

# The Power Of Data

**The Complete Beginners Data Warehouse Kit**



SQL Saturday  
Baton Rouge, LA  
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CSM

- **University of New Mexico**
  - **Bachelor of Business – MIS**
- **City of Albuquerque**
  - **Database Architect**
- **20 years experience software development & project management**
  - **Certified ScrumMaster**
  - **Other Experience**
    - **Judiciary**
    - **Healthcare**
    - **Electrical Supply**

# Objectives

Basics of Data Warehouses

E T L Process

The Power Of Data

The background features a series of concentric, overlapping circles in light gray, some solid and some dashed, creating a ripple effect. In the center, there is a large orange callout box with a downward-pointing arrow at its bottom center. The text "Basics of Data Warehouses" is centered within this box in white font.

# Basics of Data Warehouses

## What is a Data Warehouse?

**A system used for reporting and data analysis and is considered a core component of Business Intelligence.**

**Data Warehouses are central repositories of integrated data from one or more disparate systems.**

**(Wikipedia)**

# Data Warehouse Primer

- **Table Types**
  - **Fact Table**
    - The granularity of the item
  - **Slowly Changing Dimensions**
    - Who, what, where and when of what you want to count
- **Tracking Changes in Dimensions**
  - Type 1 – No history
  - Type 2 - History
  - **What Changed & How to Tell**
    - CheckSum
    - HashBytes

# Getting Started

- **What to count first?**
- **Basic Dimensions**
  - **Date**
  - **Time**
  - **Locations**
  - **Employee**
- **What changes to track?**



# Employee Dimension

- **dimEmployee**
  - EmployeeKey – Primary Key, Autoincrementing
  - SourceSystem Key – Business/Natural Key
  - Name, Title, Rank, Position, Organizational Structure
  - Supervisor Position, Supervisor Name
  - Original Hire Date, Termination Date, Latest Hire Date
  - Employee Status, IsCurrentEmployee
  - Contact Information, Emergency Contact Information
  - LAN ID, User IDs
  - Type1\_CheckSum, Type2\_CheckSum
  - IsCurrent, EffectiveDate, ExpirationDate

## Slowly Changing Dimensions

- **Employee Dimension**
  - **Update (no history)**
    - **Emergency Contact Info, Current Contact Info**
  - **Insert (has history)**
    - **Supervisor, Assignment, Job Title/Rank**
- **Two Fields in Dimension Table**
  - **Type1\_checksum & Type2\_checksum**
  - **If current values in dimension don't match current query Checksum values perform action**

# Slowly Changing Dimensions

- **Type 1**
  - Insert/Update aka Merge
- **Type 2**
  - **History**
    - IsCurrent
    - Effective Date/Expiration Date
    - Created Date/Last Update Date
  - **Two Steps**
    - Update current record
    - Insert new record

# Star Schema

## prod\_dimension

product\_key  
description  
sku\_number  
brand  
subcategory  
weight  
weight\_unit\_of\_measure  
package\_size  
package\_type  
units\_per\_retail\_case

## cust\_dimension

store\_name  
address  
county  
state  
zip  
store\_manager  
store\_phone  
customer\_key  
city  
sales\_region  
store\_fax

## sales\_fact

time\_key  
product\_key  
promotion\_key  
customer\_key  
unit\_sales  
dollar\_cost  
dollar\_sales

