
Proposal

Brooklyn Urgent Care (BKUC)

Proposal for data integration and analytic services

3 October 2016



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Prelude

introduction

Brooklyn Urgent Care (BKUC) is a medical care centre that provides walk-in urgent care and pain management services in the Brooklyn area. In the rendering of these services, BKUC uses a range of software systems that facilitate operations; such as an Electronic Medical Records (EMR) solution, a document scanning OCR solution for check payment processing, an online scheduling solution for managing patient visit schedules, a PDX phone system that manages call logs, numerous manually updated excel files and so on.

The challenge that BKUC currently faces is to have and maintain a consolidated central repository of all their data available from all these disparate systems and thereafter have certain analytics and alerts generated from this consolidated data that can help the BKUC team track certain compliances and streamline operational performance.

To this end, BKUC is in discussions with [redacted] to architect a data integration and analytics framework that will integrate the data streams from BKUC's various systems, maintain a relational database with referential integrity, generate metadata and triggers and provide dashboards that provide analytics which allow BKUC to gain insight into their compliances and operations. A more detailed description of BKUC's stated requirement is provided from pages 5 to 9 of this proposal.

Based on the discussions so far, this proposal will document the BKUC requirement in detail, explain proposed solution roadmap and provide effort estimates, timelines and commercials for the same.

Background

current state

A short description of some of the data sources, integrations and reporting currently in effect at BKUC is provided below for the purposes of ratifying a common understanding of what has been discussed so far. Based on discussions and the documents and information shared with [redacted] so far, our understanding of the current state is as follows:

- **MSSQL Server 2014:**

BKUC uses a locally hosted MSSQL database that primarily holds two main databases named "BKUC" and "HF_BKUC".

The "BKUC" database holds the historic data from their previous EMR system, DocuTap; as well as the data from Mavro, used for tracking their check payment processing.

The "HF_BKUC" database holds the backup of data tables from their current EMR, MediTouch. In addition to this, the "HF_BKUC" database also contains certain lookup (LU) tables and certain views created for reporting.

Based on discussion so far, it is also understood that the scheduling of data imports and some of the reporting triggers are built using the SSIS services, however as of now, we do not have access to the SSIS services and therefore cannot verify this (ref. list of Dependencies on for each requirement).

- **MediTouch (HealthFusion Inc.):**

MediTouch currently holds the Electronic Medical/Health Records (EMR/EHR) and billing information of patients at BKUC. It is deployed as a Commercial off the Shelf (COTS) SaaS hosted solution with an Oracle backend database.

A scheduled csv dump of the MediTouch data tables is generated daily and stored in a FTP folder, which is then pulled into the BKUC MSSQL database. The actual scripts used to pull the csv data into the database is not currently available with us and needs to be verified (ref. list of Dependencies on for each requirement).

Background | current state

- **MediTouch (HealthFusion Inc.): (contd...)**

Currently the MediTouch system holds the patient records from April 2016 onwards. It contains data on the patient master, visits, visit types, CPT and diagnosis (codes) per visit, payor details and stage-wise details of the billing cycle.

The system however does not hold visit records for certain procedures such as MRI, Neurology, etc. Additional records for such visits are maintained manually in Excel.

Also, till date the system was not capturing the start date and end date for each case that a patient had with BKUC. However now, BKUC proposes to capture these under DOI and Termination dates within MediTouch itself, which is critical to identify Active/Inactive patients.

- **Mavro:**

MavBridge is a Mavro Imaging solution that is used to scan and process the check payments and documents received against billing.

The system used by BKUC is customized for them (the extent of customization is not know). The backend database for Mavro is unknown. Currently the Mavro system generates a XML file (.oxi) that is parsed using a Java package and fed into the local MSSQL database.

Based on discussions so far, our understanding is that only about 60% of the fields available in the XML are being pulled into the local db.

- **Clockwise.MD:**

Clockwise.MD is a cloud hosted SaaS solution used by BKUC to schedule patient appointments. The solution also allows patients to login online and schedule their own appointments.

