POWER OF ANALYTICS

IN FORECASTING

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DEPARTMENT OF HEALTH/EMS

CAROL PUGH AND PAUL SHARPE- PROCUREMENT REASONING

- **Justification**

- The addition of **SAS Data Quality** to our existing SAS contract will make the process of preparing the Virginia Pre Hospital Information Bridge (VPHIB, the EMS database) data for analysis more consistent, more efficient, and more reproducible from month to month. To quote SAS's tagline, "Brilliance isn't built on bad data." Despite all of the data submission rules Paul Sharpe has put in place to ensure the input of quality VPHIB data, bad data still creep into the system and need to be corrected before the monthly upload to the national EMS Registry, NEMSIS. We also need to clean up the data before using the information to monitor EMS performance improvement efforts. In January, we will begin the implementation of the new Virginia Statewide Trauma Registry (VSTR) and will have the same needs for that program.

- **SAS Visual Analytics** is vital to our ability to provide access to quality data in the EMS Patient Care Information System (PCIS, the combination of VPHIB and VSTR). This tool will allow for the connection to interactive summary data with drill down capability that can be safely (from a HIPAA perspective) explored by both contributors to the EMS PCIS as well as other stakeholders (*e.g.,* county administrators and EMS regional personnel). We will have the ability to create both general access accounts for the public, students, and researchers as well as more defined roles for the above noted stakeholders.

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VDH/OFFICE OF EMERGENCY MEDICAL SERVICES

CONTINUED

- **Consequences**
-
- The main consequence *not* of purchasing **SAS Data Quality** is the loss of time encountered by both Paul Sharpe and Carol Pugh as they clean up the data “by hand” each month. The time spent in this manual process can be reduced significantly and put to better use for the EMS PCIS and other Division of Trauma-Critical Care projects.
-
- Loss of time is also a consideration if **SAS Visual Analytics** is *not* purchased. Another significant disadvantage is the continuation of our current inability to provide timely summaries of data to stakeholders who are not contributors to the EMS PCIS. We have a rich source of data that can be used to promote the health and well-being of the citizens of the Commonwealth of Virginia. Our current lack of tools to share this wealth of knowledge, while preserving patient confidentiality, is a disservice to all Virginians.
-
- **Other Thoughts**
-
- SAS is expensive, but it is a world-wide standard. We have already invested significantly in SAS tools, and it makes sense to add on these two additional programs. The upfront cost of SAS is large, but the annual maintenance subscriptions are reasonable.

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BUSINESS PROBLEM TO SOLVE

- Forecasting:
  - Incorporating teachers and county employees into the state health plan pool
  - Work force planning
    - Cost of general raises and attrition
  - Health care cost increases
    - Focus on procedures and payoff
    - Other State “what if scenarios”
  - Providing easy to generate and visual reporting for the General Assembly
  - Ability to speak to trends and probabilities with confidence

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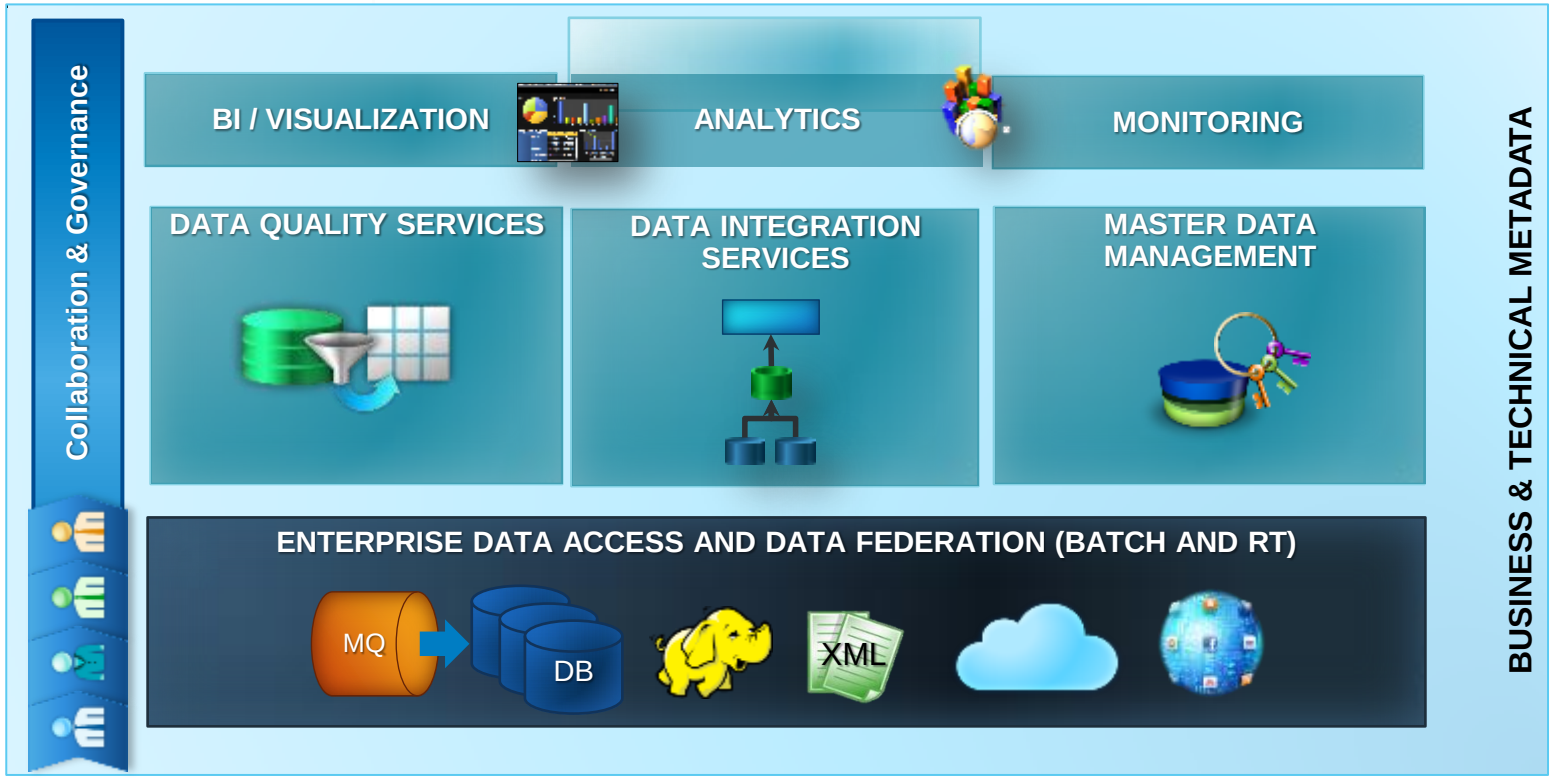
ANALYTICS FRAMEWORK