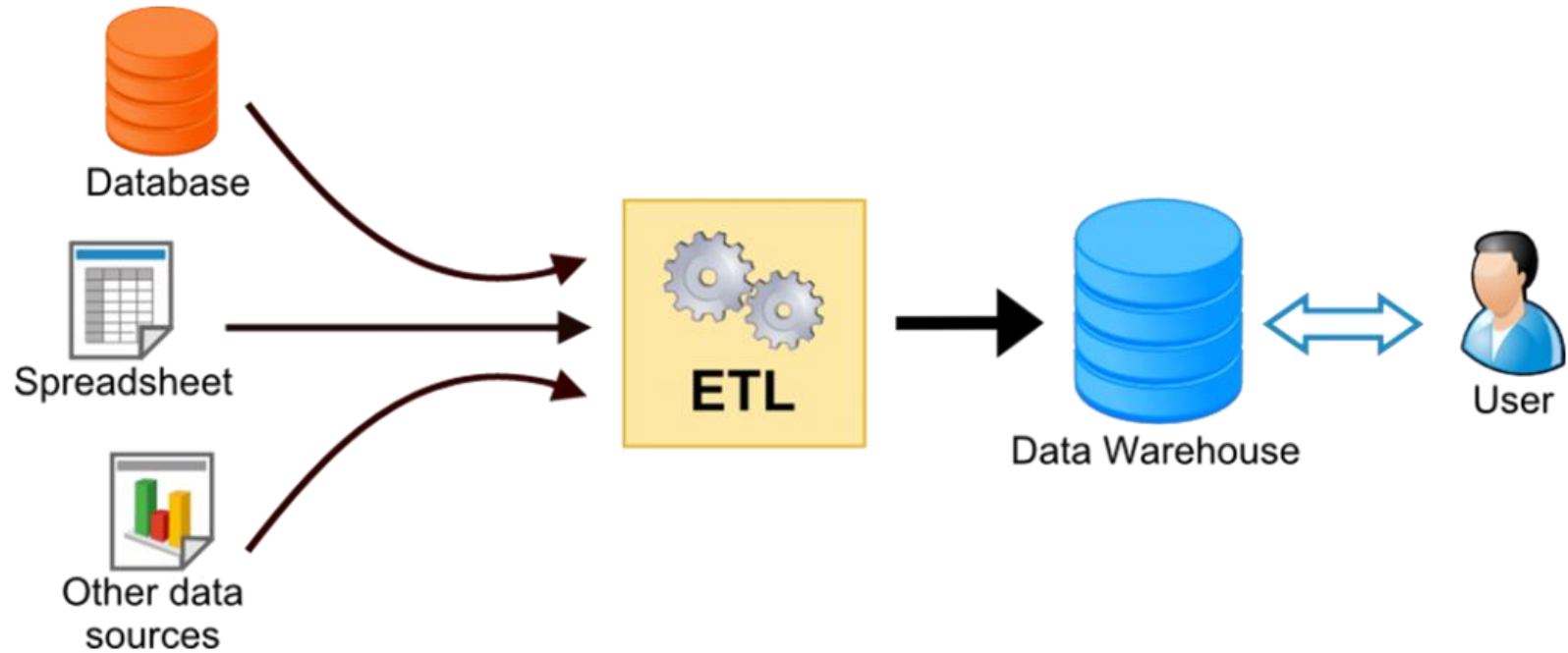
## time\_dimension

day\_of\_month  
weekday  
julian\_day  
julian\_week  
month\_number  
month\_name  
week\_of\_the\_year  
weekday\_name  
the\_year  
day\_of\_the\_year  
the\_quarter  
time\_key  
weekend  
julian\_year  
week\_day\_number  
the\_date

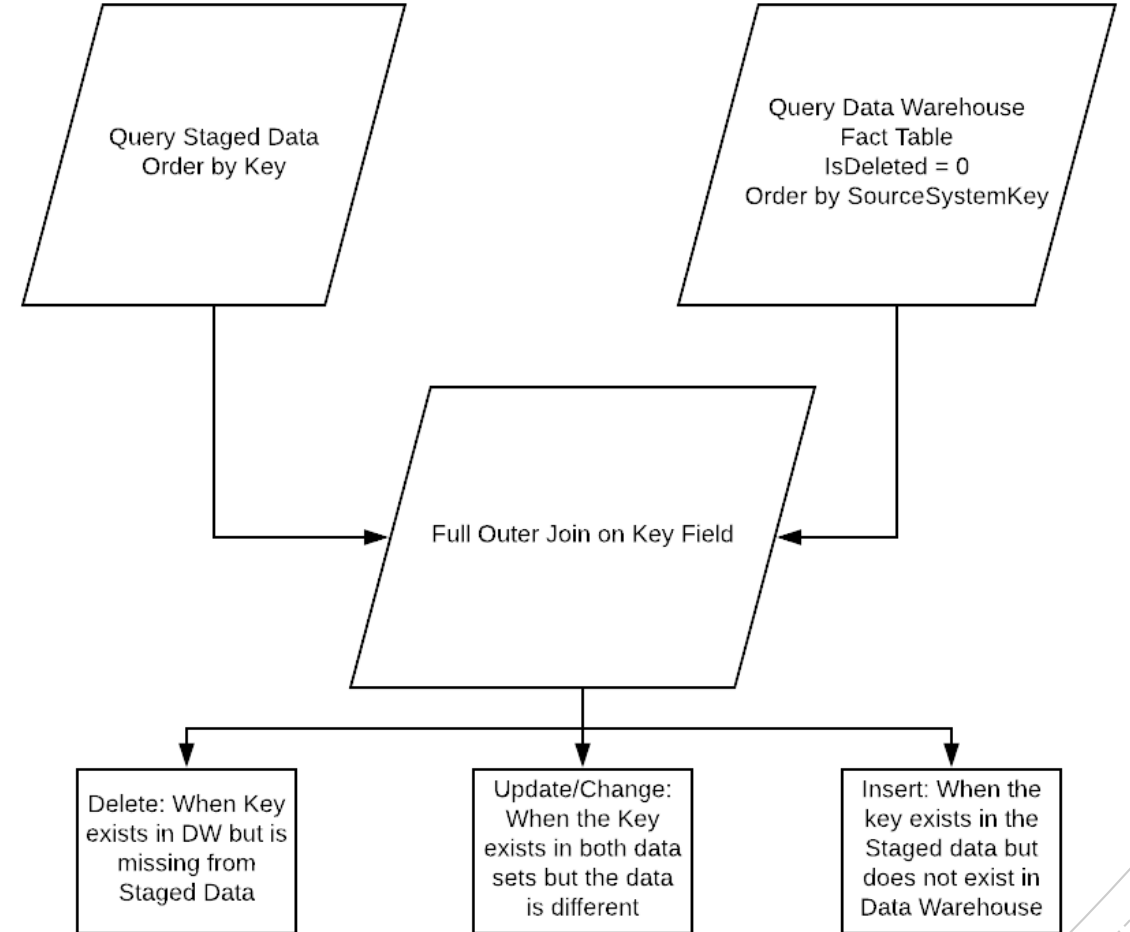
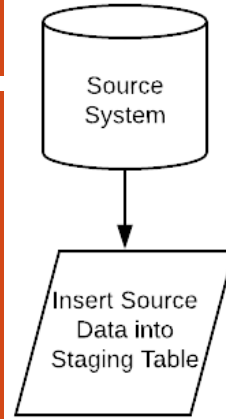
## promo\_dimension

