



HEALTHTRUST[®]
UNIVERSITY CONFERENCE

July 25, 2022

Building Better With Business Intelligence: Data to Action

Mario A. Rosado, PharmD, MHA

Corporate Director of Pharmacy, Steward Health Care

| Disclosures

- The presenter has no real or perceived conflicts of interest related to this presentation

Note: This program may contain the mention of suppliers, brands, products, services or drugs presented in a case study or comparative format using evidence-based research. Such examples are intended for educational and informational purposes and should not be perceived as an endorsement of any particular supplier, brand, product, service or drug.

Learning Objectives

At the end of this session, participants should be able to:

1. Identify various types of business intelligence (BI) tools, including self-service tools
2. Recall the structure needed to build a BI self-service program
3. Recognize important elements for a self-service app for an end user

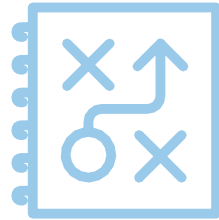
| Agenda

- Review Business Intelligence (BI) history in the marketplace and system basics
- Explore WHY BI is a cornerstone for business and how to close adoption gap
- Examine the structure of a self-service program
- Assess key elements for a self-service app for an end user

Business Intelligence Basics

| What is Business Intelligence (BI)?

Blend of strategies & technologies against business information to gain a competitive advantage



Strategies

Gathering Information, Processes, Presentations,
Dissemination of Business Information, etc.



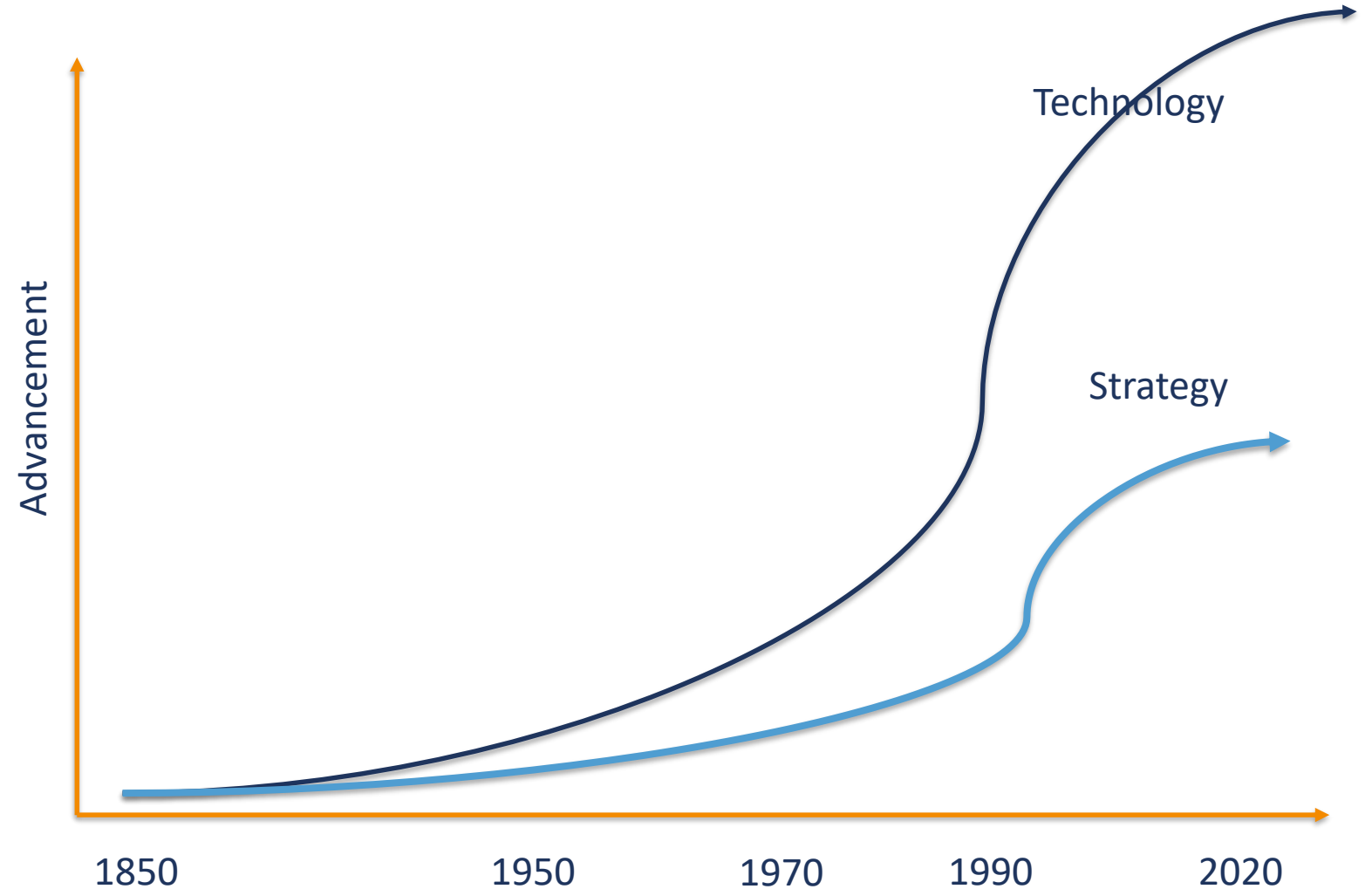
Technologies

Databases, Servers, Data Visualization,
Data Querying, etc.