THE FOUNDATION TO MAKING BETTER DECISIONS



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SAS® VISUAL ANALYTICS

BUSINESS VISUALIZATION DRIVEN BY ANALYTICS

EASY TO USE ENTERPRISE SOLUTION

DON'T HAVE TO BE A DATA SCIENTIST

FORECASTING, REPORTING, DATA EXPLORATION

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WHAT IS VISUAL ANALYTICS?

Provides the ability to leverage an in-memory analytic engine, to conduct ad-hoc data analysis, visually explore data, develop reports, dashboards and KPIs then share insights through the web and mobile platforms.

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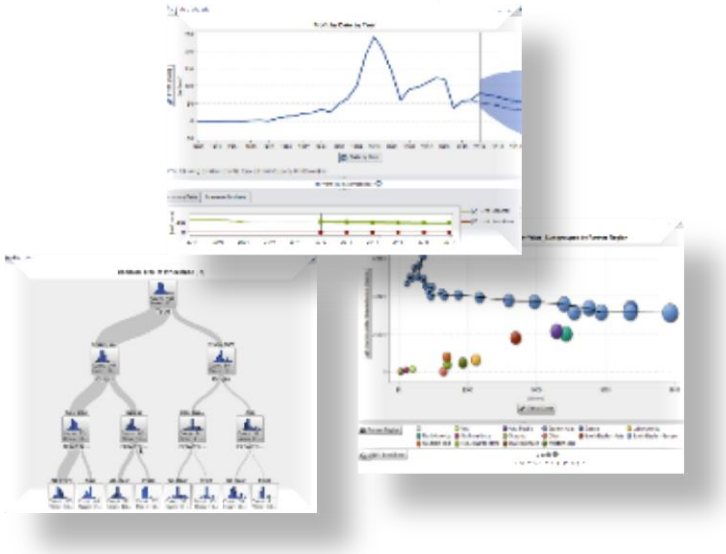
BENEFITS

INCREASE THE USE OF ANALYTICS AND BI



- Self-service
- Easy to use Analytics
- Work with more data

- Reporting and Dashboards
- Mobile BI
- Collaboration

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VISUAL ANALYTICS

A SINGLE PLATFORM FOR MULTIPLE ROLES AND FASTER DECISIONS

Central Entry Point | Integration | Role-based Views

DATA BUILDER

- Join data from multiple sources
- Create calculated and derived columns
- Load data

ADMINISTRATOR

- Monitor server
- Load/unload data
- Manage security

EXPLORER

- Forecasting
- Perform ad-hoc analysis and data discovery
- Apply advanced analytics

DESIGNER

- Create dashboard style reports for web or mobile

MOBILE BI

- Native iOS and Android applications that delivers interactive reports

In-Memory Server

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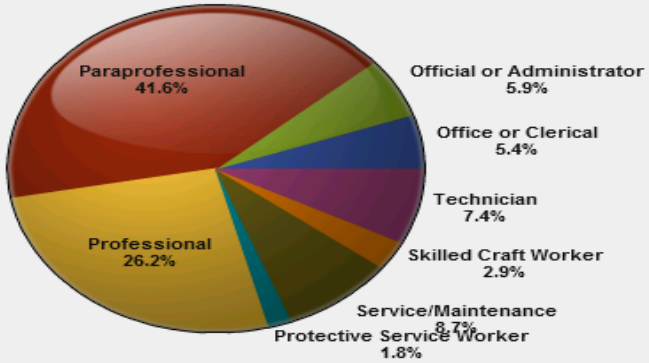
Workforce Planning Report