promotion\_key  
promotion\_name  
ad\_type  
coupon\_type  
ad\_media\_type  
promo\_begin\_date  
promo\_end\_date  
price\_reduction\_type  
promo\_cost

# Step by Step



# ETL Details



Staged Data				Query	Data Warehouse						
EmpID	EmpNam	Pos	Dept	Checksum	ID	SourceSystemKey	EmployeeFullName	Position	Department	Checksum	
1000	John Doe	President	HQ	-123456	1	1000	John Doe	President	Headquarters	-123456	No Change
1001	Sam Smith	Manager	Sales	654321	2	1001	Sam Smith	Assistant Manager	Human Resources	45687	Change
NULL	NULL	NULL	NULL	NULL	3	1002	Jane Doe	Sales Clerk	Sales	987654	Delete
1100	Sally Sanchez	Sales Clerk	Sales	87123	NULL	NULL	NULL	NULL	NULL	NULL	Insert

```

SELECT EmpID, EmpNam, Pos, Dept,
CHECKSUM(EmpNam, Pos, Dept)
FROM StagedData

```

The background features a series of concentric circles in light gray, some solid and some dashed, radiating from the center. Overlaid on this is a large orange callout box with a downward-pointing arrow at its base. The text is centered within this box.

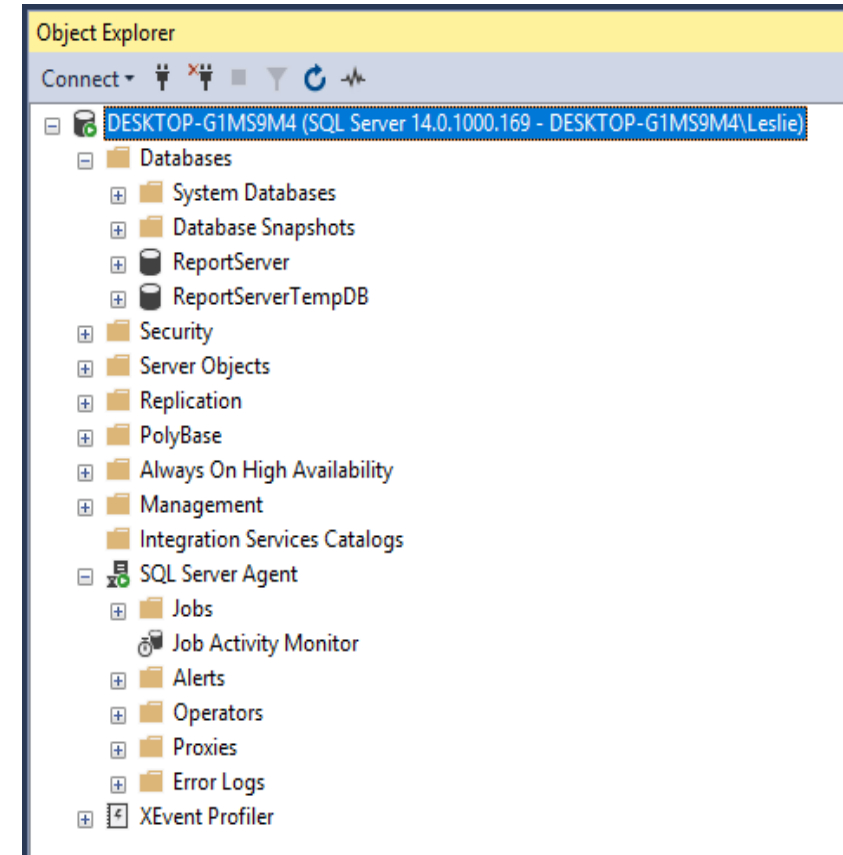
# Demo

Let's Create a Data Warehouse!



# Tools

- **SQL Server**
  - Databases
  - SSIS Packages
  - SQL Agent Jobs
  - SSRS Report Server
- **Visual Studio w/ SQL Server Data Tools**
  - Database Projects
  - Integration Services Project
  - Report Server Project



What's in the  
Demo?