Business Intelligence Gap

Barriers to Adoption

- Talent Resources
- Leadership
- Cost
- Data Sources
- Data Volume
- Data Preparation
- Ease of Use
- Complexity of Build
- Tools



Source: IIA Research Identifies Barriers to Business Intelligence and Analytics adoption:
https://www.sas.com/en_us/insights/articles/business-intelligence/ia-research-identifies-barriers-to-business-intelligence-and-analytics-adoption.html

Business Intelligence Tools

Business Intelligence Tools

Skipping Data Management & back-end tools

- Primarily BI Tools assist with:
 - Data Queries - tapping into a data source or server
 - Data Modeling - joining or comparing data tables against others
 - Analytics – running calculations on data
 - Visualization – representing data in graphs or charts
 - Reporting – the presentation or collating of data and/or data visualizations
- Automates data gathering and analytics
- Introduces Self-Service Capabilities

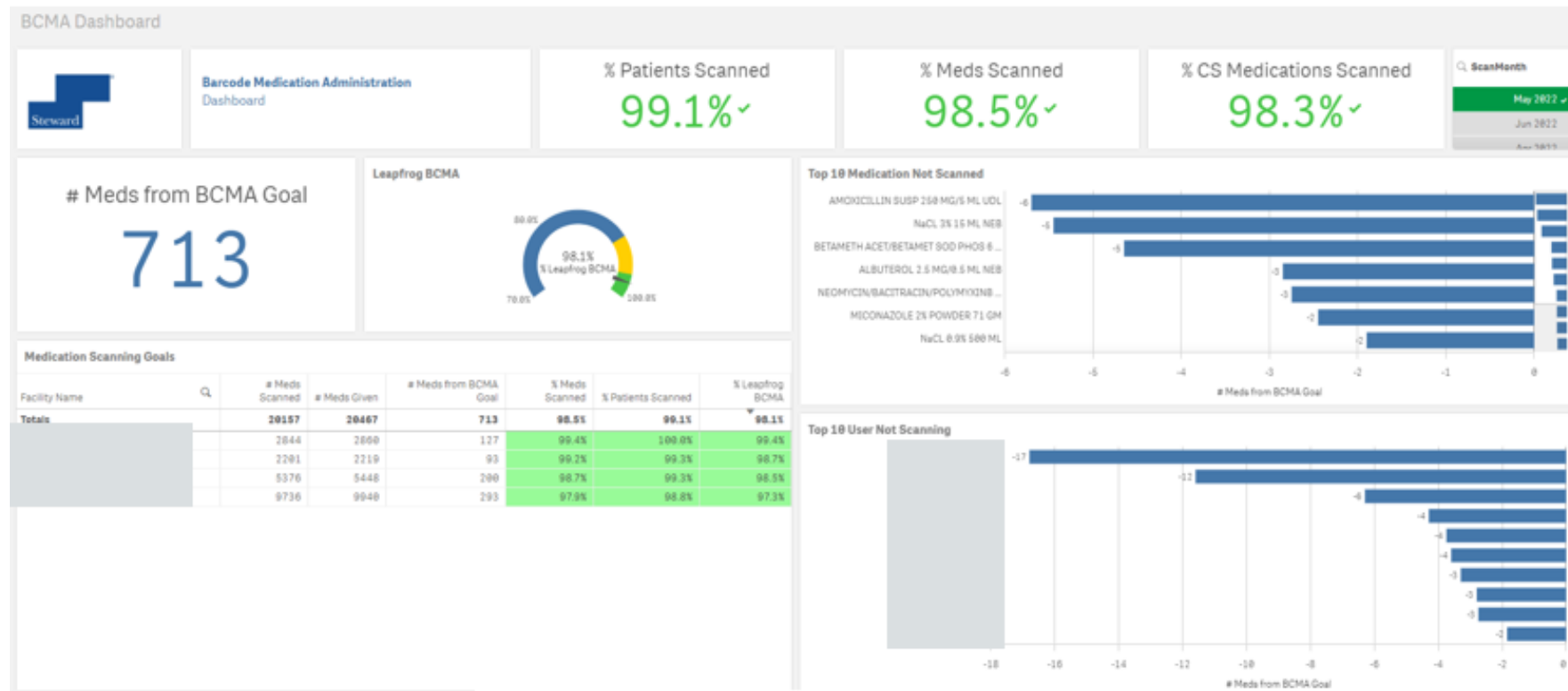


BI Applications

End User Experience

Can display static data or drilldown options for user through filters or added permissions

Applications often have cross filter functionality within the visuals on page



Self-Service BI

| Self-Service Features

End users are empowered to manipulate and explore data using an underlying data model



Pre-defined Analytics

Built by developer or super user for end users to use



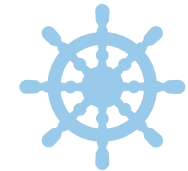
Easy Data Access

Automated queries to databases, even across platforms



Quick Insights

Data visualizations, KPIs or alerts can assist in quick action



Service Line Control

Data model built for service line subject matter experts to manipulate or build upon. No need to submit new report request

