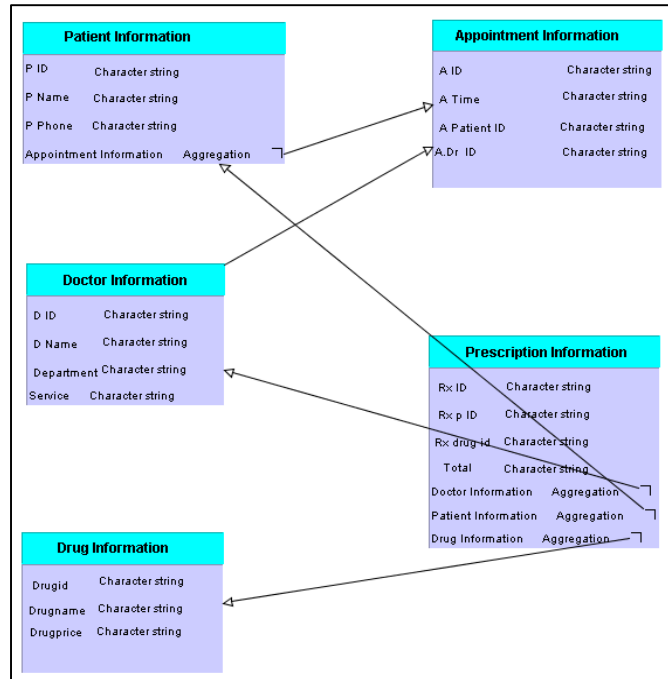
As-is Object-Model

In the organization chart below, there are one management level with one manager, and 5 department under controlled. The 5 departments are medical department with three doctors (not shown all in the graph), nursing department with one nurse, accounting department with a accountant, administer department with a counter staff and a porter, and pharmacy department with one pharmacist.
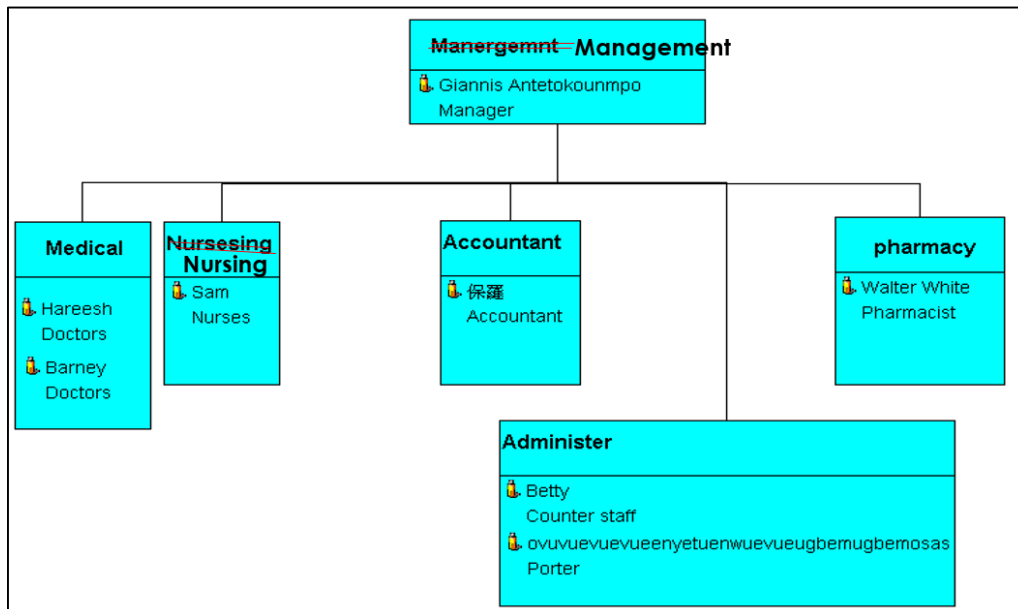

