A Digital Transformation - The Gooden Center

Ethan Grace & Phil Wilkens

Georgetown University School of Continuing Studies

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Abstract

The Gooden Center undertook an initiative to consolidate data from across the organization for the purpose of intelligence-gathering. This consolidation included ingesting disparate data types and advanced analytics on those data. The solution detailed in this paper provided predictive guidance aimed at better patient and business outcomes. The center approached the solution looking for non-intuitive correlations between data and results. This approach will be iterative going forward as a part of center operations. The paper details how the center has become better-positioned to gather market intelligence and best practice guidance relating to nonprofit business, healthcare operations. The center has been positioned for success as defined by better healthcare services. These services are the result of better understanding and funding availability through streamlined business operations.
Problem Statement

The Gooden Center runs and operates four residential inpatient programs with a total of forty-three beds. The financial sustainability at The Gooden Center is reliant upon the occupancy of these beds, which the budget expects the capacity to remain at or above 62% throughout the entire year (Gooden Center P&L, 2018). However, a low or high census of the residential program is not as simple as one might suspect, it is a culmination of the efforts from multiple departments from marketing, admissions, accounts receivable, clinical, operations, HR, and business development.

All the departments mentioned above contribute in one way or another to the quality of patient care, our ability to collect and receive payment, fundraise, provide appropriate staffing, raise brand awareness, and obtain a fair market price for our offered services.

Currently, The Gooden Center collects data using multiple tactical software technologies. The repository for all of the data collection is scattered in various places, such as individual laptops, desktops, multiple folders throughout the server, and several different cloud-based storages. David Hewlett, the CFO of the Gooden Center describes the current model of data collection and reporting structure as being ineffective towards its ability to translate into tactical data for strategic decision making. David continues to describe Gooden’s datasets as disparate, “nearly all of Gooden Center’s data is locked in silos from each department, which creates an inability to execute drill-down reports to identify potential correlating performances issues from department to department. (D. Hewlett, personal interview, October 23, 2018) The heart of our conflict is a combination of independent silos working in separate software systems
and then extracting the data into excel spreadsheets, which provide no connection and no in-depth understanding. Gooden's data is in desperate need to be restructured to paint a better picture of our overall performance.

To begin producing results to enhance patient care will start by changing the way Gooden looks at its data. The best way to produce positive results starts with the blending of all our data from finance, operations, and clinical organizations. Removing the data from the current department reporting silos will be the first step toward improvement. Creating a centralized strategy with proper data governance will be the start of genuinely improving our patient care and forge a new pathway to strengthen our alignment with our organization's mission and vision.

**Executive Summary**

The Gooden Center is committed to the continuous advancement of delivery systems. By leveraging advanced analytics, the Gooden Center is implementing a system utilizing big data technologies to increase positive outcomes for patients. We intend to increase positive outcomes of our services and launch innovative methods to enhance the quality of care we provide to our patient population, strengthen our business development decisions, and boost our donor base to support Gooden Center's mission and core values.

The recommended solution for The Gooden Center is to implement a new system and begin using a data visualization software tool to integrate all of Gooden’s data, which will become the dashboard for real-time health, big data for strategic forecasting and visualization. The number one barrier toward implementing a tool to complete the task at hand is the upfront cost. The Gooden Center has been running tight with its planned 2018 budget and allows no wiggle room for additional expenditures or costly initiatives. Since the Gooden Center is a non-profit
organization, it has access to TechSoup.org, which is an organization that provides software and hardware solutions to eligible organizations at a heavily discounted rate. One of the technology solutions TechSoup offers is Tableau at a cost of $58 for Tableau Desktop Professional two year license. In addition to the Tableau software TechSoup offers to the eligible organizations, TechSoup provides live online training from Tech Impact at cost of $15 an hour. Tech Impact is the leader in providing non-profit IT services and solutions. Tableau will provide the initial steps needed to allow our leadership and management team to have the ability to produce analytics that is descriptive, prescriptive, and predictive. The recommendation is Tableau, (see Competitive Analysis section for justification analysis) the implementation of Tableau will help Gooden obtain organizational transparency and the accuracy needed to make swift determinations and allow management the room to plan for a better future from all core-areas from patient care, business development, HR, administration, and finance.

**Data Analysis**

In the first quarter of 2016, The Gooden Center took a sizeable risk by expanding its billable services by opening up a new center to begin treating mental health patients at a residential and outpatient level of care. Upon opening the new facility, The Gooden Center leaped without having data to verify the need in the marketplace. As Gooden continues to grow, the risks will become greater. To remain sustainable, The Gooden Center will need to put the proper tools in place to make confident decisions.

Erin Reiney, MPH, a certified health education specialist (CHES), who is the acting director in the division of Child, Adolescent and Family Health for HRSA, recently reviewed the Gooden Center’s patient outcome survey questions (Figure 1) in an interview conducted by
Ethan Grace and Phil Wilkens. Before Erin provided her analysis on Gooden’s outcome survey, she first gave a brief background on the challenge’s organizations similar to Gooden face with their current outcomes.

- Organizations struggle with produce evidence-based metrics on quality of care
- Most organizations submit outcomes based on credit process metrics (i.e. the total number of patients served, ages of patients served, treatment types, diagnoses. . .)
- Very little evidence of preventative care success
- The ability to produce evidence in linking mental health and substance use disorder treatment initiatives w/metrics on patient success is extremely low

Erin’s initial feedback on the Gooden Center’s patient outcome questions was positive, she felt Gooden is on the right track by including questions that track the social determinants of health and social capital. Erin feels the Gooden Center could value further by digging deeper to find more meaningful information that tells the story of the stability and security the Gooden Center alumni feels about their education, housing, employment, and their social network.