Self-Service App Example

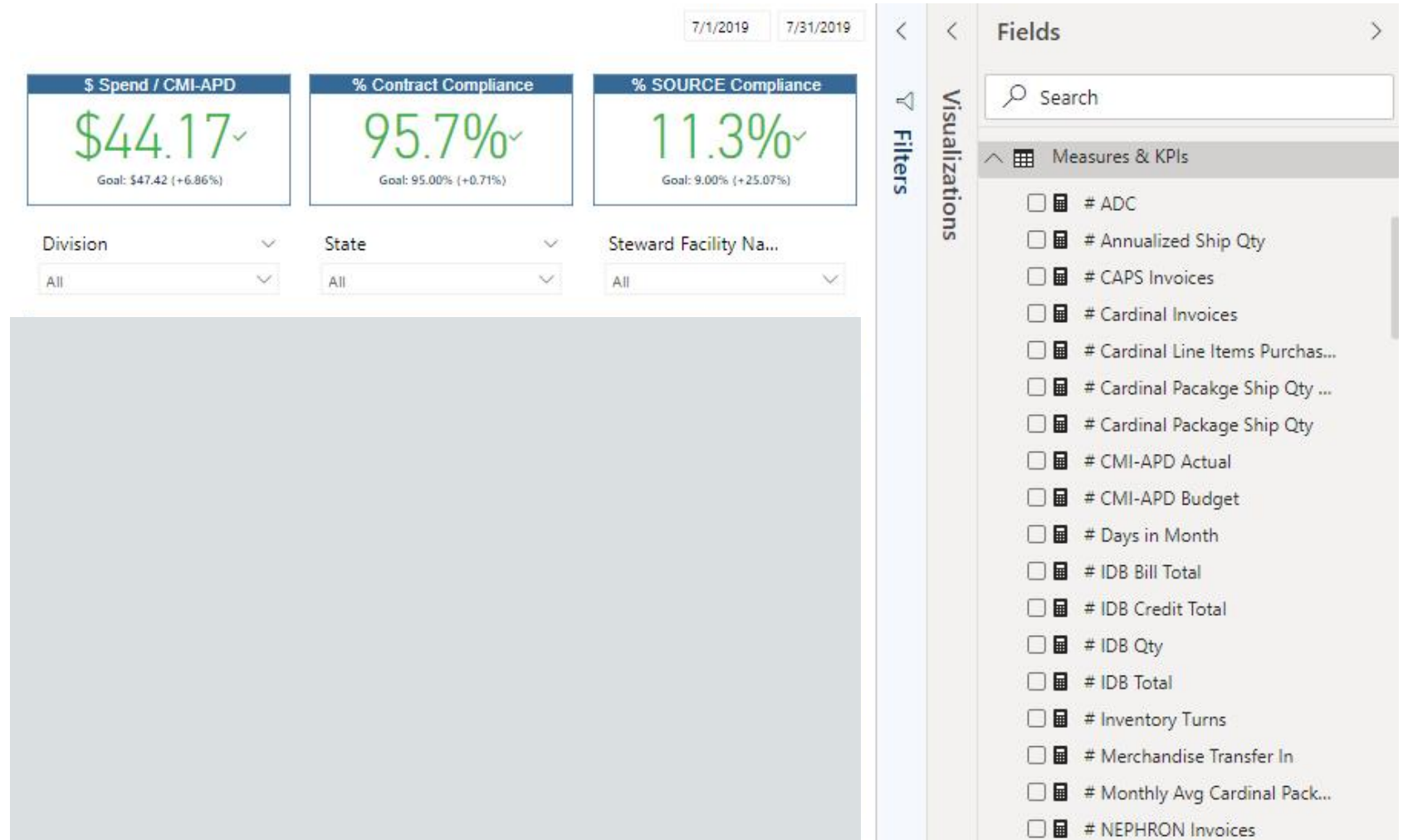
Built Analytics

Pre-defined measures & analytics used to help display KPI information

Users can filter by date, division, state & facility

Further filters not shown include specific medication or drug class

No need to log into multiple areas to find information



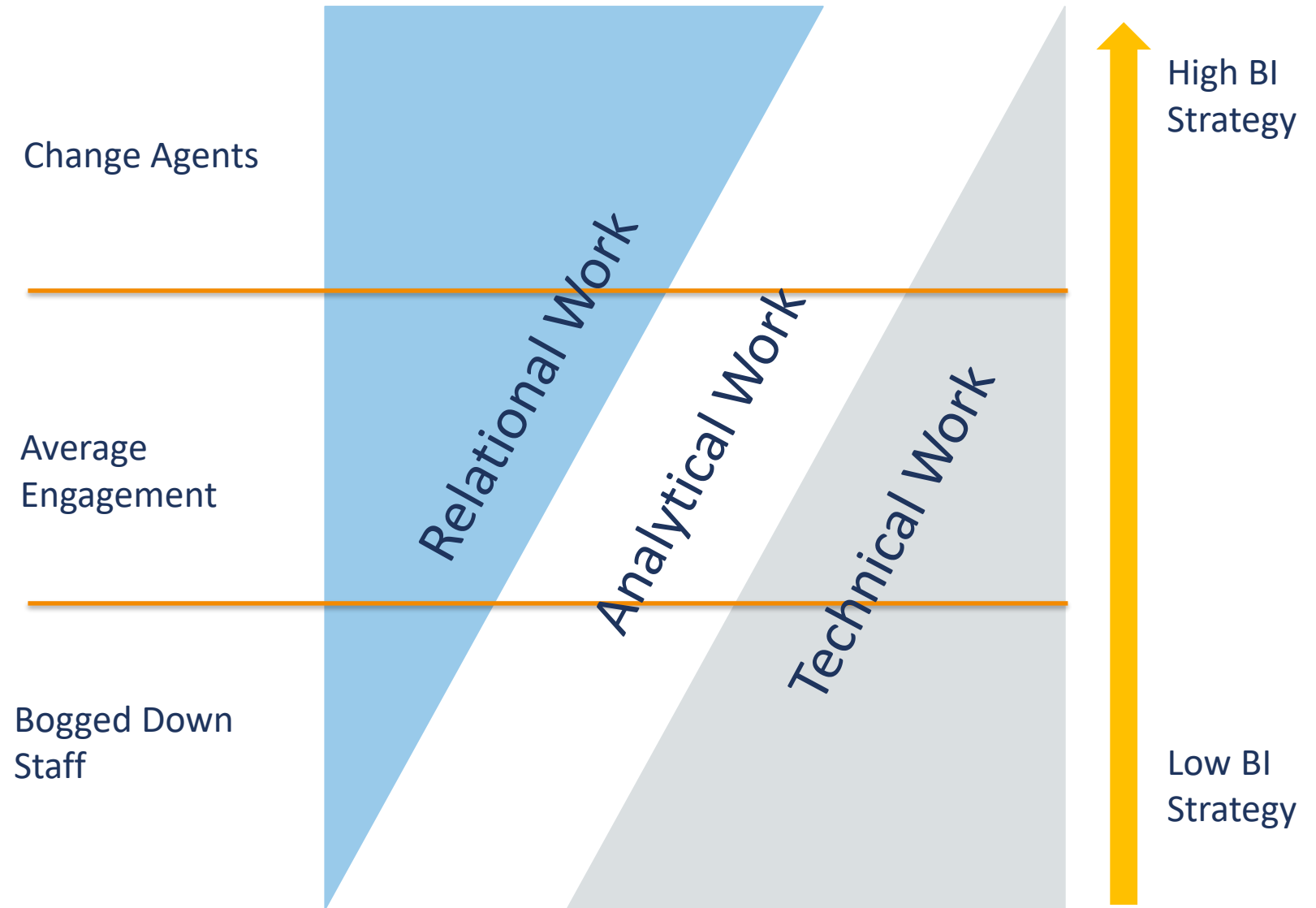


Why BI & How to Close the Gap

BI Strategy Creates Change Agents

High Technical Inefficiencies caused by

- Clunky report writing
- Manual report pulls
- Complex report presentation
- Complex report expectations or report outs



Business Intelligence Strategy Opportunities

Gathering Information

- Build a data warehouse or library
 - Reduces portals and logins
 - Builds confidence in data integrity
 - Opens enterprise to new data
 - Gives developers ability to compare data across systems

Processes

- Automate data prep
 - Reduces time from data gathering to action
 - Reduces manipulation errors
 - Reduces variation across end users

Presentation

- Build unifying report/application layout
 - Builds familiarity across reports increasing usability
 - Minimizes expectations to only key actionable information