As-is Organization Model

The graph below is the as-is income behavior model (first level). In the first level, once patient enters the clinic, he has to make a registration. After the registration, the patient then waits for diagnosing. Then doctor would make a prescription while diagnosing. After the curing process, the patient has to take the prescription to pay the fee and take the drug.
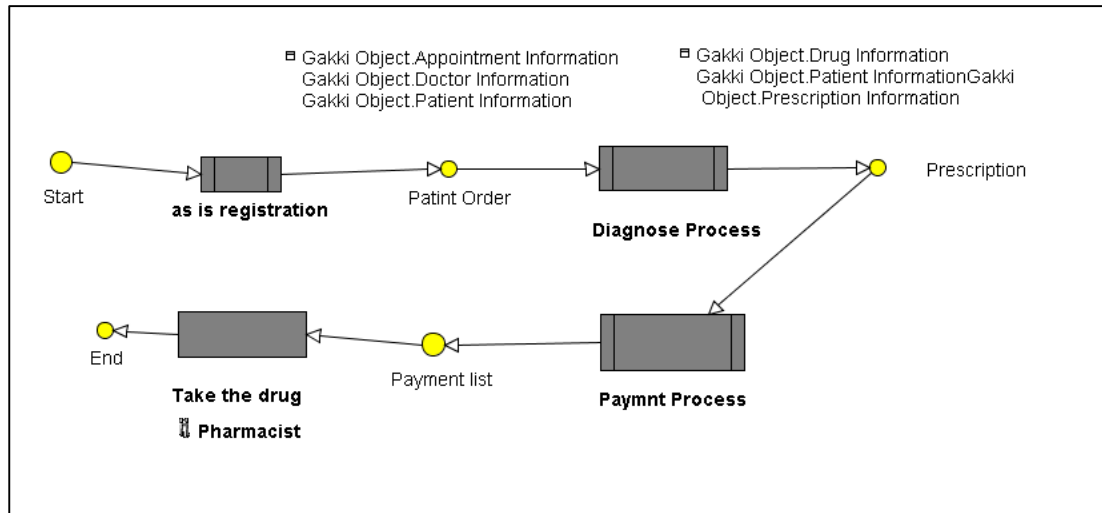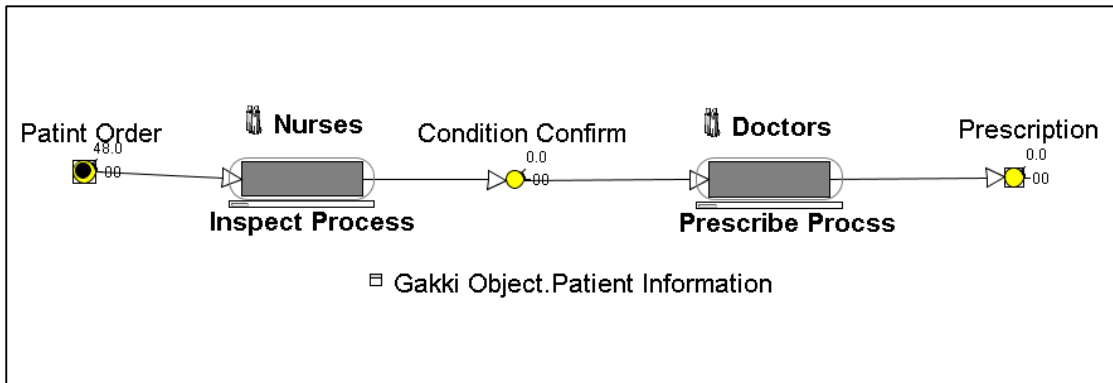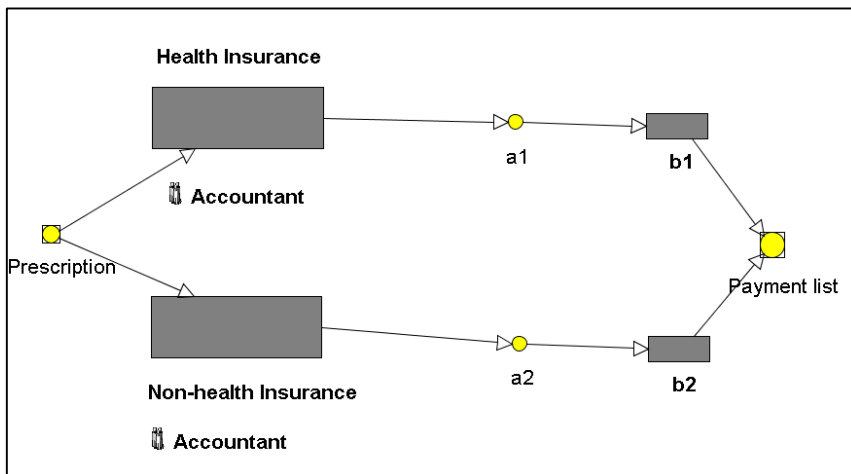