Social Capital - correlates to the effectiveness and quality of resources both tangible (public and private space) and intangible (individual relationships and group relationships).

Social Determinants of Health - relates to an individual's comfort, stability, and security involving financial employment, food, housing, and education. (E. Reiney, personal interview, November 15, 2018)
Initial business analysis has shown that there are potential business benefits for advanced analytics at the Gooden Center. Recent reviews of budget spending showed that there’s a need for greater visibility into cost-benefit spending. For example, the center recently did a spend study on online marketing and advertising return on investment. The results show that Gooden’s advertising spend on Google Ads should be diverted to other initiatives (Figure 2). The summary showed that organic clicks resulting from Google searches, without paid promotion,
are much more effective than Pay Per Click spending with Google. In addition, we pulled data from our EHR system to demonstrate the total patients admitted from the internet as the referral source. (Figure 3) As a caveat, we pulled the same referral report and drilled-down slightly further to demonstrate the total number of patients admitted at the residential level of care, which is our highest revenue earner against total amount spent on pay per click advertising. (Figure 4)

**Figure 2.** Call data metric analysis based on The Gooden Center’s currently available data.
Figure 3. Admissions metric analysis based on The Gooden Center’s currently available data.

Figure 4. Marketing data analysis based on The Gooden Center’s currently available data.

There’s an opportunity at Gooden Center to automate this type of analysis using big data analytics. This effort will identify opportunities in real time. This ability to identify and respond to information quickly will become a competitive differentiator to the Gooden Center. This
advancement will provide for better business outcomes and, more importantly, better patient outcomes.

The system will provide the ability to cross-pollinate our data and create more meaningful KPIs (Key Performance Indicators)

- **Financial Measures.** Metrics are gathered from accounting software, Electronic Healthcare Records (EHR) and collaborate billing software to gauge the progress of goals, objectives, performance, and general organizational soundness.

- **Operations Measures.** Metrics are gathered to measure the condition of facilities and equipment and to assess health and safety competence and emergency preparedness.

- **Admissions Measures.** Metrics are collected from initial call to determine trends in the current market environment for program services.

- **Clinical Measure.** Metrics to track the quality of patient care and success rate from admission, treatment, discharge, and post-discharge.

- **Human Resources Measures.** Employee measures generate information on employee satisfaction, licensure, and training needs.

- **Information Technology (IT).** Metrics to determine the effectiveness, efficiency, adequacy of its current technology and information systems in place

**Research**

Value-add analytics are not intuitive. The value of analytics is derived from unexpected correlation. In order to establish the value of advanced information gathering and analytics, organizations need to familiarize themselves with resources available to assist in creating a
baseline for metrics. Once baselines are established and implemented, data modeling becomes a primary technical approach. One valuable resource is Gartner.

**Gartner Group Analysis:** Industry groups such as Gartner can provide information on what technologies exist to support business transformation. Gartner’s Magic Quadrant™ is a valuable source of information on selecting technologies to meet business needs. Gartner includes a knowledge base available for research.

The Gartner article, *Progress in Healthcare Analytics Lies in Leveraging Data*, by Laura Craft, provides governance guidance to avoid common obstacles associated with the healthcare sector (Craft, 2018). The articles provide details from the use case of the Lexington Clinic. One of the key lessons learned by the clinic was the need for governance of existing data and future data structure. “A deliberate investment was made in human capital. Riley identified four dedicated team members with knowledge spanning claims, clinical and administrative data, who became a permanent team. Job descriptions were modified, and stewarding data excellence became part of the culture of their job (Craft, 2018).”

Craft showed that healthcare facilities such as The Gooden Center need to focus on data governance to ensure they can most-quickly respond to opportunities in patient care as well as business best practices. An important aspect of this governance is operational continuity. Because of the non-intuitive nature of much valuable analytics, clinical teams can be slower to accept correlations. Data professionals need to build trust with the medical teams they support in order to ensure that recommendations based on data analytics are understood and implemented.

Gartner also provides analysis of the business value of analytics for healthcare. *Augmented Analytics Is the Future of Data and Analytics*, by Rita Sallam, Cindi Howson, and Carlie Idoine
is an example of this type of research. The article details the use of insight discovery and information sharing. Insight discovery is the use of advanced analytics for “finding and surfacing the most important insights or changes in the business… (Sallam et al, 2018)” Similar to Laura Craft, these authors focus on partnering opportunities as primary recommendations:

- Establish trusted relationships between business professions, practice professionals, and data scientists to tackle high-value business and practice issues.
- Develop roles and responsibilities that establish accountability, authority, and responsibility of action based on data analysis.

The authors take the analytics beyond the traditional tool stack of analytical trial and error to a predictive data paradigm they call augmented analytics. This augmentation is artificial intelligence applied to analytical operations. This allows analytics to “augment human intelligence and contextual awareness, and to transform data management, analytics, and BI…(Sallam et al, 2017)” This augmentation will become more valuable to the Gooden Center as two criteria are met:

1. The value of analytical forecasting is shown to improve business and healthcare outcomes.
2. The volume and complexity of available data exceed the capabilities of the planned system implementation.

Once these two criteria are met, the Gooden Center should review big data platforms to do the more-advanced online analytical processing.

Daniel Cane, the CEO of Modernizing Medicine, details the need for analytics in healthcare in a 2013 Forbes interview: “There’s a fundamental problem—the data is
unstructured. The medium is so complex, you need something akin to IBM’s Watson for each specialty… (Rogers, 2013)” Cane is referring to the lack of structure and standardization between healthcare partner organizations including insurance companies, pharmaceutical companies, for-profit hospitals, and care providers. Because the United States healthcare system is profit driven, there is a siloed approach to efficiency in operations. For example, an insurance company will make changes to their data policy without considering the impact of these changes on insurance company operating policies. This lack of a consolidated data solution, according to Cane, has created an environment where the most efficient way for patient care providers to operate is in a paper-based approach (Rogers, 2013).