Dissemination

- Automate dissemination/alerts
 - Builds consistency and high reliability
 - Drives information to end user rather than pulls
 - Triggers action

Addressing Barriers to BI

Not all Data is BIG DATA

- Start Small
 - Identify a report or workflow that is time consuming
 - Use desktop tools (Power BI Desktop, Power Query + Excel)
 - Use small data samples
- Identify Talent
 - Tools are easier and easier to use; find superusers willing to learn
- Capture Wins
 - Use multiple small projects to demonstrate value



Case study – Expanse of Quality Technician



Steward Health Care

*Use of Power
Query + Excel to
expand FTE
coverage*

Simple small-scale automation led to the following saving opportunities through the use of Power Query with Excel:

- 2 FTE Cost Avoided
- Expansion of clinical quality resources for 9 hospitals
- 10% increase in Barcode Medication Scanning performance seen in 4 hospitals over 3 months

Power Query + Excel Workflow Optimization

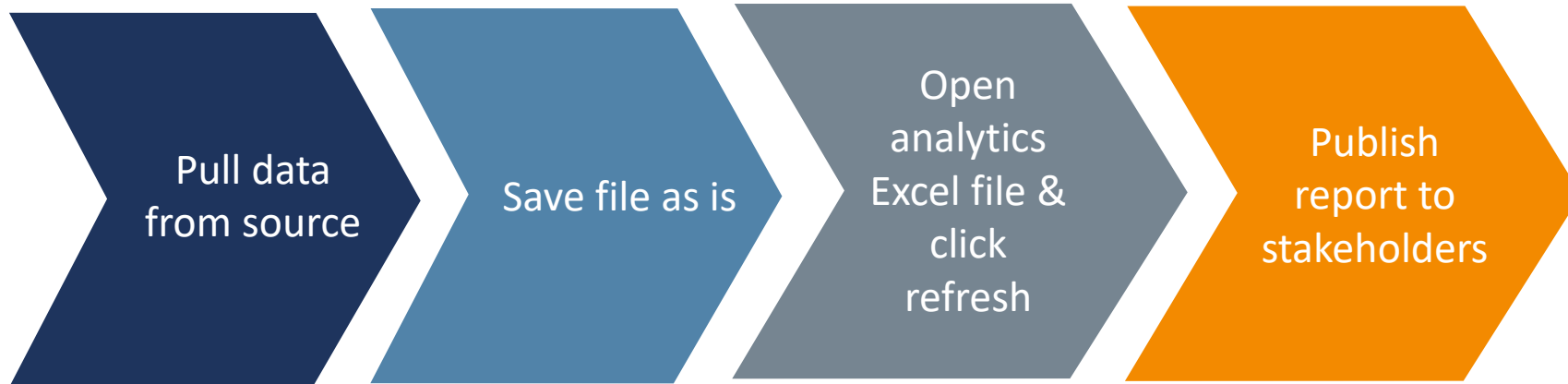
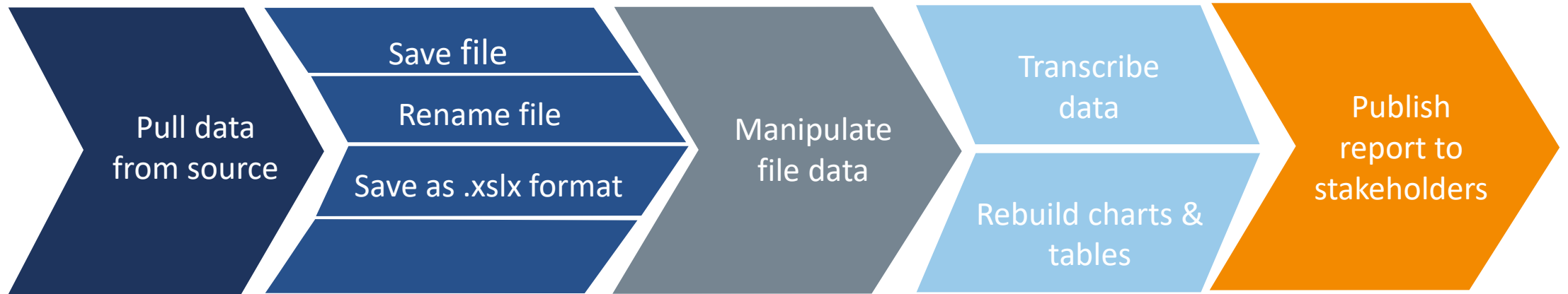
Created a standard folder system for quality tech to pull data & place in labeled folders