As-is Behavior Model-Main Process

In the registration process, we drill down the process as shown below. When the patient takes the waiting ticket, the stuff would check his health ID card, then go to find the patient's diagnose record and give it to doctor.
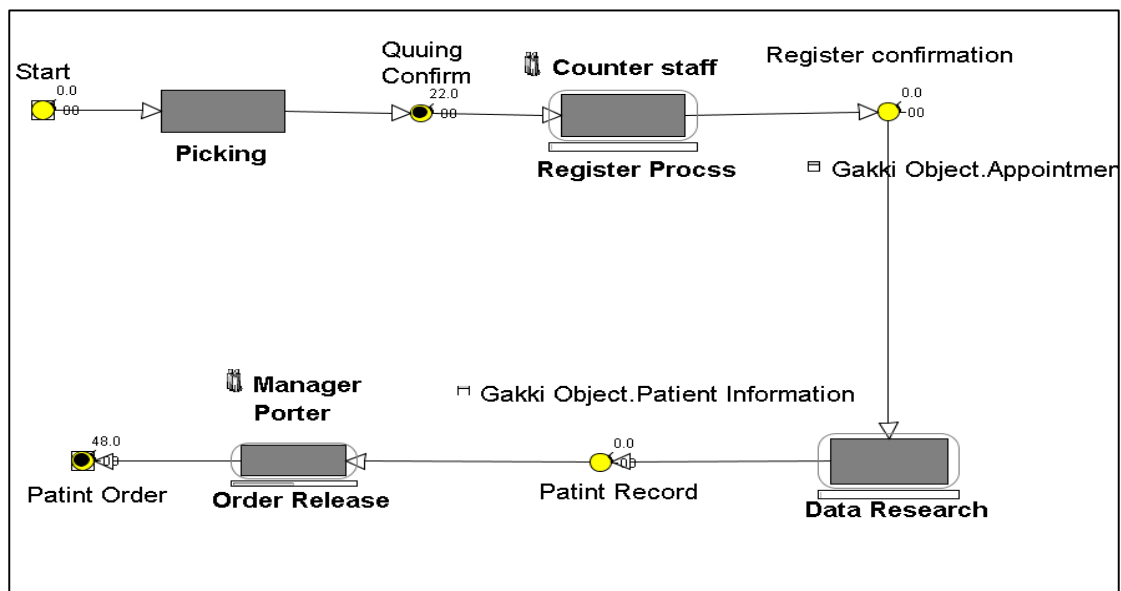

In the diagnose process shown below, the nurse first makes a preliminary check such as body temperature, then the patient can go to the diagnosing room.

Patint Order   Nurses   Condition Confirm   Doctors   Prescription
48.0   0.0   0.0
Inspect Process   Prescribe Procss

Gakki Object.Patient Information

In the payment process the patient with health insurance and without health insurance pays different fee.

Health Insurance

Accountant

a1   b1

Prescription   Payment list

Non-health Insurance

Accountant

a2   b2

The picture below shows the income outcome with the calculation of cost, value added and time cost.
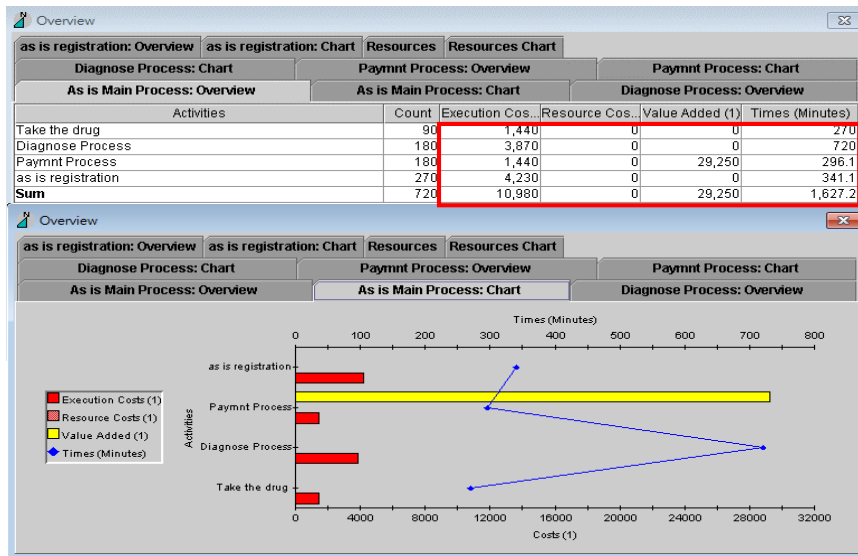
As-is Behavior Model Payment Process

(Overview)

2.3DMAIC Method : Analyze

This research uses VSM, blue printing and time analysis to figure out the problem in our process. There are mainly six issues found as shown in the table below. For example, we find out the waiting time waste by analyze VSM diagram and blue printing.