This tendency toward a paper-based operating model has caused health care to lag behind other businesses with respect to technology. The Affordable Care Act offers financial incentives to providers to digitize health records but according to Eva Harris with the State of Health, California has been slow to convert to electronic health records, due partially to lack of funding and lack of staff resources (Rural California Hospitals Slow to Digitize). Additionally, California has some of the strictest regulations in the nation (Global Health Care). The Gooden Center will need to adhere to the Health Insurance Portability and Accountability Act (HIPAA) regulations regarding the protection of electronic records and the personally identifying information contained within them. All these issues make it a challenge to effectively implement analytics within a California-based health care provider.

To assist with the challenges detailed above, the Health and Human Services, Health Resources and Services Administration (HRSA) Bureau of Primary Health Care (BPHC) has established the Health Information and Technology, Evaluation and Quality (HITEQ) Center.
HITEQ specializes in leveraging electronic healthcare records (EHR) data effectively for better health outcomes (About the HITEQ Center). HITEQ provides resources specific to population health management covering implementation, data usage, data protection, and information policy and governance.

This research is provided to The Gooden Center to assist in the development of the system platform, policies, and technologies that will move the center toward better patient health and business outcomes. There will be opportunities to evaluate current performance and to develop a roadmap of additional advancements at the center. This, along with continued executive sponsorship and support will position The Gooden Center to capitalize on existing data and develop a data management plan to drive new metrics.

**Data sources**

The following are the departments, data sources, and the type of data considered for the implementation:

- **Finance**
  - QuickBooks
    - Historical financial transactions for all receivables and payables

- **Program / Clinical**
  - EHR
    - Discharge reports, length of stay, insurance authorizations

- **Operations**
  - Excel & Smartsheet
    - Historical reports of the organization’s health and safety program, incident reports, vehicle inspections, building inspections, accreditations
- Admissions
  - SalesForce & EHR
    - Referral/Referent report, occupancy report, total admission by patient care type
- Development
  - Donortap, Salesforce, & Smartsheet
    - Planned giving, donations received, & submitted grant applications vs. received,
- Human Resources
  - Paychex, Smartsheet, & Excel
    - Employee turnover, employee satisfaction, and employee credentialing

**Key Performance Indicators (KPIs)**

To continuously provide an excellent quality of care to those in need, Gooden Center needs to implement a system to produce quantifiable outputs from all data inputs. Each core area of the Gooden Center will have a set of Key Performance Indicators. The sum of all indicators will represent the overall health of the Gooden Center. The indicators are to be measured, benchmarked and analyzed for organizational growth and sustainability.

The KPIs represent

**Key:**

- RP: Responsible Person
- FQ: Frequency of report generation
- Dist.: List of persons on the KPI distribution list
- KPI: Key Performance Indicator
- Ex Com: Executive Committee of the Board of Directors
- BOD: Board of Directors
- Fi Com: Finance Committee of the BOD's
- Sr. Mgmt.: Senior management team that meets weekly on Monday morning includes; CFO, COO, VP of Development, Director of HR, VP of IT and A/R, CEO
- CPA: Cost per acquisition
- Mo. report: a monthly report due, unless otherwise specified, on the first Monday after the first of the month for use at the Senior Management Meeting
- Qtly Report: a quarterly report due on the first Monday of each fiscal quarter for use at the Senior Management Meeting
- Semi-Annual Report: a semi-annual report due of the first Monday of the first of third quarters for use at the Senior Management Meetings
- MCO: Managed Care Organization
- ASA: Against Staff Advise COB:
- Close of Business