Built Query in Excel (through Power Query) to tap into folders and pull data into a single source

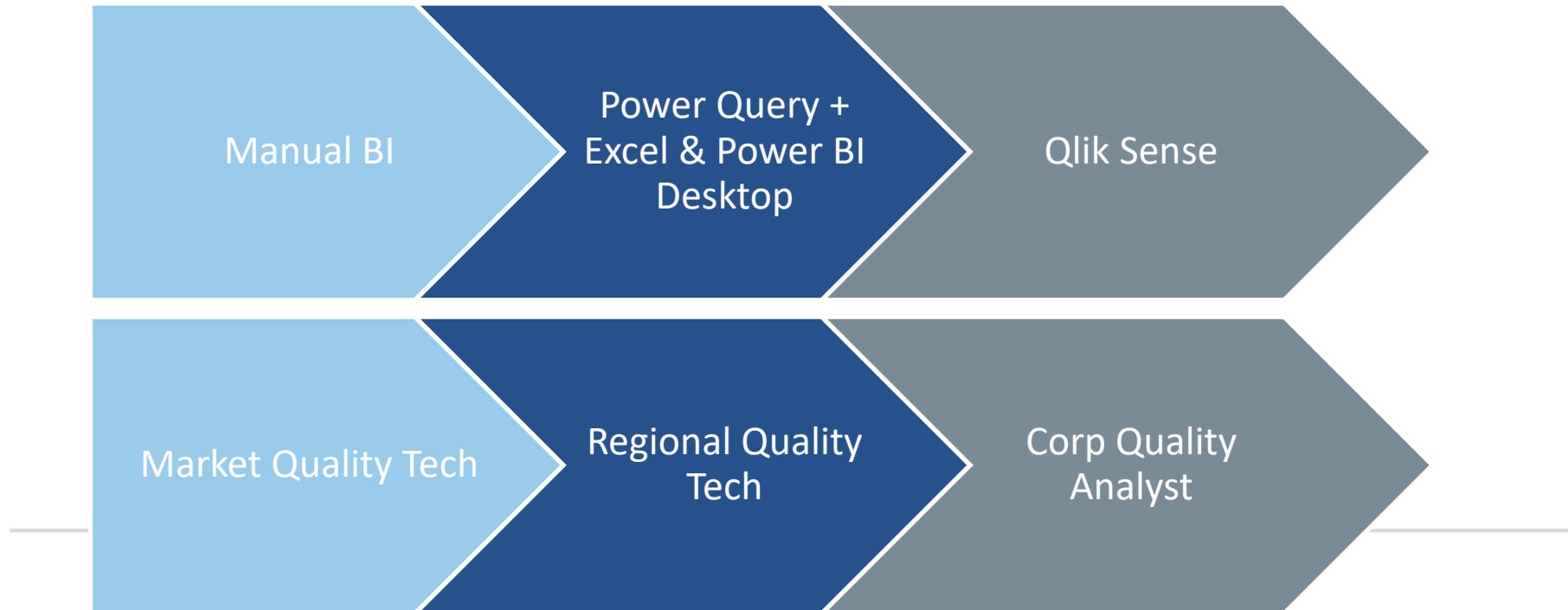
Automated the data manipulation steps using Power Query to output a clean table of condensed data

Used pivot tables & Excel calculations to output simple data visualizations in Excel

Before & After



Small Project to Larger Realization



By using BI tools we were able to turn the 1 FTE of a market quality tech to then support all of Steward's hospitals in multiple quality initiatives.

Saved at least 4 hours of labor per report converted to Power Query + Excel.