While previously BKUC used Clockwise primarily for the scheduling of Pain Mgmt. visits, they now also proposes to start using Clockwise to maintain the schedules for visits such as MRI, Ortho and Neurology that were previously tracked manually in Excel.

Where and how the data from Clockwise is pulled and stored still needs to be discussed.

- **ShoreTel:**

ShoeTel is a PBX phone system used by BKUC. The only data needed from this system at the moment are call records on patient follow-ups.

Again, where and how the data from ShoreTel is pulled and stored still needs to be discussed.

- **DocuTap:**

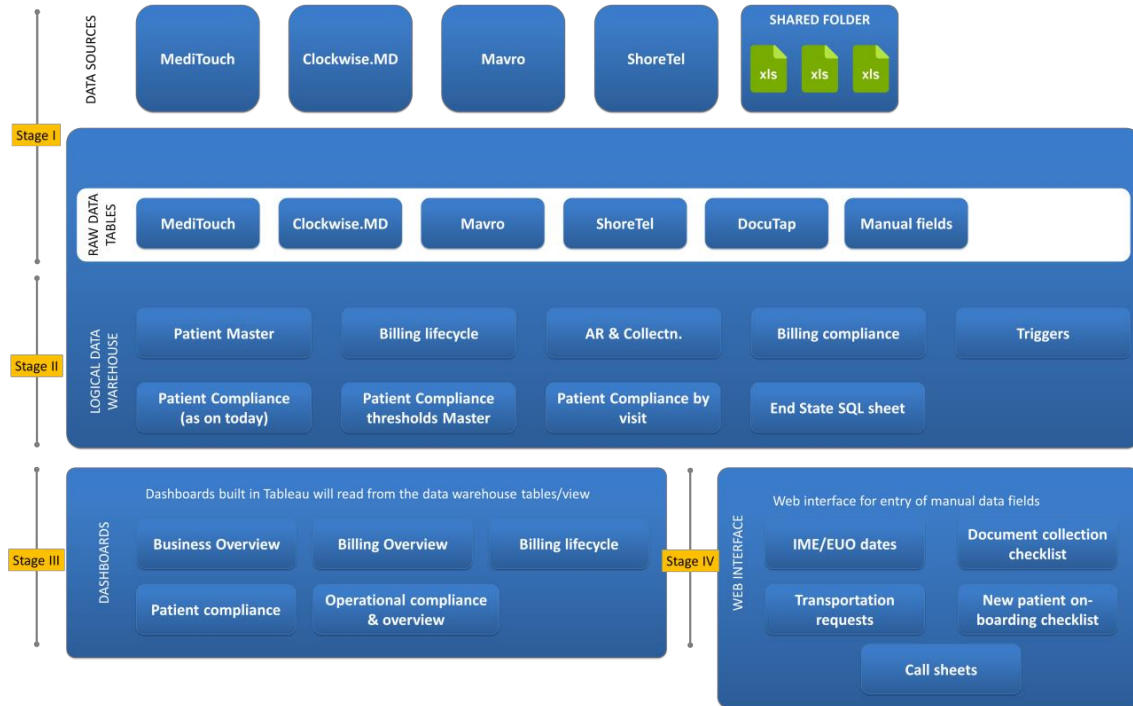
DocuTap was the EMR system used by BKUC upto March 2016. The historic data from this system is available in the "BKUC" db.

- **MS Excel files**

A wide range of operational data is still maintain in Excel files manually updated by respective stakeholders. Specifically, the appointment schedules for MRI, Ortho and Neurology, IME and EUO deadlines, document collection and scanning, document submission deadlines (e.g. NF-2), new patient on-boarding check-lists and schedules and call sheets for daily follow-up calls to non-compliant patients.

Requirement | stated goals

Our understanding of BKUC's stated requirement is as follows:



STAGE I: Importing data from stated data sources to raw data tables:

The following requirements are stated based on the assumption that the current methodology for data import will be continued. In case the methodology is to be changed (e.g. instead of importing from a csv, we need to use API or any other protocols available), the effort estimates will be revised accordingly.