- **Visual Studio Database Projects**
  - Staging
  - Data Warehouse
- **Visual Studio SSIS Package**
- **SQL Server Agent**

# Transformations

- **Getting Key values from Dimensions**
- **Standardization**
  - **Lookup Tables to convert Codes to Standard Values**
  - **No Data vs Unknown**
- **Clean up**
- **Add Indicators**
- **Pre-Calculate Aggregates**

The background features a series of concentric, overlapping curved lines in shades of gray, some solid and some dashed, creating a sense of depth and movement. In the center, there is a large, solid orange shape that resembles a speech bubble or a callout box, pointing downwards. The text is centered within this orange shape.

# The Power of Data

Be a Catalyst for Change

# My First Warehouse

## Agile Data Warehouse Design

*Collaborative Dimensional Modeling, from Whiteboard to Star Schema*

Lawrence Corr  
with Jim Stagnitto





## Impact

### FORMER DIRECTOR REAL TIME CRIME CENTER

*“This is a huge help to our live operations. Because of this tool you created it is going to help us from missing vital calls. Ultimately it is going to have a direct impact on officer safety.”*

### OPERATIONS SERGEANT

*“This process is being used for a number of our documents to allow the department to meet our own internal goals and assist in the improved prosecution of our cases. In a city where crime has risen to new levels, these changes are the tiny steps which will make a safer city a reality.”*

An orange speech bubble graphic with a white outline, containing the word 'Impact' in white text. The bubble is positioned on the left side of the slide, pointing towards the testimonial text on the right. The background features decorative curved lines in shades of gray and orange.

## Impact

### FIELD SERGEANT

*“As you always seem to do, you captured what I need as a supervisor and then used your incredible technical skills to provide me a working solution to a real problem that I face. Knowing exactly where my team stands on such an important issue such as this helps to keep me “ahead of the curve”, and solving a potential issue timely.”*

## Impact

### EVIDENCE UNIT DETECTIVE

*“Leslie has taken our body camera program into the 21st century. Her work with automatic tagging of files and developing a video review process and report has added huge amount of value to the department. She has saved our officers vast amounts of time and in turn our department a large amount of money.”*



## Impact

### DATA ANALYST

*“Due to the ongoing demands of my police department being able to get accurate data fast is imperative. Unfortunately, I was unable to keep up, but now with the warehouse I’ve turned hours of time spent gathering data into seconds. Those hours saved are now properly spent analyzing the data. I couldn’t do my job effectively without the data warehouse and corresponding reports.”*

The Good Stuff

- **Compliance Rates**

- Have policy directives been followed
- Have additional requirements been fulfilled

### Compliance Rate for the period 1/1/2018 to 4/30/2018

Assigned Division	Assigned Unit	Employee Name	Total Tow Calls	Completed Tow Sheets	Tow Sheet Complete %	Total CITEncounters	Is CITWrkSht Complete	CIT Wrksht Complete %	Total Comm Events	Completed Comm Events	Comm Event Complete %
Academy			15	9	60.00 %	9	8	88.89 %	6	6	100.00 %
Administrative Support			0	0	-	0	0	-	2	0	0.00 %
Aviation Division			10	8	80.00 %	0	0	-	0	0	-
Behavioral Health Section			0	0	-	0	0	-	0	0	-
Chiefs Office			0	0	-	0	0	-	0	0	-
CID/Family Advocacy Center			59	24	40.68 %	27	14	51.85 %	31	10	32.26 %
Communications			0	0	-	0	0	-	0	0	-
Communications and Community Outreach			0	0	-	0	0	-	0	0	-
Compliance Division			0	0	-	0	0	-	0	0	-
Crisis Intervention Section			8	0	0.00 %	1485	1379	92.86 %	1475	55	3.73 %
Crossing Guards			0	0	-	0	0	-	0	0	-
Field Services			22	12	54.55 %	0	0	-	1	0	0.00 %
Fiscal Division			0	0	-	0	0	-	0	0	-
Foothills Area Command			4634	3526	76.09 %	4391	4142	94.33 %	4063	2703	66.53 %
	FH Commander		0	0	-	0	0	-	9	0	0.00 %
	FH Days LT		0	0	-	0	0	-	16	0	6.25 %
	FH Days Team 1		252	192	76.19 %	81	81	100.00 %	264	173	65.53 %
	FH Days Team 3		175	153	87.43 %	175	158	90.29 %	117	70	59.83 %
	FH Days Team 4		541	324	59.89 %	537	534	99.44 %	402	100	24.88 %
	FH Grave Team 11		94	63	67.02 %	96	86	89.58 %	33	26	78.79 %
			36	9	25.00 %	36	32	88.89 %	0	0	-
			10	10	100.00 %	0	0	-	10	6	60.00 %
			4	4	100.00 %	4	4	100.00 %	4	4	100.00 %
			0	0	-	9	8	88.89 %	0	0	-
			0	0	-	3	2	66.67 %	3	0	0.00 %
			4	0	0.00 %	4	4	100.00 %	0	0	-

cabq.lcl  
Internet access

## The Good Stuff

- **Compliance Rates**
  - Have additional requirements been fulfilled
  - Have policy directives been followed
- **Operational Improvements**
  - Missing Reports Reconciliation
  - MyPAL/MyTeamLog