Power BI Desktop Example

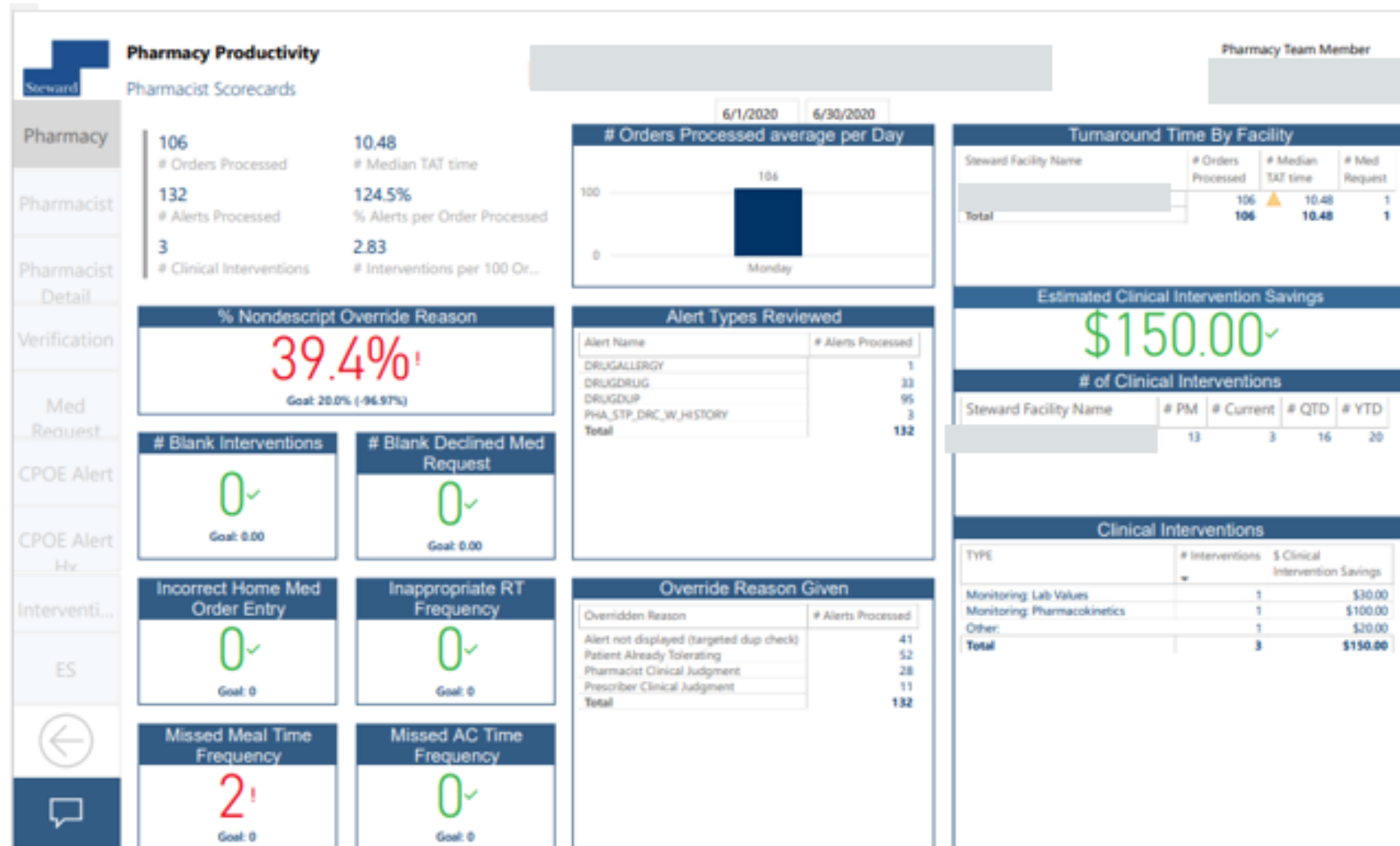
Data Model Review

Pulled in:

- Interventions
- Orders reviewed
- Alerts & overrides

Power Query:

- Added values to interventions
- Identified when an order was verified out of policy compliance
- Reviewed alert responses to identify lack of alert documentation



| Steward Health Care Success

BI Strategies lead to better action for AZ Market

- Freed up time for analyst to expand scope
 - Avoid cost of 2 additional FTEs for other markets
 - EOM month procedures for pharmacy director went from 16 hours per month to 2
- Pharmacy Directors had better conversations with staff on performance
 - 50% decrease in targeted order entry errors over 6 months
 - 30% increase in pharmacy interventions over 6 months
- Pharmacy Director awareness and mastery increased
 - Contract Compliance and Budget hit 9 months in a row

| Assessment Question #1

Which of the following business intelligence tools are also self-service tools?

- a. Power BI, Tableau, Qlik and Excel
- b. Power BI, Qlik and Microsoft SQL Server Management Studio
- c. Power BI, Tableau, Qlik and R

| Assessment Question #1

Which of the following business intelligence tools are also self-service tools?

- a. **Power BI, Tableau, Qlik and Excel**
- b. Power BI, Qlik and Microsoft SQL Server Management Studio
- c. Power BI, Tableau, Qlik and R

Structure of a Self-Service Program

| Self-Service Program Structure

- Self-Service Program Team
- Data Architecture
- Data Models
- Self-Service App Templates

| Self-Service Program Team



Executive Sponsor – Team sponsor to get the resources needed for large projects



Subject Matter Expert – Team lead to help shape direction of needs



BI Developer – For large projects & ongoing support to help build data models



Analysts or Super User – Users to help translate the data model to analytics for end users

| Two Program Approaches to Self-Service Kickoff

1. Start With Questions – Seek data to answer questions
 - What specifically do you want to know?
 - What is most time consuming?
 - What has the most variation?
2. Free Exploration - Connect to everything & let data sources generate questions
 - Inspire more bold change
 - More time consuming
 - Results may not be statistically significant

| Data Architecture

Addresses Data Gathering

- What data do you want access to?
- Where is your data coming from?
 - In-house server
 - Vendor reports
 - Can they be automated to a server via electronic file transfer?
 - Application Programming Interface (API)
 - Managed Data Lake or Warehouse

Data Architecture Dictionary Example

Data Source	Subject Matter Expert	Description	Format	Location
Wholesaler	Purchasing Manager	Feed of purchases from primary wholesaler. Line-item detail of invoices	SQL	<server and database name>
Direct Purchase	Purchasing Manager	Purchase report for direct purchases	Excel	<folder location>
EHR Charges	Finance Manager	Charges by patient by charge with DRG information	SQL	<server and database name>
Clinical Interventions	Clinical Manager	Custom report emailed monthly from vendor	CSV	<folder location>

| Data Modeling

Addressed Data Prep

- Multiple data models would be built for various reports/applications
- Data model can be one data source or 10+
- What data do you want to compare?
 - Compare data across systems? need unifying join keys
 - Compare data points by patient?
 - Do you need to normalize data across tables?
 - Compare data against past or future performance?
- BI developers are best suited to help connect your self-service program to queries that manipulate the data to meet needs
- Small projects can be done through simpler tools, but are limited to smaller data sets
- Data models can be shared across applications to improve consistency and remove variability

