

IST 654



Business Data Mapping for Claim
Processing System, CPI & BI

BY:

Name: Saurabh Jape

Team Name: ANALYZERS

Team Number: 05

Mentor: Vishakh Viswanathan

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Health Care Ltd. – Introduction

In today's health care scenario, when a customer is hospitalized or visits a doctor to get treatment, he/she submits a claim with the health provider company. The company then checks if the customer is insured with the company. The company then goes on to check the coverage that the employee is under. Ex: Some treatments like dental treatments are not covered. After checking the coverage, companies check for how the coverage may apply i.e. did you go in network or out network? This is then followed by checking and matching the ICDM-9 () diagnosis code currently ICDM-9 to the CPT (current procedural terminology). Each of these assign numbers to diagnoses and medical procedures.

If the claim has broken toe proximal phalanx great toe code as the diagnosis and the procedure is open reduction internal fixation of the humerus as the procedure the claim will be refused. You simply can't treat a broken toe by operating on the arm. So the diagnosis must match the treatment.

The claim that the patient submitted is verified by the claim processing system and if successful the amount is deducted since the patient's employer had registered the patient while availing the self insured health plan.

The steps involved in the claim process can be summarized as follows:

1. The insured individual seeks medical attention from a healthcare provider including affiliated hospitals or nursing home etc.
2. The hospital submits charges to the insurer using a health insurance claim form.
3. Claim forms are sent electronically using a series of codes. The charges are received by the insurance company with each claim having a dedicated date and code to ensure timely payment.
4. The health insurance company reviews the charges to make sure they follow their policy guidelines.
5. Once the claim is verified, the selected claims are paid and notified to the customer.

The various services offered by the claim processing system include-

- Verification of claims submitted
- Claim code identification
- Claim code conversion
- Processing of claims
- Sending alerts to individuals about the claim status
- Calculating final claim amount
- Tracking claim status
- Claim report generation

Business Data Model, Business Intelligence Requirements and Operational Performance Metrics:

This document presents the Business Data Model of the Claim Processing System at the Health Care Ltd. The Business Data Map, is used to list down all the primary data sets and combined together to answer various Business Intelligence questions that the organization can focus on. The output data sets are used in combination with other data sets to answer further business questions.

The business data map thus helps in coming up with Business Intelligence Requirements. The key performance indicators and operational performance metrics is used to quantify and qualify the service being provided to the customer, thereby helping in improving the various processes.

Business Data Mapping

A) CUSTOMER APPOINTMENT, CLAIMS SUBMISSION AND VERIFICATION

This involves the following processes:

- Gathering the Customer Appointment information
- Gather the treatment information and its effectiveness
- Gathering the Medical history of the customer
- Finding the number of claim system users
- Analyzing the most popular plans

	Type of Data Cluster	Customer Appointment Details	Effectiveness of Treatment	Medical History of Patient	No. of Claim users	Popular Plans
<i>Patient Information</i>	P	I				I
<i>Doctor Information</i>	P	I				
<i>Symptom Information</i>	P	I				
<i>Treatment Information</i>	P	I				
<i>Medical Centre Information</i>	P	I				
<i>Time Period</i>	P	I				
<i>Health Improvement Information</i>	P		I			
<i>Patient Visit Information</i>	P			I		
<i>Claim details submitted by customer</i>	P				I	
<i>Customer Registration details</i>	P					I
<i>Payment Information (type of plan)</i>	P					I
<i>Customer Appointment Details</i>	C	O	I	I	I	
<i>Effectiveness of Treatment</i>	C		O			
<i>Medical History of Patient</i>	C			O		
<i>Number of Claim Users of a System</i>	C				O	
<i>Popular Plans</i>	C					O

B) PLAN VERIFICATION, CLAIM DETAILS VALIDATION AND ICD CONVERSION

This involves the following processes:

- Gathering information about the customer plan
- Verifying the submitted claims
- Sending and Receiving the ICD code and other claim details