Human Resources

Fiscal Year

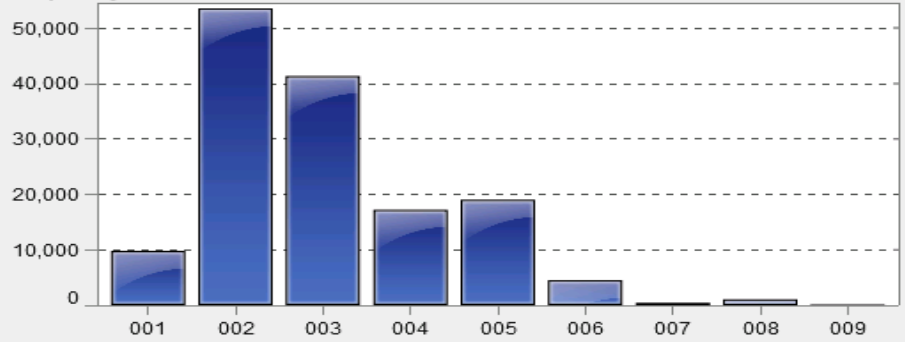
Employee Classification

Frequency



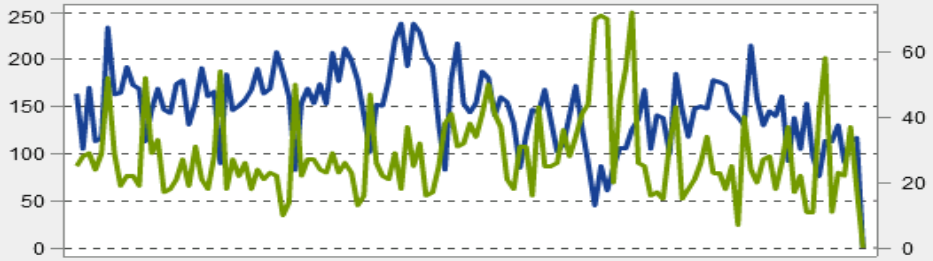
Employees by Pay Band

Frequency



Hires

Retirements



Transition Effective Date

Hires Retirements

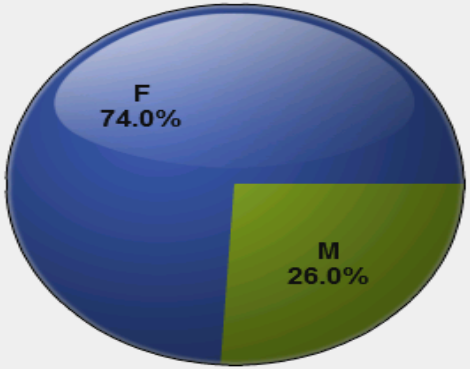
Play Jan2009 Loop 1/5X 1X 5X

Employee Demographics Report

Fiscal Year

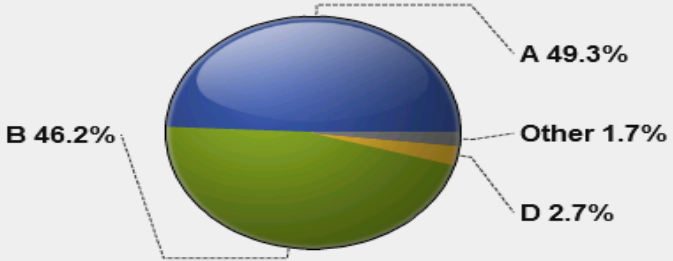
Gender

Frequency



Race

Frequency

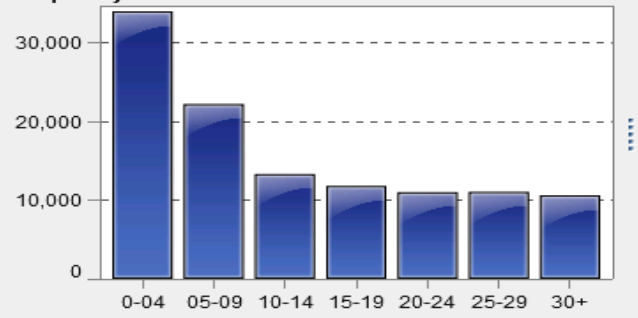


Office Location	Employee Count
Accomack	46
Albemarle	33
Alexandria	98
Alleghany	8
Amherst	4,310
Appomattox	4
Atkins	108
Augusta	456
Beach	150
Beford	17
Bland	21
Botetourt	33