	Problems	Method
1	Many waiting wastes	VSM/Blue printing
2	Low productivities	VSM//Blue printing
3	The Stream isn't smooth	VSM/ Time analysis
4	Many systems to manage a process	VSM
5	Human Pass	VSM
6	Transfer waste	Time analysis

Problem/Method

| Item		Problem Definition	Reason	Reengineering
Electronic	1	Many waiting wastes	Patients go to clinic Simultaneously	Appoint online and display the Visiting progress
	2	low productivities	Much waiting time	Integrate the working station
	3	The Stream isn't smooth		
Process	4	Many systems to manage a process	Physical facility restrictions	Integrate Electronic system
	5	Human Pass	Paper patient record	Electronic Patient record
	6	Transfer waste	Information transform	

Problem Analysis

2.4DMAIC Method- Improve
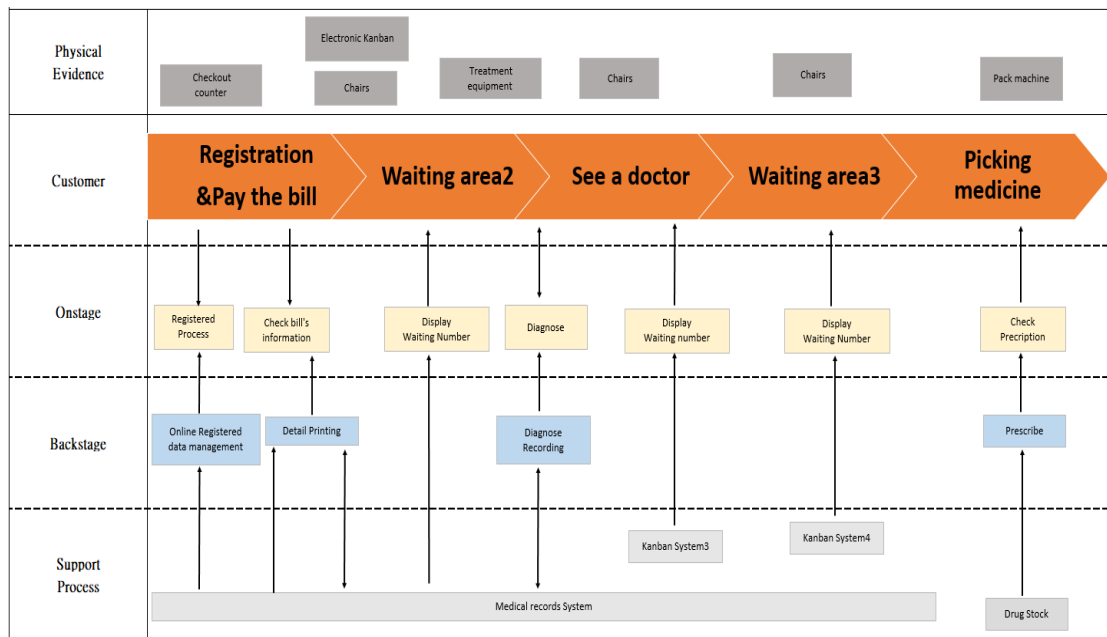
To-be Model Service Blueprinting