## Case Report Status List for For CADs Between 1/1/2018 - 4/30/2018

### Missing Reports (No Original in ARS)

Employee Full Name	Report Status	Call Date	CAD Call No	CAD Case Number	Final Call Type
	Crash Report Waiting for Approval	4/15/2018 10:31:37 AM	181050394	180035926	44
	MISSING	3/2/2018 2:56:28 PM	180610879	180021014	39
	MISSING	3/9/2018 9:03:22 AM	180680353	180023280	39
	Officer working on Report	4/27/2018 9:55:47 AM	181170451	180040329	31
	Report not Transferred - Check in Archive	3/23/2018 10:57:22 AM	180820599	180028196	31
	Report not Transferred - Check in Archive	4/12/2018 1:29:43 PM	181020802	180035074	31
	Crash Report Waiting for Approval	4/5/2018 3:55:46 PM	180951034	180032683	44
	Waiting on Supervisor Approval	4/27/2018 11:58:32 PM	181171788	180040608	39
	Waiting on Supervisor Approval	4/28/2018 4:49:14 AM	181180273	180040645	40
	Crash Report Waiting for Approval	3/24/2018 4:38:36 PM	180830911	180028648	44
	Needs Crash Report	3/24/2018 5:22:57 PM	180830968	180028652	44
	Waiting on Supervisor Approval	4/28/2018 11:06:01 PM	181181551	180040887	43-1
	Waiting on Supervisor Approval	4/29/2018 4:21:59 AM	181190223	180040922	31
	Waiting on Supervisor Approval	4/29/2018 5:48:21 PM	181190966	180041060	27-4



2

of 3



100%



Find | Next

Find | Next

## Case Report Status List for For CADs Between 1/1/2018 - 4/30/2018

### CADs Missing Additional Documentation

	Report Status	Call Date	CAD Call No	CAD Case Number	Final Call Type
	Missing CIT Worksheet	1/5/2018 10:26:36 AM	180050456		40
	Missing Community Event Form	4/27/2018 6:43:27 PM	181171309		75-1
	Missing Tow Sheet	3/29/2018 8:09:50 AM	180880224	180030193	27-4
	Missing DV Questionnaire	2/3/2018 2:34:48 PM	180340738	180011603	15
	Missing Tow Sheet	1/5/2018 9:14:36 AM	180050359	180001563	31
	Missing Tow Sheet	3/9/2018 1:23:24 PM	180680763	180023360	45
	Missing CIT Worksheet	3/3/2018 4:24:14 PM	180620950	180021337	43-1
	Missing DV Questionnaire	2/10/2018 12:04:05 AM	180410007	180013814	15
	Missing Tow Sheet	1/12/2018 6:24:16 AM	180120175	180003968	31
	Missing Tow Sheet	2/17/2018 5:47:09 AM	180480229	180016381	47
	Missing Tow Sheet	4/23/2018 6:45:06 AM	181130184	180038669	44
J	Missing CIT Worksheet	3/6/2018 10:09:22 AM	180650424		40

## Case Report Status List for For CADs Between 1/1/2018 - 4/30/2018

### Report Status Action Required:

**MISSING** - an original report does not exist in Copperfire or ARS. The officer needs to write the report and Owner Approve it.

**Report not Transferred - Check in \_\_\_** - an original report does not exist in ARS but is in Copperfire in the location(s) shown. Move the report back to 'Owner Approved' and **Approve & Transfer\*** to ARS

**Waiting on Supervisor Approval** - a report exists in Copperfire and in 'Owner Approved' Status.

**Officer working on Report** - a report exists in Copperfire and is in 'My Reports' Status

**\*Be sure you are on the page the states 'Approve and Transfer' as the option.**

### Report Status Action Required:

**Has Crash Report - Change Final Call Type** - The officer needs to change the call type of this CAD to a 44 or a 45 since there is a Crash Report for this case.

**Needs Crash Report** - A Crash Report does not exist in TraCS and needs to be created.

**Crash Report Waiting for Approval** - A Crash Report is in progress and may need Supervisor approval.

***\*It will take approximately an hour for any changes made in CAD, TraCS, Copperfire or ARS to be reflected in this report.***

Report Run Date: 5/4/2018 2:04:29 PM

## The Good Stuff

- **Compliance Rates**
  - Have additional requirements been fulfilled
  - Have policy directives been followed
- **Operational Improvements**
  - Missing Reports Reconciliation
  - MyPAL/MyTeamLog
- **External Agency Integrations**
  - Auto tagging body camera uploads
  - Electronic File Transfers to District Attorney's Officer