EMPLOYEE CLASSIFICATION

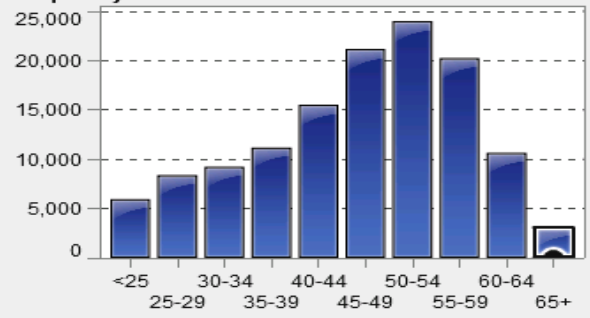
Total Yrs Service Range

Frequency

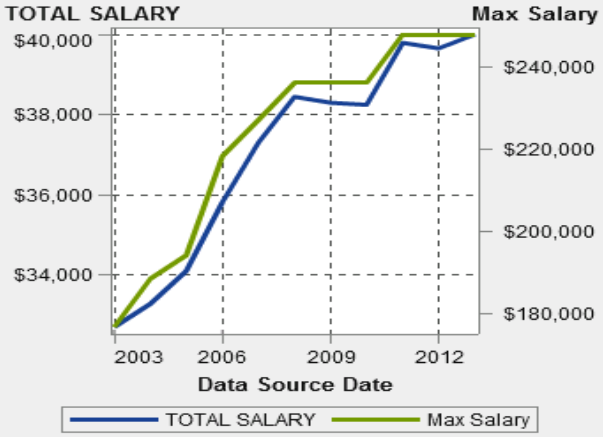


Age Range

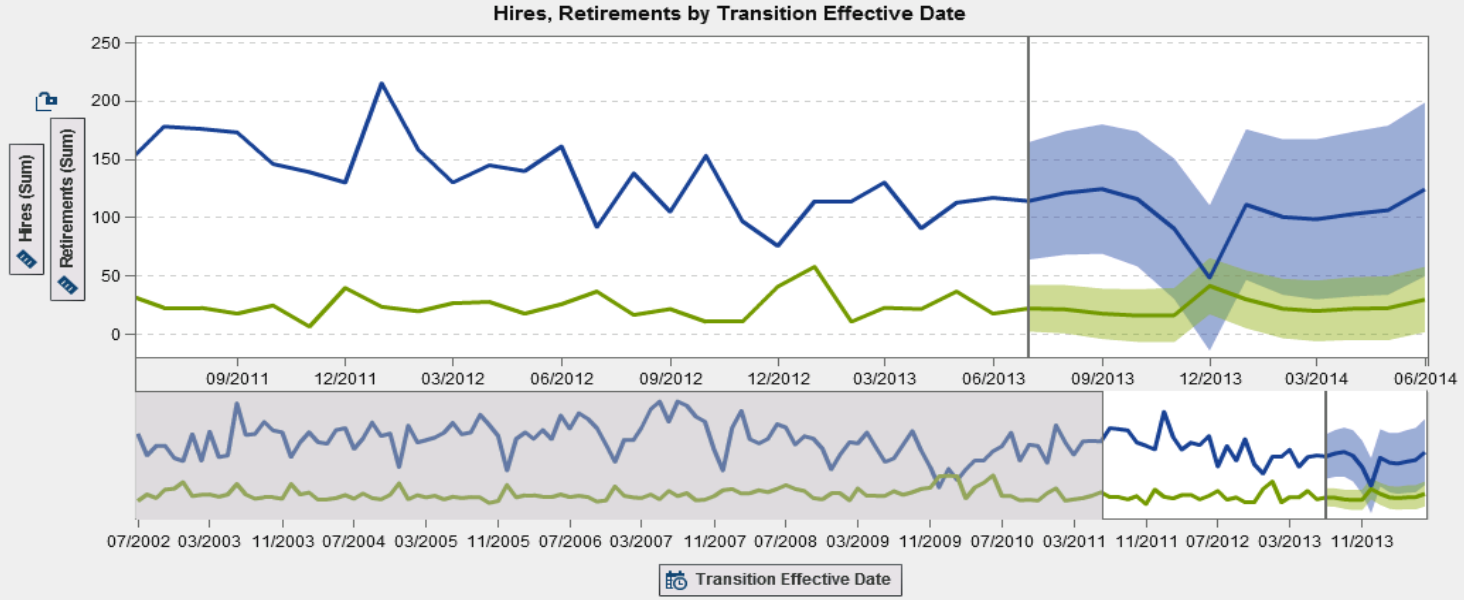
Frequency



TOTAL SALARY / Max Salary



Visualization 1



Results | Analysis

Transition Effective Date	Hires	Retirements	Hires (Upper 95%)	Hires (Lower 95%)	Retirements (Upper 95%)	Retirements (Lower 95%)
07/2002	166	14				
08/2002	117	29				
09/2002	138	21				
10/2002	139	40				
11/2002	111	42				
12/2002	104	57				
01/2003	164	25				
02/2003	105	28				

Roles | Filt... | Ra... | Pr... | Co...