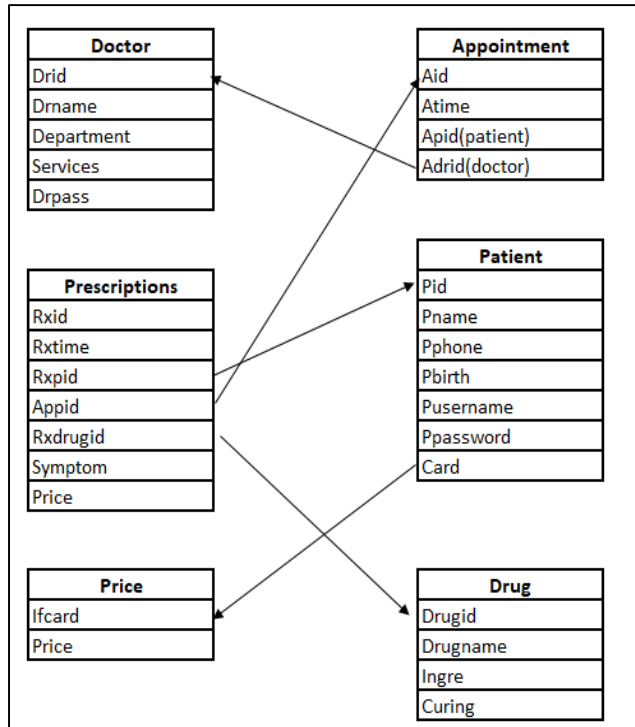| Item	Activity	Activity Times(minutes)			Total
		Operating	moving	waiting	
1	Register/Pay the bill	2.5	0.3	0	2.8
2	Go to Waiting area2	0	0.3	5	5.3
3	See a doctor BottleNeck	8	0.3	0	8.3
4	Go to Waiting area4	0	0.3	3.5	3.8
5	Picking medicines & leave	2	0.6	0	2.6
Total Time		12.5	1.8	8.5	22.8

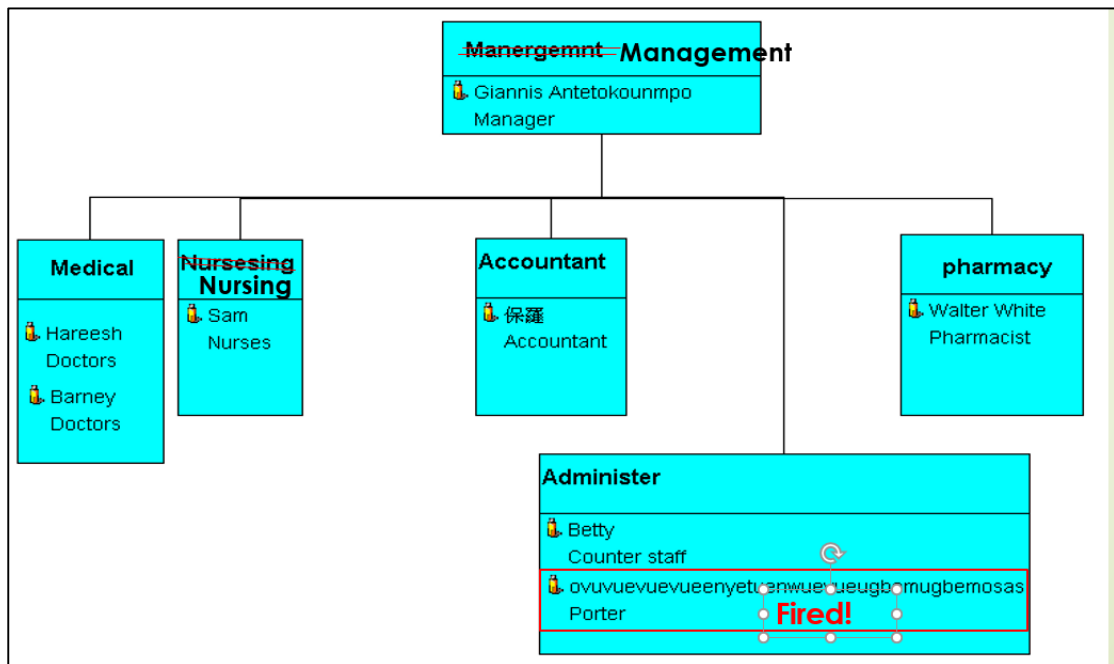**To-be Model Time Analysis**
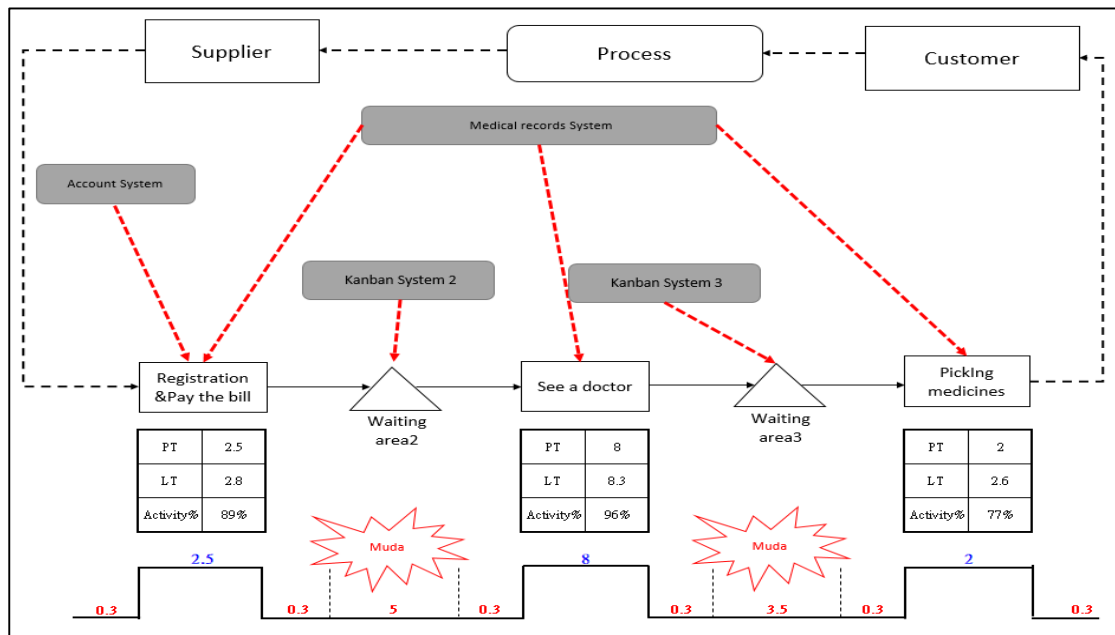
To-be Model VSM Diagram