Complex Data Model Example

Data Connections

Wholesaler

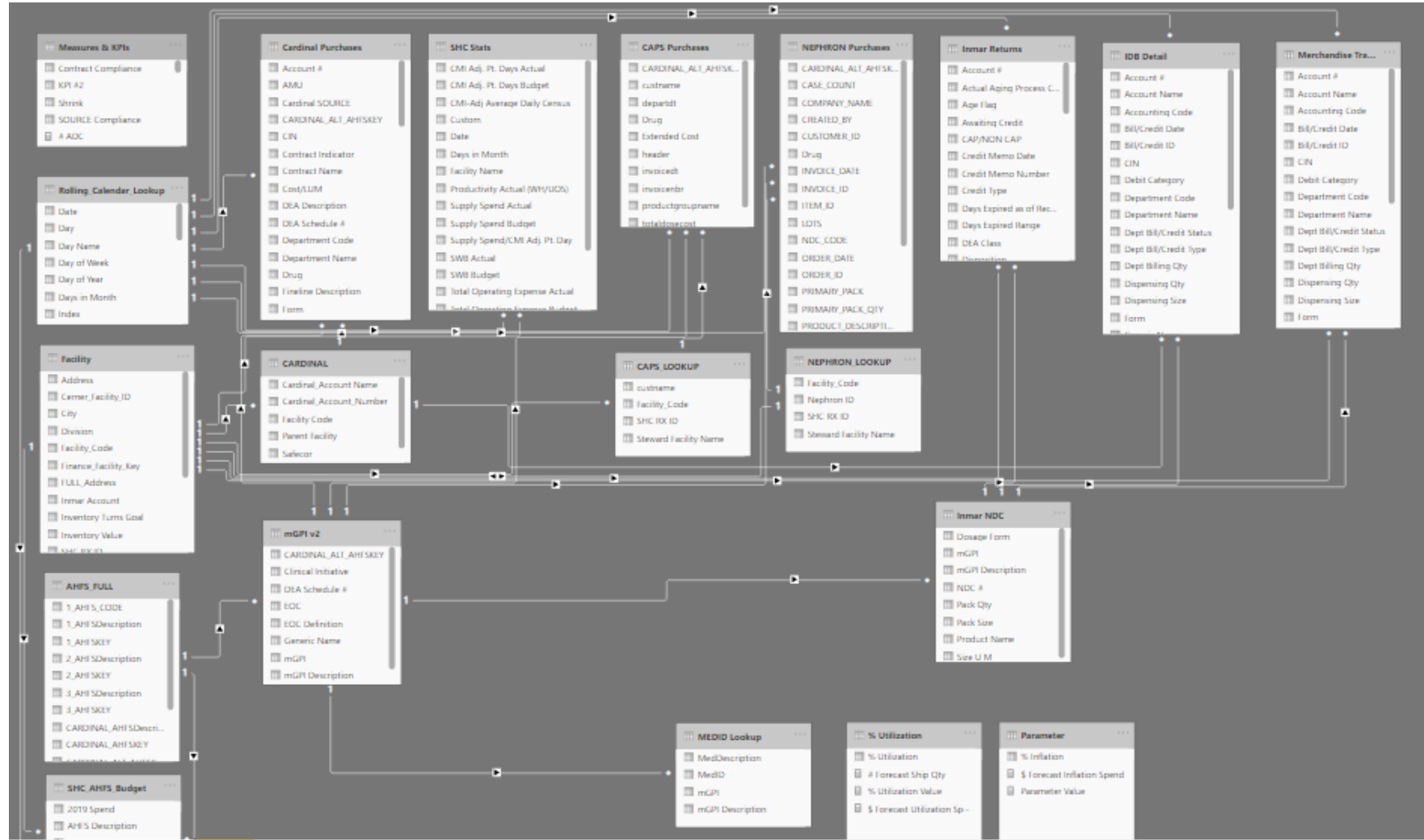
Reverse Distributor

Direct Purchases

Interdepartmental Billing

Budgets

Inventory



Data Model to Application

Analytics

- Led conversations with CFOs
- Drove inventory down
- Guided analysis of supply chain

SHC Pharmacy Supply Chain Analysis

Steward Facility Name

4/1/2019

9/30/2019

Prior Month Analysis

Medical Center

\$855,802.24
\$ Total Drug Spend

\$898,100.69
\$ PM Total Drug Spend

(\$42,298.45)
\$ PM Total Drug Spend Difference

-4.94%
% PM Total Drug Spend Difference

\$389,993.17
\$ Last Inventory Value

YTD Inventory Turns

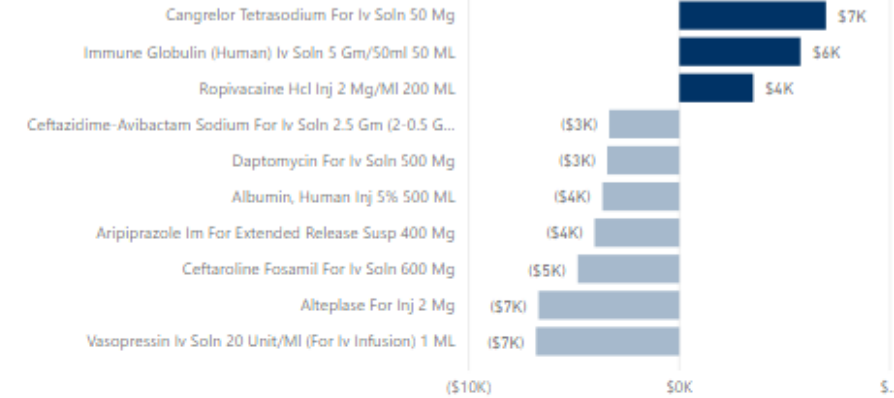
4.75!