Line Chart

Use Automatic Chart

Category

Transition Effective Date

Measures

Hires

Retirements

Group

Category

Lattice columns

Category

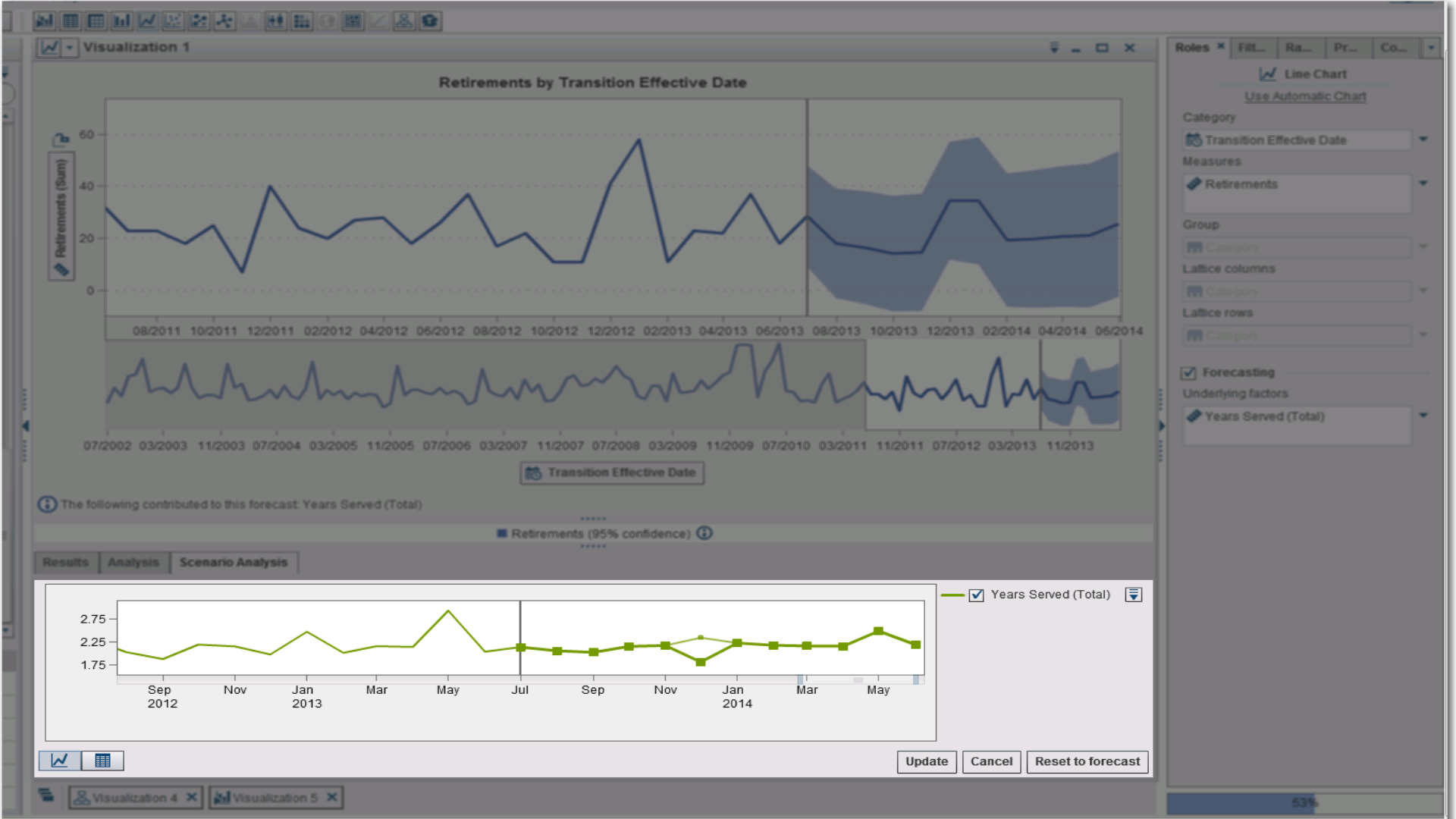
Lattice rows

Category

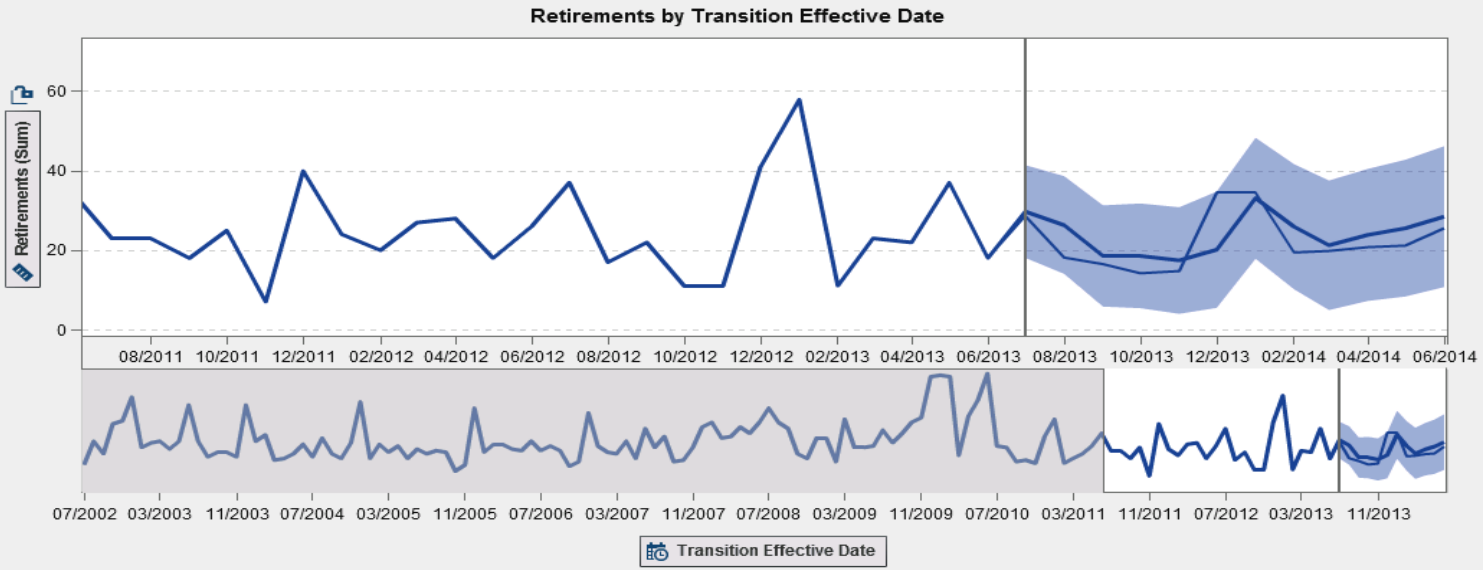
Forecasting

Underlying factors

Measure


Visualization 1
Retirements by Transition Effective Date
Retirements (Sum)
60
40
20
0
08/2011 10/2011 12/2011 02/2012 04/2012 06/2012 08/2012 10/2012 12/2012 02/2013 04/2013 06/2013 08/2013 10/2013 12/2013 02/2014 04/2014 06/2014
07/2002 03/2003 11/2003 07/2004 03/2005 11/2005 07/2006 03/2007 11/2007 07/2008 03/2009 11/2009 07/2010 03/2011 11/2011 07/2012 03/2013 11/2013
Transition Effective Date
The following contributed to this forecast: Years Served (Total)
Retirements (95% confidence)
Results
Analysis
Scenario Analysis
Years Served (Total)
2.75
2.25
1.75
Sep 2012
Nov
Jan 2013
Mar
May
Jul
Sep
Nov
Jan 2014
Mar
May
Update
Cancel
Reset to forecast
Roles
Filt...
Ra...
Pr...
Co...
Line Chart
Use Automatic Chart
Category
Transition Effective Date
Measures
Retirements
Group
Lattice columns
Lattice rows
Forecasting
Underlying factors
Years Served (Total)
Visualization 4
Visualization 5
53%

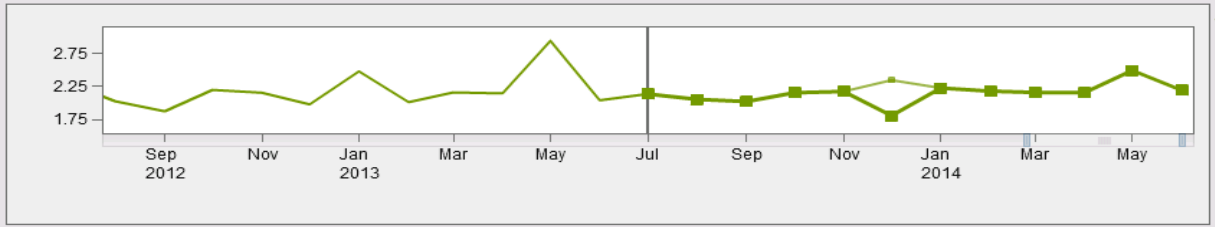
Visualization 1



The following contributed to this forecast: Years Served (Total)

Retirements (95% confidence)

Results | Analysis | Scenario Analysis



Update | Cancel | Reset to forecast

Visualization 4 | Visualization 5

Roles | Filt... | Ra... | Pr... | Co...

Line Chart

Use Automatic Chart

Category: Transition Effective Date

Measures: Retirements

Group: Category

Lattice columns: Category

Lattice rows: Category

Forecasting

Underlying factors: Years Served (Total)

53%

DEMO

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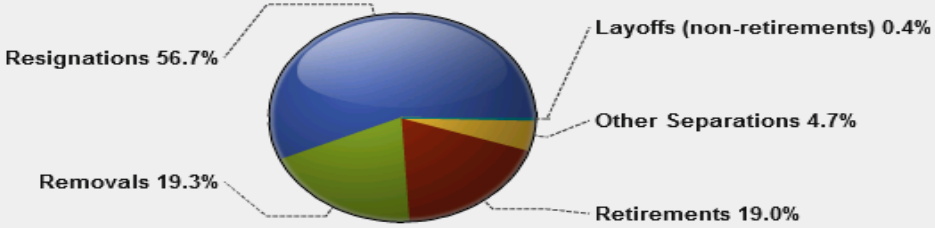
Employee Detail Report

Employee ID	Agency Name	POSITION LEVEL	POSITION ROLE TITLE ▲	Position Pay Band	State Begin Date	Veteran Status
16390	Dept of Taxation	Employee	Admin and Office Spec I	1	1980/08/16	N
507	Central Training Center	Employee	Admin and Office Spec II	2	1977/08/01	N