- MediTouch** – First, we need to verify whether all the data fields available in the daily MediTouch csv dump are being pulled accurately and in all completeness into the local db. In case certain fields are not being pulled or being pulled inaccurately, we will need to modify the MediTouch tables in the local db to accommodate the additional fields as well as modify the import scripts accordingly.

Dependency: Currently we don't have visibility of the import scripts being used to pull data from the csv to the local db. This access would be needed ASAP to verify both accuracy and completeness of the data being pulled.

- Mavro** – Currently only about 60% of the data available in the XML is being pulled into the db. Balance 40% of the data needs to be imported as well. We will need to modify the Mavro tables in the local db to accommodate the additional fields as well as modify the import scripts accordingly.

Dependency: We would need the XML format that specifies the tags within the XML, which should be available as a document with Mavro. In case this documentation is not available, we would need to reverse engineer this mapping based on the Java package currently used to parse the XML, which is likely to take longer.

- Clockwise** – We need to pull the scheduling data for all the patient appointments from Clockwise into the db. Currently, we don't see any specific tables that contain the raw data from Clockwise. Raw data tables will need to be built in the local db and an import mechanism/script will be built to import the data from Clockwise into these tables.

Dependency: At this point, we don't know whether data is currently being pulled from Clockwise to the db; and if so, how it is being done. This will need further discussions.

Requirement

stated goals

STAGE I: Importing data from stated data sources to raw data tables: (contd...)

- **ShoreTel** – Call log data for all patient follow-ups, to be pulled to the local db. Currently, we donot see any specific tables that contain the raw data from ShoreTel. Raw data tables will need to be built in the local db and an import mechanism/script will be built to import the data from ShoreTel into these tables.

Dependency: At this point, we donot know whether data is currently being pulled from ShoreTel to the db; and if so, how it is being done. This will need further discussions.

- **Excel** – There are a number of data fields from an operational stand-point which are currently being tracked and manually entered in distributed Excel files.

The following Excel files have been identified which need to be maintained to receive manual inputs from users, which will then be pulled into the local db:

- Exam sheet: For tracking patient appointments scheduled
- IME/EUO: tracking IME/EUO schedule dates
- Document collection checklist
- New patient on-boarding checklist
- Call sheet: call status and comments update
- Transportation: transport schedule sheet
- Billing status of contested claims

Dependency: Of the excel files mentioned above, the “Billing status of contested claims” is not available with us.

STAGE II: Data warehouse:

Based on discussions so far, the following consolidated views/tables populated using the raw data will be built and maintained in the data warehouse.

- **Billing lifecycle** – The billing lifecycle table will contain the complete lifecycle data for each billing transaction; from the visit info, at cpt and diagnosis code level, charge generated against each code, corresponding claim, status of claim submission, payment status (part/full), adjustment codes and thereafter manual fields of claims that have been contested, arbitration details and final status after arbitration outcome.

Dependency: Stage I raw data tables need to be complete.

- **Patient Master** – The Patient Master table will contain the all the static information regarding each patient (name, contact details, race, age, policy information, etc.) as well as certain aggregated fields such as total visits by visit type (total UC visits, total PM visits, total cases, etc.), billing till date, AR till date, Active/Inactive tag, etc.

Dependency: Stage I raw data tables need to be complete.

Requirement

stated goals

STAGE II: Data warehouse: (contd...)

- **Patient Compliance threshold master** – The Patient compliance threshold master table is the table that will define the expected thresholds for each visit type. All patient visit compliance tables will refer to this threshold master to verify whether a patient is C/NC at a particular visit type at any particular stage of his treatment.

If any thresholds need to be changed in the future, they simply need to be updated in the threshold master rather than changing it at a script level across tables.

Dependency: Stage I raw data tables need to be complete. Patient compliance thresholds list needs to be frozen upon.

- **Visit Master** – The visit master table will contain the visit level (appointment) details of each patient visit. Apart from details such as the case ID, visit type, cpt & diagnosis codes for the visit and patient details, the table will also contain the expected threshold value for the visit type completed (to calculate C/NC at a visit level) and the billing details of the visit. The table will include visits that are both billed and that are yet unbilled.