Table 1. The Gooden Center Key Performance Indicator Descriptions

<table>
<thead>
<tr>
<th>KPI name</th>
<th>Description/Purpose</th>
<th>FQ</th>
<th>Dist.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance</td>
<td></td>
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<tr>
<td>Daily Snap Shot</td>
<td>Report focuses on census by service line detailing revenue by service line, global revenue per day and average daily revenue organization wide. Allows Clin/Ops an opportunity to update, authorization and verify Clin/Ops records with Finance records in a timely manner</td>
<td>Daily</td>
<td>MH PROG. DIR., SU PROG. DIR., VP OF INF. MGMT., COO, LIC. MGR., CEO</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
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<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Profit and Loss</td>
<td>Profit and Loss statement records revenues and expenditures and compares actual with budget</td>
<td>Monthly, 3 weeks after end of month</td>
<td>Ex Com, Fi Com, COO, VP OF INF. MGMT., SU PROG. DIR., MH PROG. DIR., SC, CEO</td>
</tr>
<tr>
<td>Balance Sheet</td>
<td>Report that defines an organization’s assets and liabilities</td>
<td>Monthly, 3 weeks after end of month</td>
<td>Ex Com, Fi Com, COO, VP OF INF. MGMT., BOD, CEO</td>
</tr>
<tr>
<td>Cash Report</td>
<td>Report that defines the organization's cash by category, available cash, restricted cash, other sources of revenue</td>
<td>Monthly, 3 weeks after end of month</td>
<td>Ex Com, Fi Com, COO, VP OF INF. MGMT., BOD, CEO</td>
</tr>
<tr>
<td>A/P Report</td>
<td>Report that defines the payables out from the organization</td>
<td>Monthly, 3 weeks after end of month</td>
<td>CEO</td>
</tr>
<tr>
<td>FA Report</td>
<td>Finance Agreement Report defines the percentage of patients that are admitted to TGF with a FA signed in accordance with P&amp;P's</td>
<td>Monthly</td>
<td>CQI, Sr. Mgmt., JM, MK, CH</td>
</tr>
<tr>
<td>Document Title</td>
<td>Description</td>
<td>Frequency</td>
<td>Responsible Parties</td>
</tr>
<tr>
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</tr>
<tr>
<td>Profitability by Program</td>
<td>Details the profitability by Program and Program service line with the goal of judging the efficiencies/profitability of each service line</td>
<td>Monthly</td>
<td>Sr. Mgmt., MH PROG. DIR., SU PROG. DIR., LIC. MGR.</td>
</tr>
<tr>
<td>Discount Report</td>
<td>Defines the discounts offered to clients by service line, highlighting outliers and total percentage off list price</td>
<td>Monthly</td>
<td>Sr. Mgmt., MH PROG. DIR., SU PROG. DIR.</td>
</tr>
<tr>
<td>CPA Report</td>
<td>Defines the total cost of client acquisition in aggregate for all clients and includes web hosting, bonuses, PPC and SEO</td>
<td>Monthly</td>
<td>COO, VP OF INF. MGMT., CEO, Fi Com</td>
</tr>
<tr>
<td>Per Unit Cost Report</td>
<td>Defines the total costs for each client to be served by service level</td>
<td>Qtly</td>
<td>Sr. Mgmt., SU PROG. DIR., MH PROG. DIR.</td>
</tr>
<tr>
<td>Payer Source report</td>
<td>Defines the payer sources for all clients</td>
<td>Semi-Annually</td>
<td>Sr. Mgmt., Fi Com, Ex Com</td>
</tr>
<tr>
<td>DSO Report</td>
<td>Days Sales Outstanding or DSO report calculates the DSO or average number of days between when claims are filed to MCO's and when payment is received</td>
<td>Weekly</td>
<td>Sr. Mgmt., Fi Com, Ex Com, AD</td>
</tr>
<tr>
<td>First Pass Auto Adjudication Report</td>
<td>Defines the B2B relationship between MCO's and TGC as related to machine to machine payments, expressed as percentage for TGC’s claims that are paid on a &quot;first-pass adjudication&quot; basis and among other factors is an indicator of how clean and pre-scrubbed TGC's claims are prior to submission</td>
<td>Monthly</td>
<td>Sr. Mgmt., AD, Fi Com</td>
</tr>
<tr>
<td>Collections Report</td>
<td>Collection report defines that number of clients, expressed as a percentage, reported to a collection agency for unpaid co-pays or other payables to TGC.</td>
<td>Monthly</td>
<td>Sr. Mgmt., MK, JM, CH, CQI</td>
</tr>
<tr>
<td>Report</td>
<td>Description</td>
<td>Frequency</td>
<td>Responsible Parties</td>
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</tr>
<tr>
<td>A/R Report</td>
<td>Defines the A/R's due from both MCO's and private pays in aging buckets. MCO A/R is reported as both in aggregate and by each MCO</td>
<td>Weekly</td>
<td>Sr. Mgmt., AD</td>
</tr>
<tr>
<td>Bad Debt Report</td>
<td>Defines the bad debt that the organization incurs from all sources</td>
<td>Monthly</td>
<td>Sr. Mgmt., JM, MK, MH PROG. DIR., SU PROG. DIR.</td>
</tr>
<tr>
<td>Incurred No Auth's Report</td>
<td>Defines the number of clients that TGC incurred the cost of providing service without an authorization</td>
<td>Monthly</td>
<td>Sr. Mgmt., MH PROG. DIR., SU PROG. DIR., CQI</td>
</tr>
</tbody>
</table>

**Information Services**

<table>
<thead>
<tr>
<th>Report</th>
<th>Description</th>
<th>Frequency</th>
<th>Responsible Parties</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Availability Report</td>
<td>Defines as a percentage, the time that the following systems were up and available: Phone system</td>
<td>Monthly</td>
<td>Sr. Mgmt., MK, SU PROG. DIR., MH PROG. DIR.</td>
</tr>
<tr>
<td>Help Report</td>
<td>Total number of help requests for the organization by help request category</td>
<td>Monthly</td>
<td>Sr. Mgmt., AD, MH PROG. DIR., SU PROG. DIR., CQI</td>
</tr>
<tr>
<td>IT Needs Report</td>
<td>Defines the needs for investment in IT resources for the coming reporting period</td>
<td>Semi-Annual</td>
<td>Sr. Mgmt., Fi Com</td>
</tr>
<tr>
<td><strong>HR Report</strong></td>
<td>Monthly report that defines the following HR issues:</td>
<td>Monthly</td>
<td>Sr. Mgmt., MH PROG. DIR., SU PROG. DIR., CQI</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------------------------------------------------</td>
<td>---------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>1. Number of new employees</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>2. TB tests outstanding</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Percentage of HR files in full compliance with HR P&amp;P's with deficiencies complied by category</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **Higher Education Report** | 1. Report defining, since inception: The number of FTE's who participated in the Tuition Assistance Program | Semi-Annual | Sr. Mgmt., Fi Com, Ex Com, SU PROG. DIR., MH PROG. DIR. |
|                            | 2. The number of BS or BA degrees obtained          |         |                                             |
|                            | 3. The number of MS or MA degrees obtained          |         |                                             |
|                            | 4. The number of certification advancements made     |         |                                             |

| **FTE Filing Report** | 1. Defines the total number of Worker's Comp, Disability or other FTE filings report that took place in the reporting interval. | Monthly | Sr. Mgmt., Fi Com, Ex Com, CQI |
|                       | 2. Reported monthly with roll over throughout the year with potential or actual TGC liability |         |                                             |