	Type of Data Cluster	Customer Plan details	Claim Processing System incoming valid claims	Number of Claims that require conversion	Number of claims that sent for conversion	Number of claims successfully converted
<i>Patient Information</i>	P	I				
<i>Claim details entered by the medical practitioner</i>	P		I	I	I	
<i>Claim - ICD 9 code</i>	P			I	I	
<i>Claim - ICD 10 code</i>	P			I		
<i>Doctor/Expert confirmation details</i>	P					I
<i>ICD 9 to ICD 10 mapper</i>	P					I
<i>Employer plan selection details</i>	P	I				
<i>Customer Appointment Details</i>	P	I				
<i>Claim submitted by the patient/customer</i>	P		I	I		
<i>Claims received by the system</i>	P		I			
<i>Customer Plan details</i>	C	O				
<i>Claim Processing System incoming valid claim</i>	C		O			
<i>Number of claims that require conversion</i>	C			O		
<i>Number of claims sent for conversion</i>	C				O	I
<i>Number of Claims successfully converted</i>	C					O

C) CLAIM AMOUNT CALCULATION, SETTLEMENT AND REPRICING

This involves the following processes:

- Repricing of the claim submitted by the customer
- Claim Amount Calculation based on the plan selected by the customer
- Settlement of the claim, Generating the bill and drawing cheques

	Type of Data Cluster	Update repriced claim details	Customer Billing Information details	Number of accurate Deductible amount	Number of accurate Claim Adjusted Amount	Number of bills generated	Number of Cheques drawn
Amount paid by the customer	P		I				
Co-payee amount	P			I			
Deductible amount balance	P			I			
Type of network/ Coinsurance details (IIN / OON)	P				I		
Customer Appointment details	P		I				
Customer enrollment details	P	I		I			
Claim received by the system	P	I	I				
Plan offers and repricing information (from repricing team)	P	I					
Customer Bank details (from Finance team)	P						I
Claim submitted by customer	P					I	
Customer Registration details	P					I	
Update repriced claims	C	O					
Customer Billing Information details	C		O	I			
Number of accurate Claim Deductible Amount	C			O	I		
Number of accurate Claim Adjusted Amount	C				O	I	I
Number of customer bills generated	C					O	I
Number of Cheques drawn	C						O

D) ID CARD GENERATION, CLAIM STATUS NOTIFICATION, PERFORMANCE & REPORTS

This involves the following processes:

- Providing regular updates about the status of the claim to the customer
- Generating ID cards for the registered customers.
- Managing the Claim Processing System Accumulator to track the claim amount details of the customer
- Calculating the performance of the system in terms of performance and efficiency

	Type of Data Cluster	ID Card generation	Number of Claim Status notified successfully	Number of claims being handled daily by the accumulator	Number of claim calculation Errors for a specific scenario	Analysis of the claims to find customer health pattern	Effectiveness of claim processing
<i>Customer Registration details</i>	P	I	I	I	I		
<i>Payment Information (Type of plan)</i>	P	I	I	I	I		
<i>Claim submitted by customer</i>	P		I	I	I		
Notification delivery status	P		I		I		
Upto date customer information	P	I	I				
<i>Claims status details</i>	P		I	I	I		
<i>Claims successfully converted</i>	P		I	I			I
<i>Errors (Root Cause)</i>	P				I		I
<i>Continuous Monitoring</i>	P					I	
ID Card Generation	C	O					
Number of Claim Status notified successfully	C		O				
Number of accurate Claim Deductible Amount	C			O	I		
Number of claim calculation Errors for a specific scenario	C				O	I	I
Analysis of the claims to find customer health pattern	C					O	
Effectiveness of claim processing	C						O

Thus, as shown from all the Business Data Mapping tables above, some of the major Primary Business Data Clusters involved in the Claim Processing System are:

- Patient Information
- Symptom Information
- Customer Enrollment/Registration Information
- Appointment Details
- Time Period and Monitoring
- Health Improvement Information
- Claim Details submitted by customer
- Plan Information
- Type of Network (IIN/OON) information
- No. of claims received
- Claims-ICD 9 code information provided
- Claims- ICD 10 code information provided
- Claims received by system
- Amount Paid at the time of treatment
- Co-pay amount
- Co-insurance amount
- Deductible according to User Plan
- Billing Details
- Root Cause of Errors