Goal: 8 (-40.67%)

Lost Charges

Debit Category	# IDB Qty	\$ IDB Total
Lost Charges	7425	(\$3,742.00)
Total	7425	(\$3,742.00)

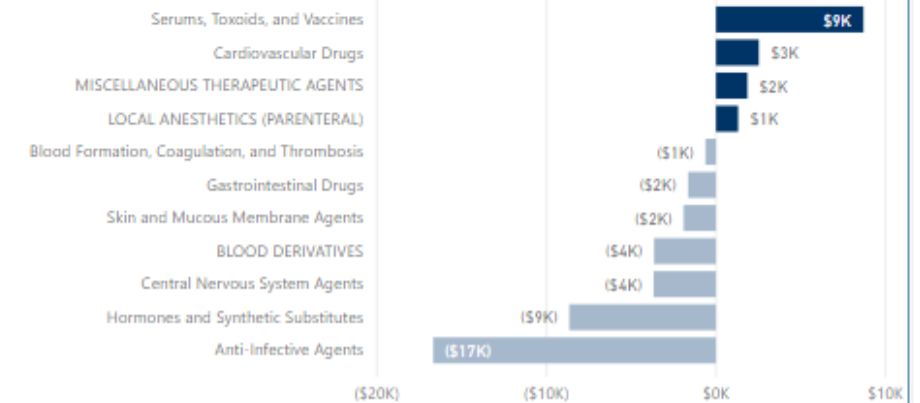
Prior Month Purchase Difference by Medication



Bulk Purchases

mGPI Description	# Pkg Ship Qty	# Avg Pkg Ship Qty	% Pkg Ship Diff vs Avg	\$ Spend
SERVICE BILLING Cardinal Billing Code/No Tax EACH 1 CS	2	1	150%	\$143.34
Medroxyprogesterone Acetate Im Susp 150 Mg/ML 1 ML	22	4	83%	\$597.54
Ciprofloxacin 400 Mg/200ml In D5w 200 ML	9	2	80%	\$457.53
Lorazepam Inj 2 Mg/ML 1 ML	104	21	80%	\$1,404.68
Proparacaine Hcl Ophth Soln 0.5% 15 ML	31	6	80%	\$783.84
Ropivacaine Hcl Inj 2 Mg/ML 200 ML	120	24	80%	\$5,392.80
Tizanidine Hcl Tab 4 Mg (Base Equivalent)	7	1	80%	\$254.40
Multiple Vitamin Inj 10 ML	27	5	80%	\$917.07
Amino Acid Infusion 5% In D15w 2000 ML	19	3	78%	\$4,077.78
Heparin Sodium (Porcine) Inj 1000 Unit/ML 10 ML	175	24	78%	\$6,728.19
Total	12419	1964	59%	\$769,897.5

Prior Month Purchase Difference by AHFS



BI Application Templates

- Builds uniformity in structure
- Ensure common elements are always covered (filters, Prior Month Analytics, etc.)
- Builds familiarity in end users increasing adoption



| Assessment Question #2

Critical elements of structure needed to build a BI self-service program include which of the following?

- a. Developer, Data Models & Artificial Intelligence
- b. Developer, Data Architecture & Data Models
- c. Program Team, Data Architecture & Data Models

| Assessment Question #2

Critical elements of structure needed to build a BI self-service program include which of the following?

- a. Developer, Data Models & Artificial Intelligence
- b. Developer, Data Architecture & Data Models
- c. **Program Team, Data Architecture & Data Models**



Key Elements of a Self-Service App

| Data Model to BI Application

Key Elements for Self-Service Applications

- Data Accuracy
- Timeliness
- Relevance
- Interpretability
- Key Performance Indicators (KPIs)
- Actionable

| BI Fundamentals

- Data Accuracy
 - Data & analytics need to have a strong confidence interval to make decisions on change
- Timeliness
 - Data needs as current as possible
- Relevance
 - Data needs to be streamlined to objectives (just because it's there doesn't mean it's relevant)

| BI Application Engagement

- Interpretability
 - Data literacy becomes a concern
 - Visualization readability
 - Too many visuals or options

Key Performance Indicators

Drive Awareness

Have at least one KPI in application to alert users

Define KPIs and goals

Allow drill down into KPI details; don't allow a question to go unanswered



| Assessment Question #3

Which of the following should be included in a self-service app for an end-user?

- a. KPIs, Details Tables & Risk Tables
- b. Clip Art, Risk Tables & Filters
- c. Filters, Details Tables & Reference Links

| Assessment Question #3

Which of the following should be included in a self-service app for an end-user?

- a. **KPIs, Details Tables & Risk Tables**
- b. Clip Art, Risk Tables & Filters
- c. Filters, Details Tables & Reference Links

Conclusion

Business Intelligence allows us to see the interrelationship of facts but without closing the gap between technologies and strategies we won't be able to capitalize on the relationships we have to drive change.

References

- American Society of Health-System Pharmacists. ASHP guidelines on the design of database-driven clinical decision support: strategic directions for drug database and electronic health records vendors. Am J Health-Syst Pharm. 2015; 72:1499–505.
- IIA Research Identifies Barriers to Business Intelligence and Analytics adoption: https://www.sas.com/en_us/insights/articles/business-intelligence/ia-research-identifies-barriers-to-business-intelligence-and-analytics-adoption.html
- The History of Business Intelligence: From the 19th Century To The Modern Day: <https://www.datapine.com/blog/history-of-business-intelligence/>
- 6 Things Every Business Intelligence Report Should Include: <https://www.teamworksgroup.com/post/business-intelligence-report>
- What Is Self-Service Business Intelligence And Why Is It Important: <https://www.analyticsinsight.net/what-is-self-service-business-intelligence-and-why-is-it-important/>
- Nedim Dedić, Clare Stanier. Measuring the Success of Changes to Existing Business Intelligence Solutions to Improve Business Intelligence Reporting. 10th International Conference on Research and Practical Issues of Enterprise Information Systems (CONFENIS), Dec 2016, Vienna, Austria. pp.225-236, ff10.1007/978-3-319-49944-4_17ff. fhal-01630541

Thank you...

Mario A. Rosado, PharmD, MHA
mario.rosado@steward.org