Business Intelligence and Data Warehousing Technology Implementation

Reddy Gurram, IT Division Chief
Sacramento embraced a collection of new business intelligence technologies and innovations to improve program management with data supported decisions.

- **DASHBOARDS** - real-time operational awareness of call centers and lobbies
- **INTERACTIVE REPORTING** - rapidly available reporting with filters, slicers, and drill downs to detailed records

Business Intelligence is a tool set that can be used to provide relevant information in both real-time and historical context.

An example of Business Intelligence
Too often, organizations are data rich and information poor due to their data residing in disconnected systems.

The adoption of a data warehouse and integrated analytics platforms like dashboards and data portals helped Sacramento County overcome this challenge.
What makes Sacramento’s BI possible?

- **DataHub** - A collection of real time (or near real time) data made available to applications and reports for operations level use. Data is merged from disconnected systems to produce relevant datasets.
  - Example: *Number of calls in progress that are conducting live phone appointments. Who is performing the call, how long is the call and what is the call status.*

- **Data Warehouse** - Aggregated data from disconnected systems transformed for detailed analysis and reporting. Maintains historical context of activity to track changes over time.
  - Example: Identify customers that have visited lobby locations immediately after missing phone appointments rather than calling to reschedule the appointment.

- **Server Infrastructure that can deliver real time visualizations and reports**
  - SQL Server 2016
  - Tableau
  - Power BI
SQL Server 2016
Physical Server, 16 core
Tableau v10.5
Power BI Server v5/2018
2 VMs, 8 core each
SharePoint (PerformancePoint) v2013
Performance Measures

- SharePoint
- Performance Point
- Scorecard Format
- Historical records
- Drill down to details
- All DHA Program Measures
- State/Federal Measures (WPR)
- DHA Administration
- Internal Investigations
### Performance Measures - Scorecard (Queue Items)

<table>
<thead>
<tr>
<th>Queue Items</th>
<th>Total</th>
<th>Processed</th>
<th>Staff Ratio</th>
<th>Avg Handle Time</th>
<th>Status</th>
<th>Avg Wait Time</th>
<th>Status</th>
<th>Avg Overall</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply for Benefits</td>
<td>408</td>
<td>408</td>
<td>34.00</td>
<td>23</td>
<td></td>
<td>11</td>
<td></td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Document Drop-Off</td>
<td>708</td>
<td>708</td>
<td>54.46</td>
<td>10</td>
<td></td>
<td>8</td>
<td></td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Fingerprint/PIN Reset</td>
<td>18</td>
<td>18</td>
<td>3.60</td>
<td>29</td>
<td></td>
<td>17</td>
<td></td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>Fiscal Services</td>
<td>2</td>
<td>2</td>
<td>2.00</td>
<td>4</td>
<td></td>
<td>10</td>
<td></td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Follow up Appointment</td>
<td>3</td>
<td>3</td>
<td>1.50</td>
<td>28</td>
<td></td>
<td>11</td>
<td></td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>Homeless Services</td>
<td>43</td>
<td>43</td>
<td>3.91</td>
<td>35</td>
<td></td>
<td>25</td>
<td></td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>Mail Pick Up</td>
<td>1</td>
<td>1</td>
<td>1.00</td>
<td>3</td>
<td></td>
<td>6</td>
<td></td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Replacement EBT/Medi-Cal Card</td>
<td>211</td>
<td>211</td>
<td>19.18</td>
<td>8</td>
<td></td>
<td>9</td>
<td></td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Reschedule an Appointment</td>
<td>15</td>
<td>15</td>
<td>3.00</td>
<td>22</td>
<td></td>
<td>7</td>
<td></td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Resource Room</td>
<td>1</td>
<td>1</td>
<td>1.00</td>
<td>0</td>
<td></td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>See Welfare-to-Work Employment Advisor</td>
<td>48</td>
<td>48</td>
<td>6.86</td>
<td>7</td>
<td></td>
<td>18</td>
<td></td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Speak to an Employment Services Worker</td>
<td>7</td>
<td>7</td>
<td>1.75</td>
<td>12</td>
<td></td>
<td>22</td>
<td></td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>Speak to Customer Service Representative</td>
<td>807</td>
<td>806</td>
<td>67.17</td>
<td>13</td>
<td></td>
<td>338</td>
<td></td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Welfare to Work</td>
<td>4</td>
<td>4</td>
<td>2.00</td>
<td>2</td>
<td></td>
<td>44</td>
<td></td>
<td>46</td>
<td></td>
</tr>
</tbody>
</table>
Real Time Operations Management
Lobby Dashboard