<table>
<thead>
<tr>
<th><strong>Employee Recognition Report</strong></th>
<th>Defines the Employees that have been recognized by the organization, purpose of the recognition and date of recognition</th>
<th>Qtly</th>
<th>Sr. Mgmt., SU PROG. DIR., MH PROG. DIR.</th>
</tr>
</thead>
</table>

| **Contact Report** | Listing of all FTE's:  
1. Cell phone  
2. Phone with extension, department  
3. Email due at the first business day of each quarter | Qtly | Sr. Mgmt., |

| **Development Report** | | | |
| **Weekly Dev Report** | Defines the following Dev issues:  
1. Number of estate calls or appointments held for previous week  
2. Number of foundation submissions for previous week  
3. Number of foundation visits held or scheduled for previous week  
4. Dev cash received for previous week  
5. Number of appointments scheduled for upcoming week for CEO | Weekly | Sr. Mgmt., |
| | Definitions | | |
| **Dev Activity/Need Report** | Defines the active Dev projects underway detailing:  
1. Name and dates of activity  
2. Estimated funds to be raised  
3. Detailed resources needed from the organization, alumni group, BOD's to achieve stated goals | Monthly | Sr. Mgmt., |
<p>| <strong>Dev CRM Compliance Report</strong> | Defines the level of compliance with CRM reporting of all Dev activities and follow-up actions | Monthly | CEO |
| <strong>Clinical/Ops</strong> | | | |
| <strong>ASA Report</strong> | Defines the number of clients that left TGC ASA (against staff advise) | Monthly | Sr. Mgmt., MH PROG. DIR., SU PROG. DIR., CQI |
| <strong>Census Report</strong> | Daily census report by service level organization wide reported at COB daily | Daily | Sr. Mgmt., CFO, COO, CEO |
| <strong>Authorization Report</strong> | Weekly report defining service line number and length of authorization | Weekly | Sr. Mgmt., MH PROG. DIR., GV, CQI |</p>
<table>
<thead>
<tr>
<th><strong>Unusual Occurrence Report</strong></th>
<th>Reported weekly, a summary of all UO's for the previous week</th>
<th>Weekly</th>
<th>CQI, Sr. Mgmt.,</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overtime Report</strong></td>
<td>Defines the overtime for all FTE's for the previous week and includes the presence or absence of appropriate authorization</td>
<td>Weekly</td>
<td>Sr. Mgmt., CQI</td>
</tr>
<tr>
<td><strong>Call Report</strong></td>
<td>Defines the statistics for the phone system for the previous week, including dropped or lost calls</td>
<td>Weekly</td>
<td>Sr. Mgmt., CQI</td>
</tr>
<tr>
<td><strong>Referral Report</strong></td>
<td>Defines the number and source for all referrals for the previous week</td>
<td>Weekly</td>
<td>Sr. Mgmt.,</td>
</tr>
</tbody>
</table>

**Sales**

<table>
<thead>
<tr>
<th><strong>Sales Report</strong></th>
<th>Weekly report that details sales activity covering the following parameters:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Number of calls outgoing</td>
</tr>
<tr>
<td></td>
<td>2. Number of emails outgoing</td>
</tr>
<tr>
<td></td>
<td>Number of visits to potential referral sources</td>
</tr>
<tr>
<td></td>
<td>3. Number of f/u visits for potential referral sources</td>
</tr>
<tr>
<td></td>
<td>4. Number of visits to current referral sources</td>
</tr>
<tr>
<td></td>
<td>5. Number of facility visits to TGC</td>
</tr>
</tbody>
</table>

| **Sales Assistance Report** | Defines the needs of the Sales Department for the upcoming week, such as visit preparation, in-service presentations | Monthly | Sr. Mgmt., |
HEALTHCARE TRANSFORMATION WITH DATA-DRIVEN INFORMATION

<table>
<thead>
<tr>
<th>Sales CRM Compliance Report</th>
<th>Defines the level of compliance with the selected CRM for all sales activity</th>
<th>Monthly</th>
<th>COO, CEO, CQI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitchen</td>
<td>Budget maintained</td>
<td>Monthly</td>
<td>Sr. Mgmt.,</td>
</tr>
<tr>
<td></td>
<td>Fully staffed, Cost per meal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilities</td>
<td>Bldg. Maintenance compliance</td>
<td>Monthly</td>
<td>Sr. Mgmt.,</td>
</tr>
<tr>
<td></td>
<td>State/Certification/City/CARF (Commission on Accreditation of Rehabilitation Facilities) is an international, non-profit organization founded in 1966 regulations</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vehicle Maintenance Regulations</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Business licenses up to date</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health and Safety</td>
<td>Inspections and Drills completed</td>
<td>Qtly</td>
<td>Sr. Mgmt.,</td>
</tr>
</tbody>
</table>

**Competitive Analysis**

The Gooden Center researched technology providers and existing analysis for their decision to implement Tableau for analytics. The two primary information sources where Gartner and TechSoup. Gartner provides strengths and weaknesses of available technologies by vendor and TechSoup provides a catalog of

*Figure 5. Leader Quadrant of the Business Intelligence analysis from Gartner.*
discounted software solutions for non-profit organizations.

In 2018, Gartner published an updated Magic Quadrant™ for the business intelligence marketplace. The quadrant entitled *Magic Quadrant for Analytics and Business Intelligence Platforms* included the following three vendors in the Leader quadrant: Tableau, Qlik, and Microsoft (Howson et al., 2018). Oracle was considered initially but it was found quickly to be an underperformer for business intelligence (Howson et al., 2018) and cost prohibitive.

All three vendors have the top vision and functionality of the twenty platforms that were evaluated.