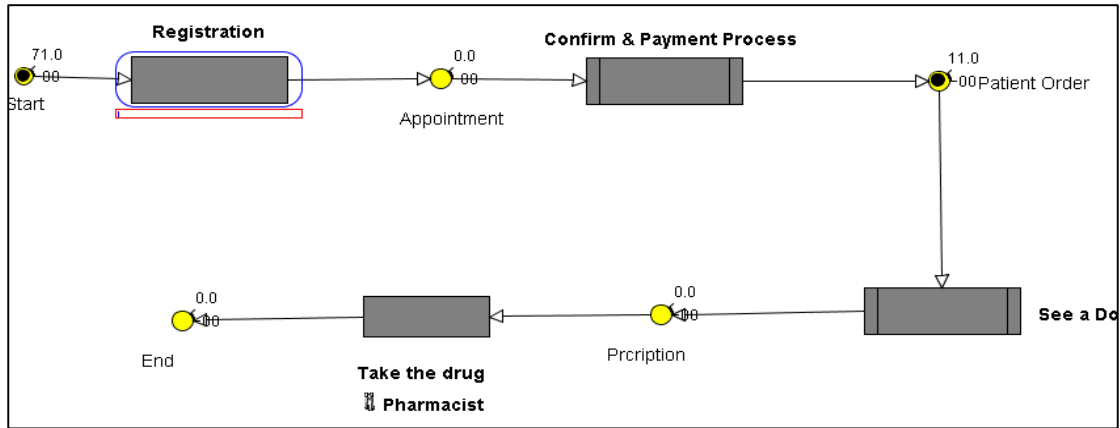Through the To-be Model VSM Diagram we can find after BPR, the process time become shorter and the wastes decrease.

To evaluate the to-be model by income software to simulation the whole process. There are Object-Model, Organization Model and Behavior Model.
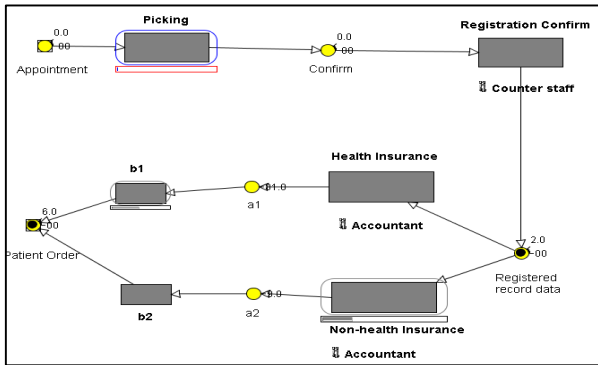
Doctor

Doctor
Drid
Drname
Department
Services
Drpass

Appointment

Appointment
Aid
Atime
Apid(patient)
Adrid(doctor)