**From:** APD DB Mail

**Sent:** Sunday, March 04, 2018 5:01 AM

**To:** Andrews, Leslie; Drager, Tracy

**Subject:** FFA Summary Sheet

**Importance:** High

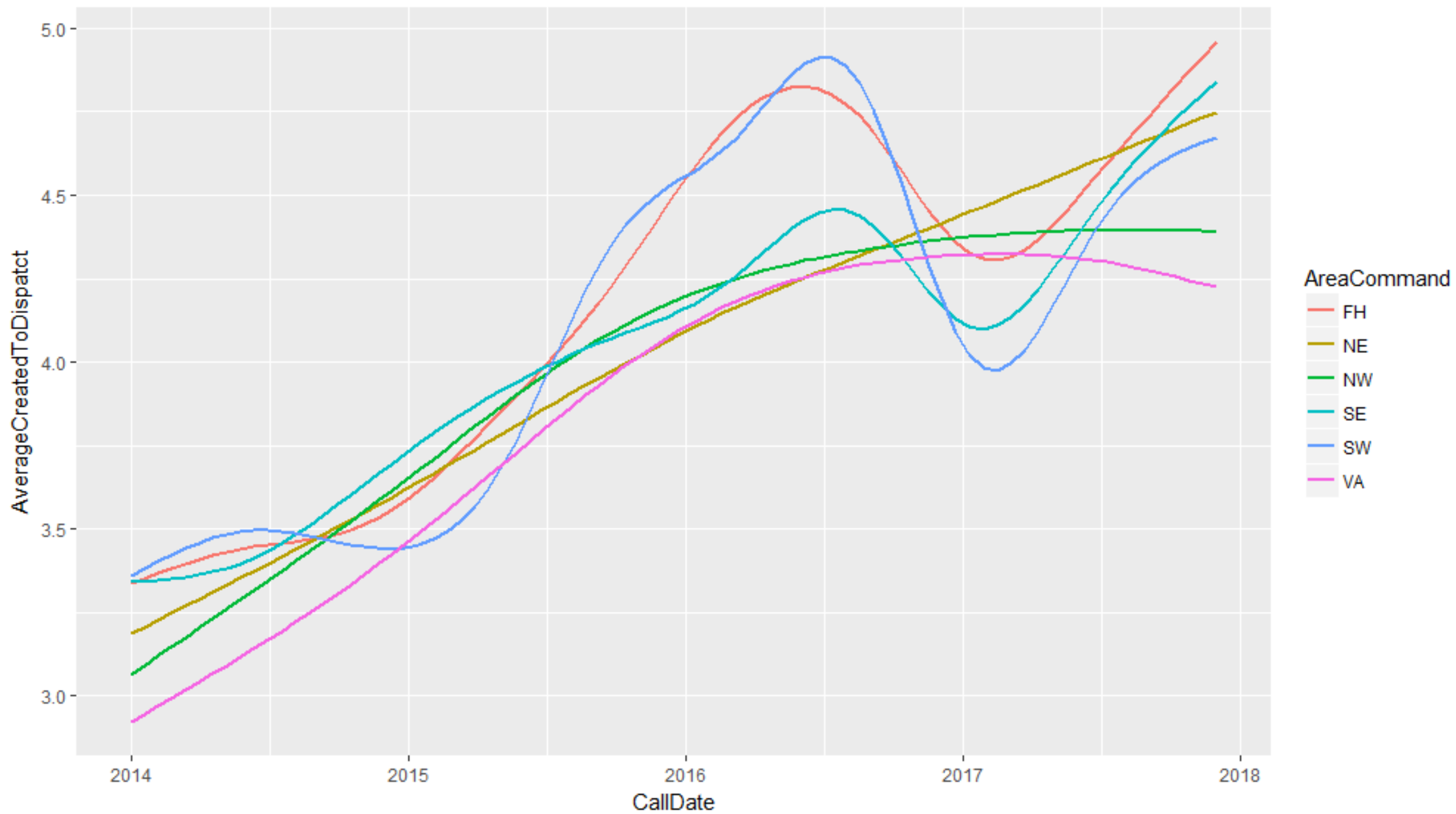
Below is a listing of the emails sent for the FFA for today. Please verify you received the correct number of emails with all the files attached. Please check your Junk Mail folder if you are missing any emails prior to contacting the APD HelpDesk at [apdhelpdesk@cabq.gov](mailto:apdhelpdesk@cabq.gov).

Case Number	Incident Type	Number of Files Sent	Primary Officer
180019914	FEL WARNT	1	
180021339	DISTURBANC	1	
180021361	DOM VIOLEN	1	
180021369	FEL WARNT	1	
180021408		2	
180021427	NARC VIOL	1	
180021436	FEL WARNT	1	

Thank you.