The Gooden Center has special pricing available on certain software tools due their non-profit status. The TechSoup Organizational mission is to “build a dynamic bridge that enables civil society organizations and changemakers around the world to gain effective access to the resources they need to design and implement technology solutions for a more equitable planet (Mission and Values)”. To accomplish this mission, Techsoup provides reduced pricing to eligible non-profits. The site provided reduced pricing for both Microsoft Power BI and Tableau. A third criteria, along with functionality and pricing, was support. The Gooden Center has staff with Tableau training, therefore the training investment would be minimal. The complete competitive analysis is below.

Table 2. *Competitive analysis matrix for solution selection at The Gooden Center*
The analysis shows that Tableau ranked highest in three of the four categories and ranked the highest overall. The Gooden Center has leveraged Tableau previously and is satisfied that the platform provides the required functionality for the business.

Financial Impact Definition Analysis

The Gooden Center initially needs eight user licences for the software that is selected. Below is the analysis for the three leader position software platforms, in order of ranking.

1. **Tableau** - Leveraging TechSoup, Tableau is available to The Gooden Center at $58/user, with $15/hr per person training, and a minimal maintenance fee.

2. **Qlik** - The Qlik estimate is approximately $8-10k for the initial setup, plus $1,000 tokens per user, plus maintenance.

3. **Microsoft** - Power BI is available via TechSoup for $3/month/user. Microsoft requires that the application be bought based on the organization’s subscription. The Gooden Center has 168 employees and volunteers on their subscription. All 168 users would have access to Power BI as a rate of approximately $6,000 per year.

Table 3. Cost projections for down-selected solutions at The Gooden Center

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>5 Year Spend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tableau</td>
<td>$1,184</td>
<td>&lt;100</td>
<td>&lt;100</td>
<td>&lt;100</td>
<td>&lt;100</td>
<td>$1,500</td>
</tr>
<tr>
<td>Qlik</td>
<td>$15,000</td>
<td>$1,500</td>
<td>$1,500</td>
<td>$1,500</td>
<td>$1,500</td>
<td>$21,000</td>
</tr>
<tr>
<td>Microsoft</td>
<td>$6,048</td>
<td>$6,048</td>
<td>$6,048</td>
<td>$6,048</td>
<td>$6,048</td>
<td>$30,240</td>
</tr>
</tbody>
</table>

The Gooden Center needs one robust repository for each department to drop their data into on a regular basis. The solution is a data warehouse, which will become the core central repository of all Gooden’s data. The launch of a data warehouse will be our initial steps toward integrating our
data from each department. The data warehouse will allow new analysis, which will be used as a foundation to help our senior level staff to understand the overall health of the organization in near real time as possible.

Figure 6. Supported Interfaces between Tableau and The Gooden Center data infrastructure.

One of the key driving factors driving the project is the ability to track, report, and analyze patient outcomes. The patient outcome survey will be completed at various lengths post-treatment discharge. The outcome survey will be completed by the patient using their login access to their patient portal from EHR. The necessary factor in the process is to keep all patient inputted data in one place from their admission, treatment plan, treatment progress, discharge plan and their outcome progress over the various lengths of time. A flow chart has been created to demonstrate the process. (exhibit 2.a)
Figure 7. The Gooden Center workflow for healthcare outcomes using improved outcome surveys.

Team Qualifications & Technology Selection Process

A data governance program will be assembled to assist in the technology selection process. Each member of the team will be a part of the overall solution to help oversee all the steps from capturing, gathering, storing, managing, accessing, and securing our data. The data governance team will be a group consisting of qualified managers and leadership members to help maintain and take
ownership within various areas of the upcoming big data project. The selection process will be a
group effort, using a collaborative approach, which will help attract each member to have a higher
sense of responsibility. The newly assembled team will assist in ensuring the flow of data is accurate,
secure, consistent, and the data will help provide meaningful information, which can be used to make
sound decisions and paint a reliable picture of specific organizational initiatives.

The sources of data for the big data analytics implementation for The Gooden Center will
come from various sets of data in each of its core operational areas. Using a data warehouse and
visualization tool will allow all of our data to integrate and connect from all departments and our data
sources.

Cost Assessment

The cost assessment will be conducted by Gooden's senior leadership team and will be comprised
of the following areas:

- Value - The overall benefits the project will introduce to the organization

  Compare the costs associated to implement the project with the added value it brings to the
organization. The benefits of the project include better financial management, clinical management,
outcomes research, forecasting capabilities, and donor management.

  - Hardware & Software - The initial and ongoing cost of equipment, cloud computing,
    subscriptions and software licenses

  The initial and ongoing hardware and software cost will have the smallest impact on the project.
We will utilize Techsoup.org, an organization who specializes in helping eligible nonprofits find
discounted technology solutions.
- Workforce - The total cost of labor (ie, the cost of internal IT personnel and the newly established data governance committee (comprised of leadership and senior management)

The Gooden Center's will have to examine the cost of staff to implement and maintain the project. The labor cost will be the most substantial of the entire project, both initially and ongoing.

**Team Timeline**

The project will consist of the following four phases: Assessment, Define, Piloting, and Execution.

*Figure 8. Project plan template for business intelligence platform integration at The Gooden Center*
Managerial Considerations

The implementation of the new system involves integrating all of its data from a multitude of sources into one repository to begin the stages to analyze all of its data across departments for the first time. The newly proposed system of data collection and data analytics in a healthcare setting must be managed carefully.