Prescriptions

Prescriptions
Rxid
Rxtime
Rxpid
Appid
Rxdrugid
Symptom
Price

Patient

Patient
Pid
Pname
Pphone
Pbirth
Pusername
Ppassword
Card

Price

Price
Ifcard
Price

Drug

Drug
Drugid
Drugname
Ingre
Curing

To-be Object-Model

Manergemnt Management

🔒 Giannis Antetokounmpo
Manager

Medical

🔒 Hareesh
Doctors

🔒 Barney
Doctors

Nursesing Nursing

🔒 Sam
Nurses

Accountant

🔒 保羅
Accountant

pharmacy

🔒 Walter White
Pharmacist

Administer

🔒 Betty
Counter staff

🔒 ovuvuevuevueenyetuenwuevueugbomugbemosas
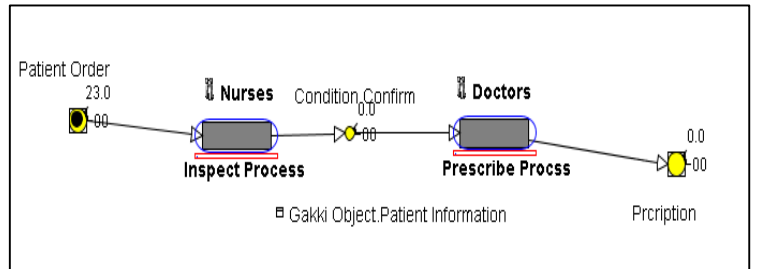Porter **Fired!**
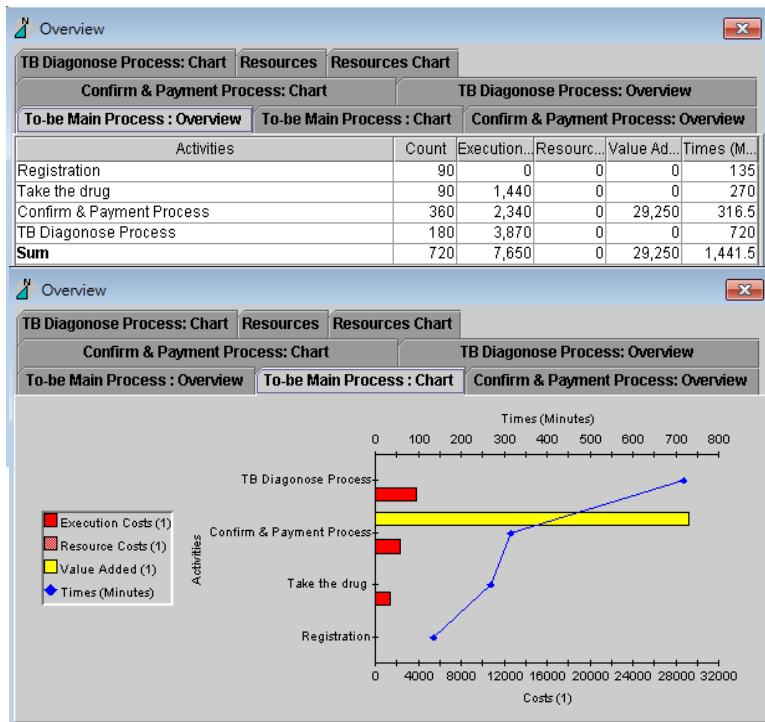
To-be Organization Model

To-be Behavior Model-Main Process

To-be Behavior Model- Confirm &Payment Process

(Drill-down)

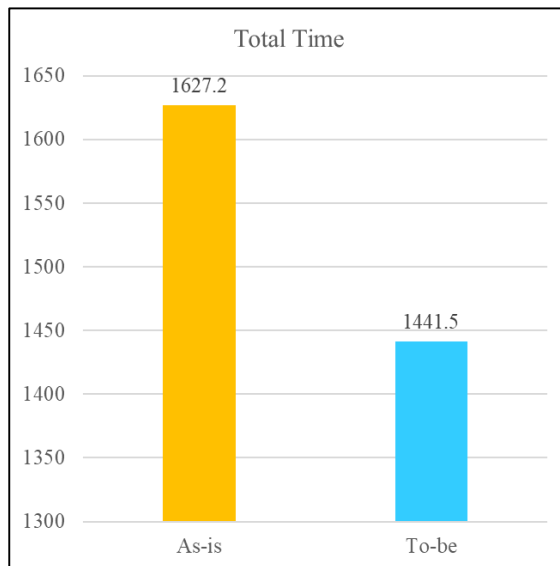To-be Behavior Model- See a doctor Process