1759	Southwestern Ment Health Inst	Employee	Admin and Office Spec II	2	1977/03/16	N
2499	Dept of Motor Vehicles	Employee	Admin and Office Spec II	2	1973/11/01	N
1687	Eastern State Hospital	Employee	Admin and Office Spec II	2	1976/07/01	N
16767	Central Training Center	Employee	Admin and Office Spec II	2	1981/11/16	N
846	SE Training Center	Employee	Admin and Office Spec II	2	1978/10/01	N
15267	SE Training Center	Employee	Admin and Office Spec II	2	1978/07/01	N
16376	Dept of Taxation	Employee	Admin and Office Spec II	2	1980/08/01	N
1030	Central Training Center	Employee	Admin and Office Spec II	2	1978/05/16	N
683	Central Training Center	Employee	Admin and Office Spec II	2	1974/07/01	N
17191	Dept of Motor Vehicles	Employee	Admin and Office Spec II	2	1984/01/16	N
12	Central State Hospital	Employee	Admin and Office Spec II	2	1973/12/01	N
16992	Dept of Taxation	Employee	Admin and Office Spec II	2	1983/01/16	N
3003	Dept of Taxation	Employee	Admin and Office Spec II	2	1976/06/01	N
5033	Dept of Taxation	Employee	Admin and Office Spec II	2	1977/08/16	N
1219	Central Training Center	Employee	Admin and Office Spec II	2	1978/05/16	N
16370	Southwestern Ment Health Inst	Employee	Admin and Office Spec II	2	1980/07/14	N
15998	Dept of Taxation	Employee	Admin and Office Spec II	2	1976/06/01	N
2861	Central State Hospital	Employee	Admin and Office Spec II	2	1974/08/01	N
16393	Dept of Taxation	Employee	Admin and Office Spec II	2	1980/08/16	N
17510	Center for Child & Adoles	Employee	Admin and Office Spec II	2	1985/03/11	N
8126	SE Training Center	Employee	Admin and Office Spec II	2	1978/10/01	N
16006	Dept of Taxation	Employee	Admin and Office Spec II	2	1978/04/01	N
15018	SE Training Center	Employee	Admin and Office Spec II	2	1978/03/01	N
16931	Central Training Center	Employee	Admin and Office Spec II	2	1982/10/01	N
15132	Central Training Center	Employee	Admin and Office Spec II	2	1975/07/16	N
15467	SE Training Center	Employee	Admin and Office Spec II	2	1977/10/16	N
8933	Dept of Taxation	Employee	Admin and Office Spec II	2	1978/12/01	N