If the data is not governed properly, the integrity and quality will become poor, which may negatively impact the following:

- Patient safety
- Quality of care
- Financial and legal decisions
- Corporate compliance
- Required regulations (state and federal)
- Organizational strategy

Patient safety and quality of care is a top priority, which is why data integrity and governance will be the pillars to achieving our goals. A strong governance program is critical for big data analytics, it will assist in making care more clear and more reliable. In addition, the leadership and management will have the information needed to prepare for the future. The most ethical and sound proposal to avoid legal implications is to enlist our organizational leaders across all departments to help by utilizing everyone's expertise to share the roles and responsibilities needed to create a powerful tool.
Data Governance & Risk Mitigation

The data governance at The Gooden Center has always been a challenging concern, it has often been overlooked, or given high priority for short periods during a time of crisis and always falls back to the wayside over time. Gooden is a non-profit healthcare center, with a staff of seventy-five full-time employees, and it has doubled in size over the last five years.

The big data project implementation at The Gooden Center will introduce a sounder data governance program and steer away from the current inconsistent structures in which we gather, manage, access, and secure our data. Data governance structure will be strategically implemented by assembling a team of qualified managers and leadership members to help maintain and take ownership within various areas of the upcoming big data project. The newly assembled team will assist in ensuring the flow of data is accurate, secure, consistent, and the data will help provide meaningful information, which can be used to make sound decisions and paint a reliable picture of specific organizational initiatives. Risk management will play a vital role in our data governance initiatives, by continuously monitoring and controlling, which will provide ongoing improvements toward accountability, and eliminate unnecessary redundancy. The data governance team must approve any new policies regarding data and review all existing policies.

Additional Benefits

The Gooden Center will have the capability to use social media as a tool to truly help brand visibility and target the intended audience. The Gooden Center puts on an annual cycling event and needs to increase the overall visibility, donations and the number of participants in the bike ride. Ingesting the data from sensors on participants will help motivate donors and create more exciting ways for our donors to give. The plan is to target and effectively engage the intended audience. For example, during our annual fundraising bike ride event, most riders are equipped with
GPS sensors. The GPS sensors are used to track total time, moving time, elevation gain, total mileage, average MPH, and even heart rate metrics. Donors can be enticed to give more by having more options to donate by donating $1 for each mile or total elevation gained by individual riders or teams.

Problems to be solved:

- Boost visibility
- Increase event participants
- Raise overall awareness
- Increase donors base

Instagram and Facebook both have "Insights," a native analysis tool for the tracking of necessary demographic information, measure specific ad-campaigns, and the monitoring of particular posts. Over the past few years, there have been advancements in social media analytics abilities to allow businesses to know their audience and target their audience. The advanced analytics utilizes and captures information from the user account profiles, friends, liked posts, connections, and their posted content. The data collected will identify the audience and provide the necessary information to make accurate adjustments in real-time to capture the intended demographic.

Ethics

In the 1990s, the National Human Genome Research Institute (NHGRI) established the Ethical, Legal, and Social Implications (ELSI) Program to inform ethical decision making related to research subject personal identifying information (PII). ELSI was developed to directly support the government’s genome research but the framework is applicable to public health and the use of medical information within analytics.
In 2003, HIPAA expanded PII protection to EHR data. According to Tavani in *Ethics and Technology*, the HIPAA protections were seen as too broad. Tavani goes on to cite Baumer, Earp, and Payton (2006), who suggest that HIPAA does not provide any specific protections for personal medical data in ‘secondary use’ scenarios such as forecasting and/or predictive analytics (Tavani, p.n. 381).

The American Journal of Public Health article, *Ethics in Public Health Research, Protecting Human Subjects: The Role of Community Advisory Boards*, author Sandra Quinn, PhD, notes the difficulty in protecting individuals in research such as analytics. She notes that as early as the early 1980’s AIDS research drove an increased scrutiny on the protection of patient data. According to Dr. Quinn, “it is increasingly common to hear researchers describe informed consent as a task to be done, speaking of the need “to consent” the subject.” This implies that the consent is a formality and a required task. This missing the more important consent mission. The consent needs to be a trusted avenue for a patient to participate in research to help the health outcomes of the community. There needs to be strong protections in place as well as an ethical understanding. This ethics of patient consent means that the patient’s consent to obtain treatment and to participate in research needs to include the same level of strong protection of PII.

These concerns and responses are captured most-clearly by Douglas Laney et al in the 2018 article *Cool Vendors in Information Innovation*:

“The key aspect in data exchange ... is trust. Without trust in the vendor and its platform, the safe data sharing ecosystem will fail. … Recent incidents with companies like Facebook and Cambridge Analytica also underline the importance of digital ethics. (Laney, et al, 2018)”
Health care ethics is advancing with the development of policies and regulations such as those detailed above. While a single comprehensive ethical map to health care is not possible, there are frameworks available to assist in guiding companies through ethical governance. Recommendations for the Gooden Center to consider include the Nissenbaum’s privacy framework. This framework deals specifically with how personal information is gathered and shared:

- Processes used in gathering and disseminating information
  - are “appropriate to a particular context”
  - and
  - comply with norms that govern the flow of personal information in a given context (Tavani, p.n. 138).

Nissenbaum defines that any attempt to gather or distribute data outside the process parameters above is a violation of privacy ethics. The data gathered by the center is compliance so long as it is used to determine better treatment options and as a tool in emergency response situations. Leveraging healthcare PII as an approach to determine business viability could present a major infringement of contextual privacy if the proper consent and data preparation is not done. Data distribution within Nissenbaum’s framework must also be considered. Distribution parameters must be made clear to patients to avoid ethical conflicts. This level of consent also applies equally to patient surveys. It is recommended that The Gooden Center leverage Nissenbaum’s Framework while developing surveys, analytics, and data management policies.
Conclusion

The Gooden Center’s newly integrated approach of utilizing data analytics to generate the KPI’s across the organization will introduce performance excellence and performance management that results in the following.