While, the Composite/Derived Business Data Clusters are:

- Appointment Information
- Effectiveness of treatment
- Customer Medical history
- Number of claim users of system
- Popular Plans
- Number of accurate claim deductible amount
- Number of accurate Claim Adjusted Amount
- Number of customer bills generated
- Number of customer cheques drawn
- Customer Plan Details
- Number of claims successfully converted
- Number of Claim Status notified successfully
- Number of claim calculation Errors for a specific scenario
- Effectiveness of claim processing

These data clusters help in understanding the customer/client satisfaction in terms of the experience Of the processing of claims and the claim calculation, after a claim has been submitted by the user.

Based on the analysis of data, we can predict, plan and execute those plans that are popular thereby increasing the effectiveness of decision making.

Business Intelligence Requirements

A) CUSTOMER APPOINTMENT, CLAIMS SUBMISSION AND VERIFICATION

1. The system shall help in analyzing customer appointment preferences, health and doctor/medical center preferences
2. The system shall help in analyzing the treatment and its effectiveness on the basis of the number of visits of a Patient, symptoms and the claims being submitted for
3. The system shall help in determining the number and popular medicines being prescribed
4. The system shall help in determining the health problems faced by employees of a specified demography
5. The system shall display the medical details of the patient along with the claim details, appointment history and treatment provided
6. The system shall help identify the popular users of the system
7. The system shall help in analyzing which type of customers submit a lot of claims thereby creating a potential to provide assistance and benefits to such customers
8. The system shall help in analyzing on which days customers tend to submit claims
9. The system shall help in analyzing and answering questions about which plans are sold the most and if there is a correlation between the high sales and premium amounts offered in the various plans
10. The system shall help predict the plan preferences of a specific demographic population over time to help develop better customized plans for them
11. The system shall analyze if there is a rise in the number of claims filed in an area and help the business analyze the overall 'health' of a population

B) PLAN VERIFICATION, CLAIM DETAILS VALIDATION AND ICD CONVERSION

1. The system shall analyze the more popular plans that customers prefer
2. The system shall provide information that will help in creating new customized plans
3. The system shall help in finding out the loop holes and difficulties faced by customers during claims submission using the difference in the claims submitted and the claims that are valid and which reach the processing system successfully
4. The system shall help in analyzing the number of claims that require conversion from ICD 9 to ICD 10 so that they are in compliance with the new law
5. The system shall help in analyzing and identifying the claims that require conversion
6. The system shall help in predicting which types of claims require automated conversion and which claims need to be manually updated by the medical expert team
7. The system shall help in determining the efficiency of the claims processing system by comparing the number of claims successfully converted and the number of claims that are entering the system for conversion
8. The system shall help analyze and identify which ICD 9 codes do not have ICD 10 code currently

C) CLAIM AMOUNT CALCULATION, SETTLEMENT AND REPRICING

1. The system shall help in analyzing the re pricing functionality and the popular discounts and offers that are availed by customers.
2. The system shall help in analyzing the amount of money spent by customers and the pattern of claims submission
3. The system shall help in analyzing the calculation of the claims deductible and adjusted amount that will help in understanding customer health and plan preference
4. The system shall help in answering questions of the total amount of money spent by customers on health care
5. The system shall help the business understand the correlation between late premium payments and any implicit financial reason for late payments
6. The system shall help in generating various reports such as:
 - Report of type of customers using the claims processing system
 - Report of the income category of the customers
 - Report of correlation between the claim submitted and the health of region
 - Report of number of users registered under a particular employer and their total premiums paid
 - Report of the claim adjusted amount and Claim deductible amount of each customer and similar trends
7. The system shall help in analyzing how the system achieves the business value proposition of 'Value based Care'