## The Good Stuff

- **Compliance Rates**
  - Have additional requirements been fulfilled
  - Have policy directives been followed
- **Operational Improvements**
  - Missing Reports Reconciliation
  - MyPAL/MyTeamLog
- **External Agency Integrations**
  - Auto tagging body camera uploads
  - Electronic File Transfers to District Attorney's Officer
- **Advanced Analytics - R**
  - Average Response Time Trends
  - Reponse Time/Call Volume

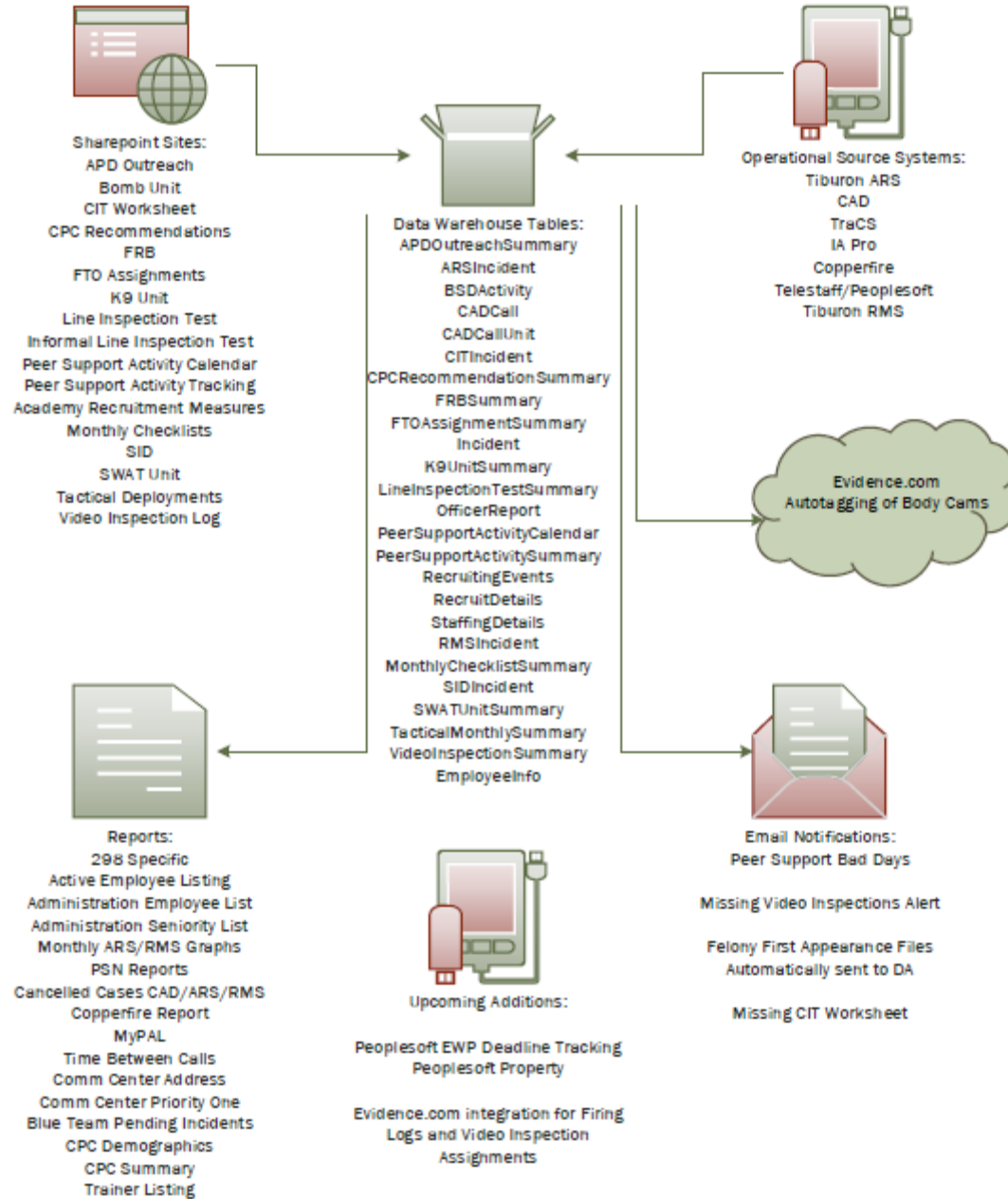


## The Good Stuff

- **Compliance Rates**
  - Have additional requirements been fulfilled
  - Have policy directives been followed
- **Operational Improvements**
  - Missing Reports Reconciliation
  - MyPAL/MyTeamLog
- **External Agency Integrations**
  - Auto tagging body camera uploads
  - Electronic File Transfers to District Attorney's Officer
- **Advanced Analytics - R**
  - Average Response Time Trends
  - Number of Calls to Free Time to Response Time analysis
- **Miscellaneous Reports**