★ The delivery of ever-increasing value to our clients and stakeholders
★ The improvement of overall organizational effectiveness and capabilities
★ Organizational and personal lessons learned

Soon after the implementation of the new data analytics tool at the Gooden Center, it was apparent a roadmap needed be created to demonstrate the new process for making decisions at the Gooden Center. A detailed Visio workflow was created and utilized to identify inefficiencies. (figure 9)
Figure 9. The Lifecycle of KPIs at the Gooden Center
In mid-October of 2018, the Gooden Center’s data governance committee (also known as the continuous quality improvement team) made a decision to end all pay-per-click spending. The total revenue against the pay-per-click spend did demonstrate enough evidence to continue spending. The committee decided to keep a watchful eye on the revenue and patient census while marketing campaign was shutdown. After the internet spend was cut, the revenue did not suffer and neither did the number of admissions. (Figure 10 & 11)

*Figure 10, 2018* - Total amount billed for all services vs Pay Per Click Spend at the Gooden Center
Figure 11, 2018 - Total amount billed for all services vs Pay Per Click Spend vs Total Admits at the Gooden Center

The newly acquired information now at everyone’s fingertips demonstrated the November figured have the highest amount of total patient admits of 67. The total billed services in November ended up being the second highest earner in all of 2018. In 2018, the Gooden Center spent over $135k on internet pay-per-click campaigns. The new data analytics tool in place gave the management the ability to closely monitor all pertinent data in one visual to make real time decisions.
References

Within Health Resources and Services Administration (HRSA), the Bureau of Primary Health Care (BPHC) has established the Health Information and Technology, Evaluation and Quality (HITEQ) Center to best leverage EHR clinical data. The ability to perform analysis on data from The Gooden Center, HITEQ is a valuable asset. HITEQ offers training, technical specification, a knowledge base as well as information exchange forums to assist in decision making at The Gooden Center.


Laura Craft's article is a technical game plan for C-level and directors within the healthcare industry. The article addresses the complexity of today's technical solutions and details approaches to bridging the technical and medical staffs within provider companies. Healthcare providers such as The Gooden Center are tasked with streamlining business operations will increasing the quality of the health services
they provide. Craft defines and details some of the technical approaches and advancements that can assist providers.


The Gartner Magic Quadrant is a standardized format for presenting market research on technology solutions. The quadrant visually ranks two axes: Ability to Execute, and Completeness of Vision. These two axes are split to provide four classifications: Niche Players, Challengers, Visionaries, and Leaders. The Gooden Center reviewed the Gartner rankings for available business analytics solutions as part of the competitive analysis for the Tableau platform. Tableau is a leader in this market, along with Microsoft and Qlik.

Trust is vital to relationships, especially in healthcare situations. This article is used to illustrate the relationship between the need to define and maintain trust, with the need for ethical approaches to technology. The authors detail this need by discussion mistakes that companies like Facebook have made when dealing with ethical issues:

"Recent incidents with companies like Facebook and Cambridge Analytica also underline the importance of digital ethics."


TechSoup is a global partner organization that specializes in assisting nonprofit companies in leveraging advanced technical solutions. To date, TechSoup has delivered over $10 billion in technology services and solutions. The organization offers a marketplace were qualifying organizations, such as The Gooden Center, can procure market-leading hardware and software solutions as heavily discounted rates.


From the Abstract: "Increasingly, researchers grapple with meaningful efforts to involve communities in research, recognizing that communities are distinct from
individuals. We also struggle to ensure that individual participants in research are fully protected."

The Gooden Center is interested in evaluating and implementing frameworks that assist in protecting patient’s rights. The need for privacy needs to be balanced with the opportunities available to advance healthcare through analytics. Researches need access to clinical data as a tool in their work. A balance is needed that includes removing PII from research data. Sandra Quinn’s article reviews approaches for this work.


https://www.forbes.com/sites/brucerogers/2013/12/19/will-daniel-canes-modernizing-medicine-revolutionize-healthcare/#1e1e23293e77

Bruce Roger’s article details the career path of Daniel Cane as the founder of CEO of Modernizing Medicine. Cane details his path toward creating technology solutions specific to the healthcare industry. Specific to The Gooden Center, the Forbes article is a good introduction in to some of the root problems associated with the partnership of technology and medicine. The primary constraint is the lack of structure in the data. The article describes the evolution of technologies that are more capable of ingesting
and analyzing this type of unstructured data. This represents a big advancement associated with big data platforms as well. The availability of this capability needs to be evaluated as a future initiative at The Gooden Center.


Federal regulations have been implemented to establish privacy standards in healthcare. As part of these regulations, federal and state agencies are tasked with enforcing the digitization of healthcare records as part of HIPAA. Since this is a large undertaking, there has been a long window for which to accomplish the effort. The article details the successes and challenges of this work in California. The article compares California-based healthcare provides like The Gooden Center, with national progress toward record portability.


The article introduces Machine Learning / Artificial Intelligence (ML/AI) techniques as a way to define analytics within an organization. Cited techniques in Insight
Discovery. Insight Discovery is the use of advanced analytical processes to discover information that can lead to better patient and business outcomes. Some of the uncited suggestions include Machine-assisted Modeling. This should be considered for future research by The Gooden Center.


This is the Georgetown Master’s program course book for reviewing ethics in technology management. It is required reading for the Technology Management degree at Georgetown’s School of Professional Studies.

Tavani discusses the Nissenbaum framework for protecting patient privacy by establishing criteria that must be met to be considered ethical. Tavani is also quoted when reviewing HIPAA regulations related to secondary-use scenarios. The Gooden Center is able to leverage this reference as it continues to build analytics that involve PII.


Erin Reiney is acting director of the division of Child, Adolescent and Family Health for the Health Resources and Services Administration. She is a certified health education specialist with a masters in public health from Johns Hopkins University.
She worked with the interviewer to review strategies and challenges for capturing data.