- Real Time
- Tableau
- Visual layout of each lobby
- Predicted Wait Times
- Lobby Kiosk Check Ins
- Appointments
- Window status
- Service Time
- Non-Active resources
- Averages and Thresholds
- Wrong Lobby Alerts
Lobby Dashboards - Unique version for each lobby
### Real Time Operations Management

#### Service Center Dashboard

- **Real Time**
- **Tableau**
- **Call Queue status**
- **Number of Calls Waiting**
- **Wait Times**
- **Handle/Talk Times**
- **Call Center Agent status**

---

#### Color Group

<table>
<thead>
<tr>
<th>Language</th>
<th>Calls Waiting in Q</th>
<th>Longest Call Waiting in Q</th>
<th>Not Ready Scheduled</th>
<th>ROTA</th>
<th>Ready</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Russian</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Spanish</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>English</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Russian</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Spanish</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Color Legend:**
- Red
- Blue
- Grey
- Yellow
- Green

---

#### Call Center Agent status

| Agent         | Status          | Wall Time 13 min 35 sec | Case Work 31 min 5 sec | Talking In 5 min 41 sec | Talking In 3 min 9 sec | Talking In 5 min 33 sec | Talking Out 1 min 41 sec | Case Work 31 min 5 sec | Talking In 15 min 37 sec | Talking In 5 min 41 sec | Talking In 3 min 9 sec | Case Work 31 min 5 sec | Talking In 5 min 41 sec | Talking Out 1 min 41 sec | Case Work 31 min 5 sec | Talking In 15 min 37 sec | Case Work 31 min 5 sec | Talking In 5 min 41 sec | Talking In 3 min 9 sec | Case Work 31 min 5 sec | Talking In 5 min 41 sec | Talking Out 1 min 41 sec | Case Work 31 min 5 sec |
|---------------|-----------------|--------------------------|------------------------|-------------------------|------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Ashley Alvarez| Ready           | 0                        | 0                      | 0                       | 0                      | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                        | 0                        | 0                        |
| Carmen Bruce  | Ready           | 0                        | 0                      | 0                       | 0                      | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                        | 0                        | 0                        |
| Deborah Arnold| Ready           | 0                        | 0                      | 0                       | 0                      | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                        | 0                        | 0                        |
| Malissa Glover| Ready           | 0                        | 0                      | 0                       | 0                      | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                        | 0                        | 0                        |
| Ana Ramiro   | Talking Out     | 1 min 41 sec              | 0                      | 0                       | 0                      | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                        | 0                        | 0                        |
| Angela Marquez| Ready           | 0                        | 0                      | 0                       | 0                      | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                        | 0                        | 0                        |
| Anna Morales | Ready           | 0                        | 0                      | 0                       | 0                      | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                        | 0                        | 0                        |
| Anthony Santos| Ready           | 0                        | 0                      | 0                       | 0                      | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                        | 0                        | 0                        |
| Bao Tang     | Ready           | 0                        | 0                      | 0                       | 0                      | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                        | 0                        | 0                        |
## Service Center Dashboard – Real time statuses

<table>
<thead>
<tr>
<th>Color Group</th>
<th>Language</th>
<th>Calls Waiting In Q</th>
<th>Longest Call Waiting In Q</th>
<th>Not Ready Scf</th>
</tr>
</thead>
<tbody>
<tr>
<td>28th GI</td>
<td>English</td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>28th Rescheduled</td>
<td>English</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Blue</td>
<td>English</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Russian</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Spanish</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

### Grant Flowers
- Busy Other: 6 min 27 sec
- Break: 4 min 13 sec

### Carroll Brown
- Talking In: 33 min 27 sec
- Case Work: 1h 22m 21s
Service Center Dashboard – Agent activity/ history

Time: 9:03:17 AM
Case ID: 
Comment Type: Case Review
Comment: Case review: EBT shows that it mailed. Benefit not issued. Submitted RFA to benefit.
Program Type Code: FS
Interactive Reporting
Power BI

- Allows exploration of data with filters, slicers and visual comparisons
- Self Service Reporting available with large data sets (Direct Query connection to SQL server)
- Drill down to detailed records
- Rapid report development from curated data sets (Data Warehouse)
- Sacramento migrating legacy reports to new Power BI platform
Power BI - Interactive filters for self-service reporting
Power BI – Interactive filters for self-service reporting