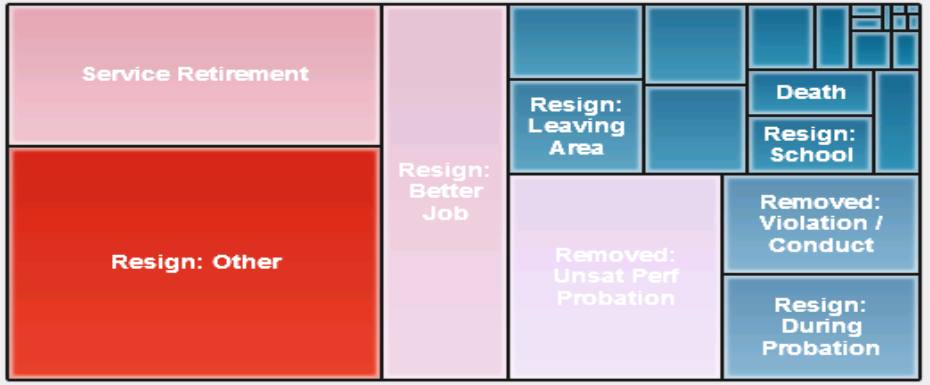
Employee Turnover Report

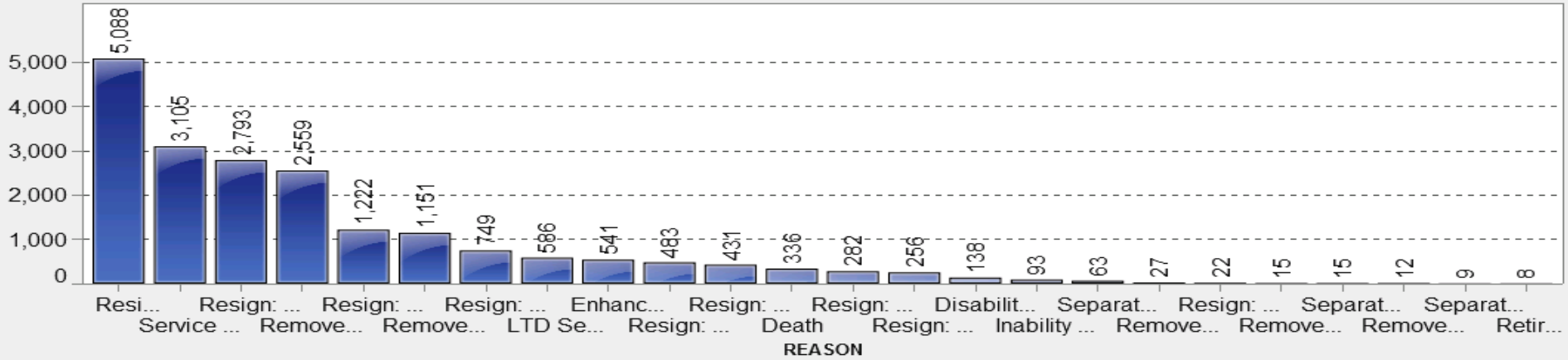
Dept Behav Hlth & Develop Svcs (88,819) | Dept Ment Hlth & Ment Retard (119,664)