Dependency: Stage I raw data tables need to be complete. Patient compliance threshold master, Patient Master and Billing lifecycle tables need to be populated.

- **AR & Collection table** – The AR and Collections table already exists in the HF_BKUC database. However it currently shows visit level details. It will be modified to take it to cpt & diagnosis code granularity.

Dependency: Stage I raw data tables need to be complete.

- **Billing Compliance** – The billing compliance table will essentially track two things; whether a particular visit has been billed or not and secondly whether the bills generated were billed on time or not.

Dependency: Stage I raw data tables need to be complete. Visit Master and Billing Lifecycle tables need to be populated.

- **End State SQL view** – The End State SQL view will be built based on the Excel file (of the same name) share with us.

The End State SQL table is a comprehensive table that contains data from across a wide range of raw data tables. We need to discuss the utility of this view and ascertain whether all of this information is needed in a single view, particularly given the complexity of multi-table joins involved which are likely to cause performance issues.

Dependency: Stage I raw data tables need to be complete.

- **Triggers** – The tables generated for triggers will be populated purely for the purpose of generating email/SMS triggers to a specified list of recipients. These are essentially scheduled reports that will be fired based on programmed events.

The triggers serve the following purposes;

- Email a daily report to relevant stakeholders
- Update and provide an excel dump of certain tables into a shared common FTP drive for the purpose of manual field updation. These updated files will then be read back into the relevant db that will store the manual field updates provided on that day.
- SMS/Email triggers to patients to prompt non-compliant patients to come in for visits.

Requirement

stated goals

STAGE II: Data warehouse: (contd...)

- **Triggers** – The following views/tables will be populated for the purpose of triggers.
 - Recommended discharge list (email report only)
 - Billing non-compliance (email report only)
 - Escalation status for contested claims (email report and dump to FTP for manual data updation)
 - Exam sheet (email report and dump to FTP for manual data updation)
 - IME/EUO report (email report and dump to FTP for manual data updation)
 - Document collection list (email report and dump to FTP for manual data updation)
 - New patient on-boarding status list (email report and dump to FTP for manual data updation)
 - Non-compliant patients call sheets (email report and dump to FTP for manual data updation)
 - Transportation log sheet (email report and dump to FTP for manual data updation)

Dependency: Stage I raw data tables need to be complete. All data warehouse consolidated views/tables need to be populated. SSIS read/write access rights. Some of the above mentioned triggers such as SMS triggers will need integration with 3rd party tools (e.g. SMS gateway providers).

STAGE III: Analytic dashboards in Tableau:

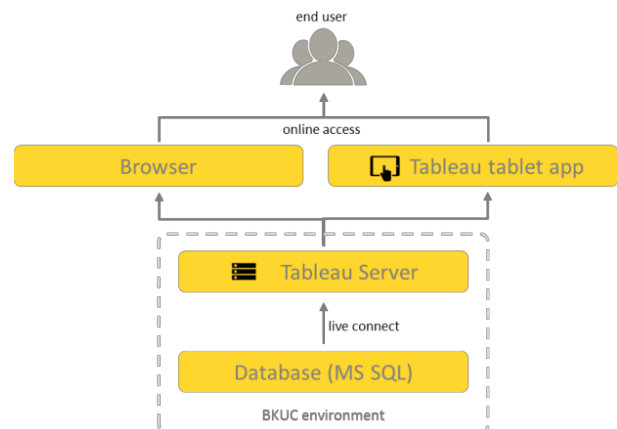
The analytic dashboards built in Tableau will provide a visual interactive reporting layer that will provide insights into business and operational performance. The dashboards will be hosted on the Tableau Server which will maintain live connectivity to the backend MSSQL database. Users will be able to access the dashboards on their desktop/laptop machines either through a browser or on their tablets via the Tableau tablet app.

The dashboards can also be downloaded (subject to permissions) for offline viewing using the locally installed Tableau Reader.