D) ID CARD GENERATION, CLAIM STATUS NOTIFICATION, PERFORMANCE AND REPORTS

1. The system shall help in analyzing the number of customers registered and having valid ID-Cards.
2. The system shall help in analyzing the effectiveness of providing alerts to customers
3. The system shall analyze which segment of the population has most number of technical complaints or error reports
4. The system shall help understand the reason for the high error reports and make room for root cause analysis for user experience improvement needs
5. The system shall account for the following reports to help predict future technology requirements
 - Report of number of users and what time of day they access it most
 - Report of number of attempts it takes users to log in after failed attempts
 - Report of the number of claim calculation errors and the reasons for the same
 - Report of the number of claims being handled by the accumulator daily
 - Report of number of people above 60 and time taken between page navigation
6. The system shall analyze the correlation between higher network usage and parameters like time of day, month, year and also location of customers
7. The system shall help analyze the performance of the system in terms of:
 - Number of claims process successfully
 - Number of claims being processed daily
 - Errors/Problems faced during conversion

Continuous Operational Performance Metrics

A) CUSTOMER APPOINTMENT, CLAIMS SUBMISSION AND VERIFICATION

Data Cluster	Business Intelligence	Information Technology	Predictive Analysis	Feedback Analysis	Strategic Analysis
Plan Information (Plan types, deductible amount, IIN/OON network etc.)	Which plans are sold the most and does the premium amount or deductible amount have an effect on it	Number of plans that are bought often and which type of customer segment buys plans leading to higher system transactions	Do people prefer plan by specific time periods or by specific deductible amounts	Customer plan preferences over a period of time	Develop customized plans for customers
Number of Claims submitted by customers	What gender, ethnicity, veteran and age groups submit higher number of claims	Number of claims submitted by each customer segment and handling of data by the system	Forecasting and planning for a variety of claim submission trends	Analyzing the relation between the gender, ethnicity or age group and the number of claims submitted.	Develop customized plans and offers to target specific customer segments
Patient Information (Medical History, Treatment Effectiveness and Appointment Details)	Which medical condition results in more number of treatments and higher submission of claims	Analyzing the need for a faster process of such type of claims that will result in lesser conversion time and delay due to claims being queued	Predict the future incoming type of claims for conversion and plan for mitigating system delays and overloads	Analyze if there is a reason behind the medical conditions and pattern of health conditions	Strategize to improve the process of claim conversion for such medical conditions

B) PLAN VERIFICATION, CLAIM DETAILS VALIDATION AND ICD CONVERSION

Data Cluster	Business Intelligence	Information Technology	Predictive Analysis	Feedback Analysis	Strategic Analysis
Number of valid claims entering the Claim Processing System	Are the claims submitted by the user being rejected because the customers haven't been registered by the employer correctly causing invalid claims during verification	Analyzing if the IT System is not able to validate the claim details accurately due to some technical issue	Predicting the need for effective advertising and communication to prevent incorrect customer registration with selected health plans	Analyzing the reasons for the claims status being invalid during verification	Strategizing to improve plans, customer support and advertising for the population
Number of Claims that require conversion	Are the claims that are entering the claims processing system already converted to ICD 10	Analyzing if the ICD 9 code, symptom and treatment details entered by the hospital being correctly sent by the system	Predicting the need for an effective process to make sure that hospitals are correctly entering the customer health details	Analyzing the reasons for incorrect/error in health details being entered by the hospital which is not in sync with the expected inputs	Strategizing on improving the User Interface and providing an interactive design to help system users
Number of claims that sent for conversion	Are all the claims entering that require conversion being sent for conversion. Is there any factor due to which claims are being rejected and not sent for conversion?	Are the plans associated with each customer mapped correctly in the database? Is there an error in the mapping that is leading to claims not being converted?	Predicting the trends associated with the plans that are not being sent for conversion.	Analyzing the difference between the claims that are rejected by the system and the claims that are approved by the system	Discover better ways to make sure that all the claims that require conversion are sent successfully
Number of claims successfully converted	Expand the conversion process and improve the conversion process time	Does the system, conversion mapper not have ICD10 codes for a particular ICD 9 code due to which conversion is unsuccessful	Predicting the relationship between the ICD9 to ICD10 mapper and the successful claim conversion process	Analyzing which type of claims have ICD9 codes that are directly mapped to ICD10, making the conversion process easy	Improving the claim process by updating the ICD mapper, using Machine Learning