## SHINE 1 - EFS Reservations - where Client slept previous night per EFS question responses

Monthly Count of Reservations by CREATE DATE

<table>
<thead>
<tr>
<th>Create Date Month</th>
<th>ACCEPTED</th>
<th>ACCEPTED SHELTER</th>
<th>ACCEPTED SHELTER WITH NEXT MOVE</th>
<th>ACCEPTED SHELTER WITH VOA</th>
<th>ALREADY MOVED INTO APT</th>
<th>DISQUALIFIED</th>
<th>DIVERSION</th>
<th>DUPLICATE</th>
<th>FLEEING FELON</th>
<th>NO CONTACT</th>
<th>Not</th>
<th>Disposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>7</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>6</td>
<td></td>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
<td><strong>14</strong></td>
<td><strong>41</strong></td>
<td><strong>48</strong></td>
<td><strong>77</strong></td>
<td><strong>83</strong></td>
<td><strong>17</strong></td>
<td><strong>166</strong></td>
<td><strong>1</strong></td>
<td><strong>48</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
</tr>
</tbody>
</table>

CaseID by Create Date Month and Where did person sleep

### Where did person sleep
- **Car**
- **Motel paid for by county**
- **Motel paid for by County or other organization**
- **Motel paid for with own money**
- **On Street**
- **Other**
- **Tent**
- **With Friend/Family**

### Disposition Description
- ACCEPTED
- ACCEPTED SHELTER
- ACCEPTED SHELTER WITH NEXT MOVE
- ACCEPTED SHELTER WITH VOA
- ALREADY MOVED INTO APT
- DISQUALIFIED

### Reservation Create Date
- 10/2/2017
- 9/12/2018

### IsCWA Active
- False
- True
Power BI -
Results change with selections

SHINE 1 - EFS Reservations - where Client slept previous night per EFS question responses

Reservation Create Date
10/2/2017  9/12/2018

IsCWAActive
False
True

DispositionDescription
ACCEPTED
ACCEPTED SHELTER
ACCEPTED SHELTER WITH NEXT MOVE
ACCEPTED SHELTER WITH VOA
ALREADY MOVED INTO APT
DUPLICATE

Where did person sleep
On Street
Other
Tent
With Friend/Family

CaseID by Create Date Month and Where did person sleep

CaseID  LastName  FirstName  DateOfBirth  Is CW  Active  Where did person sleep
0  1  6  2  4  3  4  7  6  2  1  3  2  6
1  7  8  5  1  2  3  4  5  6  7  5  0
2  3  0  0  0  0  0  0  0  0  0  0  0
3  4  4  4  4  4  4  4  4  4  4  4  4
4  5  5  5  5  5  5  5  5  5  5  5  5
5  6  6  6  6  6  6  6  6  6  6  6  6
6  7  7  7  7  7  7  7  7  7  7  7  7
7  8  8  8  8  8  8  8  8  8  8  8  8

Where did person sleep
- On Street
- Other
- Tent
- With Friend/Family
Key Take Away #1

Data warehousing creates availability of information and opportunity to integrate data sets with real time processes

Example: Sacramento’s Customer Information Portal (CIP) web application.

- 360 view of the case informs workers of upcoming appointments, tasks, documents returned, call history and case requirements in a single page with easy to use detail controls.
- Data that would normally be discovered through log in and searches in many systems is consolidated in the DataHub and returned in just seconds.
- Alerts, reminders and activity flags help guide workers to the most important details.
Key Take Away #2

**Embrace data and analytics as a culture**

Sacramento has transformed its reporting culture to leverage centralized, curated data for its reporting and analysis needs.

- DataHub is a unified, curated, and real time data store
- Data consumers are able to quickly find
- Business units empowered with “Big Picture” awareness of operations data that was previously too complex to blend.
Key Take Away #3

Real time data empowers decision making and rapid process reengineering

- Real time data dashboards display a simple graphical format layered throughout the visuals to provide both summary and detail information.
- Call center dashboards indicate the status of phone queues, call center agents, groups and critical business functions.
- Appointment scheduling and lobby/visitor data is displayed in a familiar graphical format using maps of the various facility lobbies.
- Schedule and workload are managed more effectively using the real time summary of entire workforce, while permitting the drill down to details in analysis and troubleshooting.
Key Take Away #4

Cost effectiveness
Sacramento County’s Business Intelligence initiatives were developed within the existing database and server infrastructure of the department. The costs were limited to staffing resources of IT employees for a period of one year.

- Datasets and analytics tools promote rapid report development, greater access to information by business units and reduced security and performance risks.
- Hundreds of man hours saved per year in the basic administration and curating of the data.
- Unified reporting and analysis platform has saved an estimated 1000 hours of research and development time among reporting and solution support units in a single year.
- Some projects have experienced development times reduced by 50%.