(Drill-down)

Activities	Count	Execution...	Resourc...	Value Ad...	Times (M...
Registration	90	0	0	0	135
Take the drug	90	1,440	0	0	270
Confirm & Payment Process	360	2,340	0	29,250	316.5
TB Diagonose Process	180	3,870	0	0	720
Sum	720	7,650	0	29,250	1,441.5

To-be Behavior Model Payment Process

(Overview)

2.5 DMAIC Method-Control

Comparison As-is & To-Be Income Simulation

Income Simulation
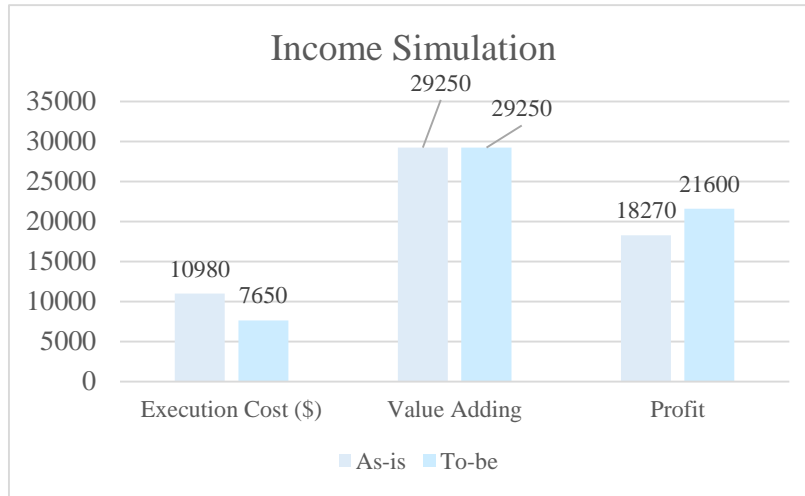
As-is & To-Be Cost comparison

Total Time

Metric	As-is	To-be
Lead Time	60.9	22.8
Operation Time	14.2	12.5
Activity(%)	23%	55%
System	7	4
Employee	8	7

As-is & To-Be Time comparison   As-is & To-Be Metric comparison

As can be seen from the above chart comparison, BPR and electronic systems have achieved an increase in cost and process time.

3. Web design

   Our website is about the clinic, and this chapter will introduce the web design of the Gakki clinic. In our website, we divide 5 headings in the top of the home page, including home, login, doctor introduction, medicine introduction and appointment of registration. Additionally, the most significant function in the website is to increase the efficiency of seeing the doctor. Therefore, we divide the login system into two types, including the patient and doctor. Next, this chapter will be based on these two types to introduce our web. The following is our home page.

Figure. Home webpage

3.1 Patient system webpage

   First, the patient clicks into the login page, and the block on the side is for the patient login. If the patient is not a member yet, the patient need to click the "Joint member" before entering to the webpage.

The following figure shows the webpage about the establish the membership. If you don't have member in our domain, you can register a new account. Type your name, ID number, password phone number, birth date and check if you have the health insurance card. Then, click this button, you are a member now. If the user types the patient id which has created before, the system will remind need to rekey or login directly.

After the patient login the webpage, the page will show the information of patient includes the registration, personal and the visit records. Moreover, the system provides some functions such as the patient can change personal data and visits records, as shown below.

After patient logins this page, we can see my member information. I can change personal data and visits, registered records but now we just have one record. So, go to make any appointment. Therefore, the patient can click into the registration webpage, and choose which one to see and date then click the button for sure. Go back to the member page. There are some records. If the patient found the registration information is incorrect, you can choose to delete this (like the following figure).

3.2 Doctor system webpage

Now we login as a doctor's identity. We can see which patient needs me to prescribe. The doctor would only see their own patient's appointment. And make prescription. Choose the drugs and input system.

4. Conclusion:

To conclude our report, first, real measurement is conducted in the as-is model, and the to-be model refers from real hospital website. In our project, DMAIC, TOC and VSM are used to define and analyze the problems. After setting an online appointment system, it can solve the time-wasting problem such as apparently shortens the time for each patient in the clinic. From the results of income simulation, after building the online appointment system, the cost and time decreased, and the profit increase. In the future, it can combine with app to be more convenient.