The Tableau dashboards will be logically clubbed based on business functions into workbooks. Each workbook may contain one or more dashboards based on the functional requirements and/or logical separation of business functions and analytics.

Broadly, the following workbooks will be built in Tableau, each workbook containing one or more relevant dashboards clubbed together (detailed further):

- Business Overview
- Billing Overview
- Billing lifecycle
- Patient Compliance
- Operational compliance and overview



Requirement

stated goals

STAGE III: Analytic dashboards in Tableau:

- **Business Overview** – The Business Overview workbook will contain dashboards that provide a macro view of the overall business performance. It will contain the critical KPIs that provide a snapshot view of volume of patients and their visits and visit types, level of compliance, retention, overall billed/unbilled values and volumes, performance of these KPIs trended over time (day, week, month, year).
- **Billing Overview** – The Billing Overview workbook will contain dashboard that provide the billing details at a granular level. We aim to cover the following information, which will be logically clubbed into one or more dashboards in this workbook.
 - Billing status for each visit (visit billed/unbilled)
 - Track pre-billing stages
 - Billing at cpt & diagnosis code level
 - By visit types, service type, by physician, by payor
 - Post-billing stages
 - Billing compliance
 - AR & Collection with AR ageing and track part/full payments
- **Billing Lifecycle** – The Billing Lifecycle dashboard will track the complete billing funnel, from visit to item level billing, to claim status, to partial/full payments with adjustment codes, to arbitration data.

The idea here is provide a single view of the number of transactions that are there in each stage of the cycle and possibly track the ageing of transactions in each stage.

- **Patient compliance** – The Patient Compliance dashboard will provide the day level, visit level, visit type level, week level and overall case level compliance for each patient.
- **Operational compliance & overview** – This workbook will contain the complete set of operational performance monitoring dashboards.
 - Visit type schedule (Exam sheet)
 - IME/EUO tracking
 - Document collection status
 - New patient on-boarding status
 - Weekly call sheet status
 - Transportation request status

STAGE IV: Web interface for manual data

Whereas in the initial stages, manual data fields will be captured using excel files kept in shared folders, the same data fields will later be captured using a web interface (GUI) developed for the purpose. Web interfaces (one web page each) will be developed for the following:

- IME/EUO tracking
- Document collection status
- New patient on-boarding status
- Weekly call sheet status
- Transportation requests

Deliverables | roadmap

Stage	ID	Description	Dependencies	Effort estimate
I	I.1	MediTouch raw data import to db		3 days
I	I.2	Mavro raw data import to db		3 days
I	I.3	Clockwise raw data import to db		TBD
I	I.4	ShoreTel raw data import to db		TBD
I	I.5	Excel manual data data import to db		7 days
II	II.1	Patient Master table/view	Stage I	3 days
II	II.2	Patient Compliance threshold table/view		3 days
II	II.3	Visit Master table/view	II.1, II.2	5 days
II	II.4	AR & Collection table/view	Stage I	3 days
II	II.5	Billing Compliance table/view	II.3	5 days
II	II.6	Triggers (Email)	Stage I, II.5	12 days
II	II.7	Trigger (SMS)	Stage I, II.4	TBD
II	II.8	Triggers (Excel dump)	Stage I, II.5	4 days
II	II.9	Billing lifecycle table/view	II.4, II.5	5 days
II	II.10	End State SQL table/view	Stage I, II.9	5 days
III	III.1	Billing Overview	II.5	7 days
III	III.2	Patient Compliance	II.3	7 days
III	III.3	Business Overview	III.1, III.2	5 days
III	III.4	Billing Lifecycle	II.9	7 days
III	III.5	Operational Compliance & Overview	II.3, II.8	15 days

Critical path timeline: 60 days

The above mentioned critical path timeline is based on the assumption that all the necessary access right and supporting documentation/logics/information is made available prior to the start of each Stage.

Additionally, the timeline is estimated based on the scope of delivery specified in the “Requirements” section of this proposal. Any requirements not covered in the above scope are likely to affect the timelines mentioned above.