C) CLAIM AMOUNT CALCULATION, SETTLEMENT AND REPRICING

Data Cluster	Business Intelligence	Information Technology	Predictive Analysis	Feedback Analysis	Strategic Analysis
<i>Update repriced claims</i>	What kind of offers and discounts are given to which customer segment	Analyzing the needs for additional IT to focus on handling claims with higher repricing	Predicting the trends of discounts and offers provided to customers and whether they would last over a long time period	Understand and analyze the types of repricing done on a claim to help improve the conversion process	Strategizing to improve the handling of repriced claims
<i>Number of accurate Claim Deductible and Claim Adjusted Amount</i>	Increase the number of claims being processed by the system, as the calculation process is more efficient	Calculating the relation between the calculation process and transaction delay	Predicting if the claim calculation process time would be the same even with higher number of incoming claims	Analyzing the system performance by increasing the number of claims being handled by the system	Business Process Reengineering to reduce the overall turnaround time
<i>Number of customer bills generated</i>	Which payment method do specific demographic populations prefer	Capacity of system in terms of Number of transactions handled by time	Predications about when people pay late the most in the year	Which type of customers, medical practitioners pay and respond better	Decide on customer plans and upgrade them according to the popularity and ease of customer access.
<i>Number of Cheques drawn</i>	What type of customer segments are cheques drawn on by the system on a regular basis	Capacity in terms of the number of cheques being drawn and credited to the customer bank account	Predicting the trends of the cheques being drawn and if it would be consistent over a long time	Analyzing the details of the customer to whom the cheque is being drawn and the medical condition for which the claim was submitted	Strategizing to improve the process of the number of cheques drawn per claim being submitted according to the condition

D) ID CARD GENERATION, CLAIM STATUS NOTIFICATION, PERFORMANCE AND REPORTS

Data Cluster	Business Intelligence	Information Technology	Predictive Analysis	Feedback Analysis	Strategic Analysis
Number of Claim Status notified successfully	Analyze the satisfaction of the customer with the accurate determination of claim status	Analyze if the system is accurately displaying the status of the claim on the UI of the user dashboard	Predict if the claim status notification would work even with increased number of users over a time, without any delay	Analyze the email, phone and portal claim alert notification and the delay involved	Plan and prepare for higher load on the scheduler job that is used to send notifications to the user
Number of claim calculation Errors for a specific scenario	Analyze correlation between high usage and overall number of customers to formalize business success	Plan for higher network speeds and more server storage for these specific times	Predict future spikes in network usage and plan to mitigate for possible system overload	Analyze if there is a reason behind specific populations using the website at those times	Plan and prepare for higher server loads
Analysis of the claims to find customer health plan pattern	Which plans are most preferred by a specific geographic and demographic population	Putting extra IT support for customers with these plans	Predicting trends of registration for these plans	Understanding the triggers for customer satisfaction for a region/ demographic population – ratio of people who prefer better claim processing and people who prefer lower cost	Strategizing to get companies and plans which cater to the larger ratio of the population
Effectiveness of claim processing	Analysis of customer satisfaction with our business for a significant population	Analyzing if there is a lacking in the IT system because of which customers are not satisfied	Predicting need for advertising and commercializing to specific population	Understand and analyze if there is a hidden cultural/ political reason for non conformance mandate	Strategizing business focus to enroll the dissatisfied customers

Conclusion

Thus, the system deals with more precise codes providing potential benefits like fewer rejected claims, improved benchmarking data, improved quality and care management, and improved public health reporting. ICD-10 will advance healthcare in many ways, with benefits accruing across five major categories.

- Quality Measurement
- Public Health
- Research
- Monitoring and Performance
- Reimbursement

Thus, the ICD-10 compliant Claim Processing System – Business Data Mapping helps to list down all the primary data sets related to the Claim Processing System. These primary datasets are combined together to answer various Business Intelligence questions that the organization can focus on. The output data sets are used in combination with other data sets to answer further business questions.

The business data map thus helps in coming up with Business Intelligence Requirements. The key performance indicators and operational performance metrics is used to quantify and qualify the service being provided to the customer, thereby helping in improving the various processes involved at each step of the Claim Processing System at Health Care Ltd.