Record Type	Sec Btwn	Call No	Call Type	Unit Logon	Call A Dispatch	Call A Cleared	Call B Dispatch	Call B Cleared	Unit Logoff
LFD	8079	180320457 (P)	Susp Pers/Vehs	8 02/01/2018 07:51:27	02/01/2018 10:06:06	02/01/2018 10:45:29	02/01/2018 10:53:28	02/01/2018 11:55:59	02/01/2018 20:44:18
LCND	479	180320457 (P)	Susp Pers/Vehs	8 02/01/2018 07:51:27	02/01/2018 10:06:06	02/01/2018 10:45:29	02/01/2018 10:53:28	02/01/2018 11:55:59	02/01/2018 20:44:18
LCND	693	180320519 (P)	traff acc no inj	8 02/01/2018 07:51:27	02/01/2018 10:53:28	02/01/2018 11:55:59	02/01/2018 12:07:32	02/01/2018 13:58:55	02/01/2018 20:44:18
LCND	8	180320636 (P)	Aggr assault/bat	42 02/01/2018 07:51:27	02/01/2018 12:07:32	02/01/2018 13:58:55	02/01/2018 13:59:03	02/01/2018 15:47:30	02/01/2018 20:44:18
LCND	69	180320865 (B)	traff acc injuri	8 02/01/2018 07:51:27	02/01/2018 13:59:03	02/01/2018 15:47:30	02/01/2018 15:48:39	02/01/2018 16:25:55	02/01/2018 20:44:18
LCND	1283	180321087 (P)	Investigation of	8 02/01/2018 07:51:27	02/01/2018 15:48:39	02/01/2018 16:25:55	02/01/2018 16:47:18	02/01/2018 20:15:20	02/01/2018 20:44:18
LCL	1738	180321191 (P)	Armed Rob Comm	42 02/01/2018 07:51:27	02/01/2018 16:47:18	02/01/2018 20:15:20	02/01/2018 16:47:18	02/01/2018 20:15:20	02/01/2018 20:44:18
LFD	4137	180330329 (P)	Traffic stop	8 02/02/2018 07:32:13	02/02/2018 08:41:10	02/02/2018 08:51:54	02/02/2018 08:54:53	02/02/2018 09:00:58	02/02/2018 18:42:20
LCND	179	180330329 (P)	Traffic stop	8 02/02/2018 07:32:13	02/02/2018 08:41:10	02/02/2018 08:51:54	02/02/2018 08:54:53	02/02/2018 09:00:58	02/02/2018 18:42:20
LCND	3200	180330344 (P)	Traffic stop	8 02/02/2018 07:32:13	02/02/2018 08:54:53	02/02/2018 09:00:58	02/02/2018 09:54:18	02/02/2018 10:31:47	02/02/2018 18:42:20
LCND	2505	180330422 (P)	Susp Pers/Vehs	8 02/02/2018 07:32:13	02/02/2018 09:54:18	02/02/2018 10:31:47	02/02/2018 11:13:32	02/02/2018 11:40:58	02/02/2018 18:42:20
LCND	1518	180330558 (P)	Traffic stop	8 02/02/2018 07:32:13	02/02/2018 11:13:32	02/02/2018 11:40:58	02/02/2018 12:06:16	02/02/2018 12:11:43	02/02/2018 18:42:20
LCND/N	3	180330608 (B)	traff acc no inj	8 02/02/2018 07:32:13	02/02/2018 12:06:16	02/02/2018 12:11:43	02/02/2018 12:11:46	02/02/2018 12:44:39	02/02/2018 18:42:20
LCND	97	180330651 (P)	Susp Pers/Vehs	8 02/02/2018 07:32:13	02/02/2018 12:11:46	02/02/2018 12:44:39	02/02/2018 12:46:16	02/02/2018 15:55:00	02/02/2018 18:42:20
LCND	203	180330711 (P)	Stolen Veh Found	42 02/02/2018 07:32:13	02/02/2018 12:46:16	02/02/2018 15:55:00	02/02/2018 15:58:23	02/02/2018 16:01:31	02/02/2018 18:42:20
LCND/N	821	180331000 (B)	traff acc injuri	4 02/02/2018 07:32:13	02/02/2018 15:58:23	02/02/2018 16:01:31	02/02/2018 16:15:12	02/02/2018 16:28:37	02/02/2018 18:42:20
LCND	265	180331063 (P)	Traffic stop	8 02/02/2018 07:32:13	02/02/2018 16:15:12	02/02/2018 16:28:37	02/02/2018 16:33:02	02/02/2018 16:38:39	02/02/2018 18:42:20
LCND	4166	180331089 (P)	Traffic stop	8 02/02/2018 07:32:13	02/02/2018 16:33:02	02/02/2018 16:38:39	02/02/2018 17:48:05	02/02/2018 17:53:25	02/02/2018 18:42:20
LCL	2935	180331206 (P)	Onsite Suspiciou	8 02/02/2018 07:32:13	02/02/2018 17:48:05	02/02/2018 17:53:25	02/02/2018 17:48:05	02/02/2018 17:53:25	02/02/2018 18:42:20

## Data Warehouse Overview



# Challenges

- **Undefined/Poorly Defined Processes**
- **Bad Data**
- **Common Definitions**
- **Bad Data**
- **Accountability**
- **Bad Data**

## Conclusion

- Basics of Data Warehouses
- ETL Process
- The Power Of Data
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-  @landrews5807
- #PowerOfData #CatalystForChange