Frequency



Turnover by Count and % Total Employees

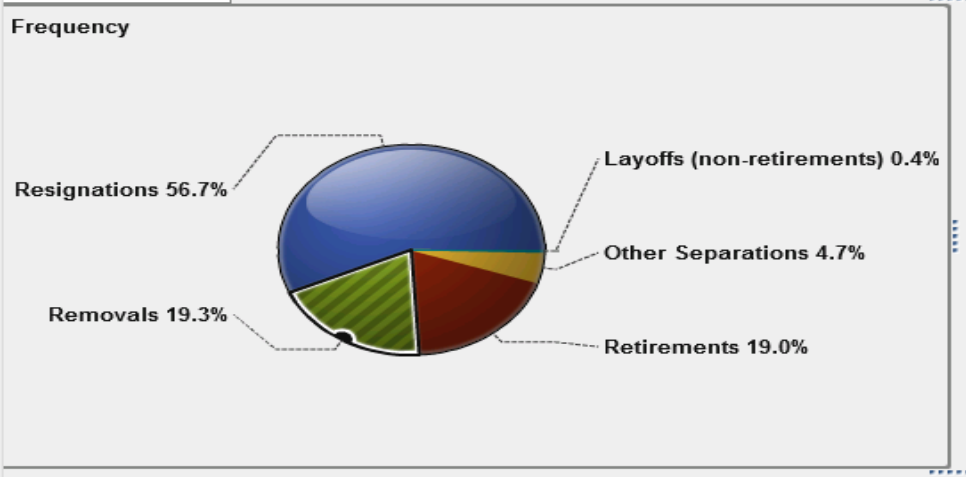


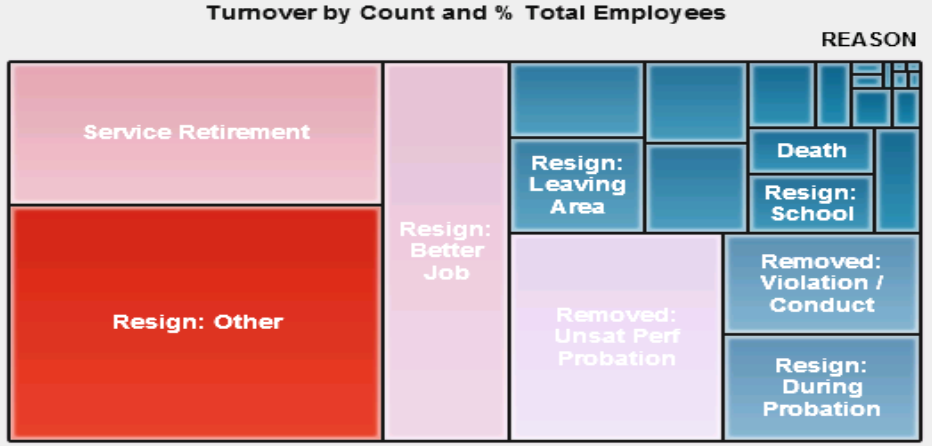


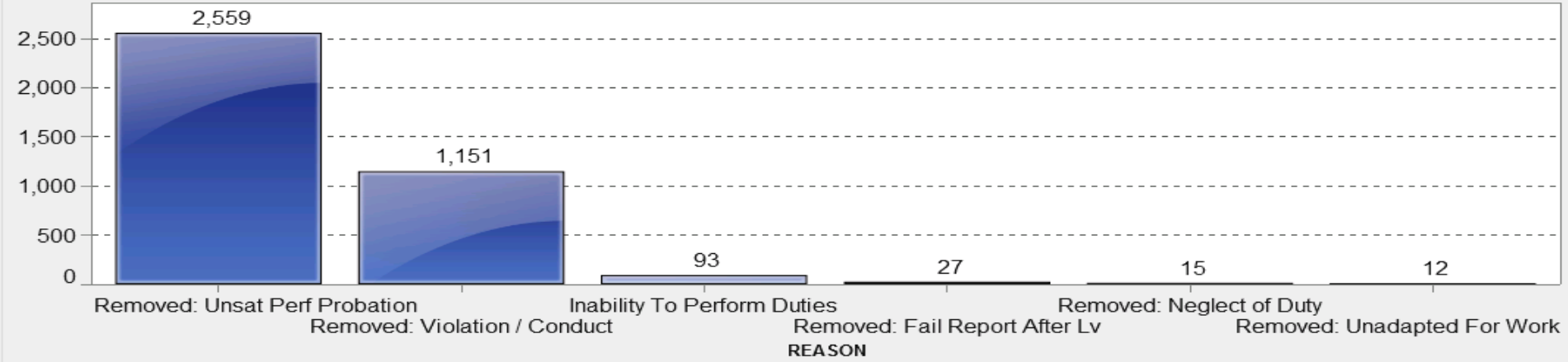
Employee Turnover Report

Dept Behav Hlth & Develop Svcs (88,819) | Dept Ment Hlth & Ment Retard (119,664)

Pie Chart 4

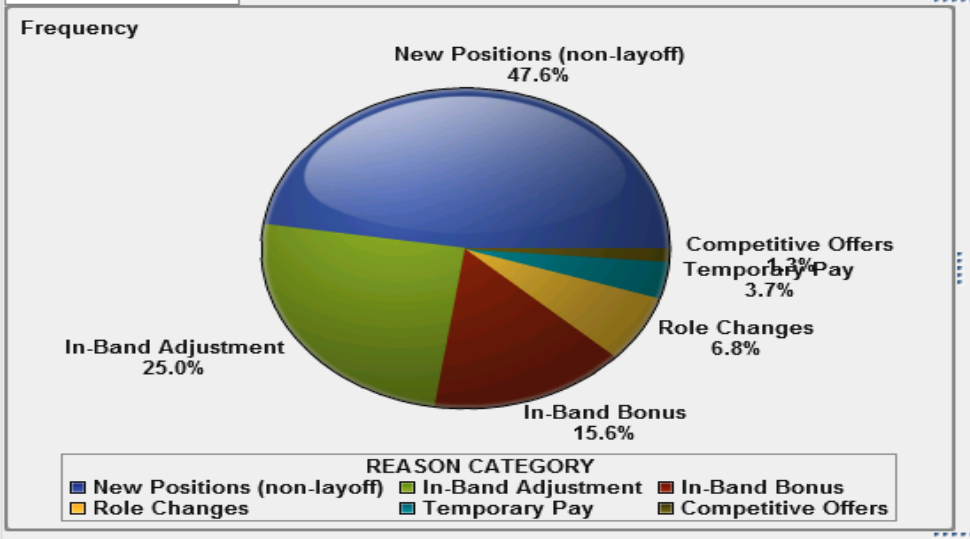


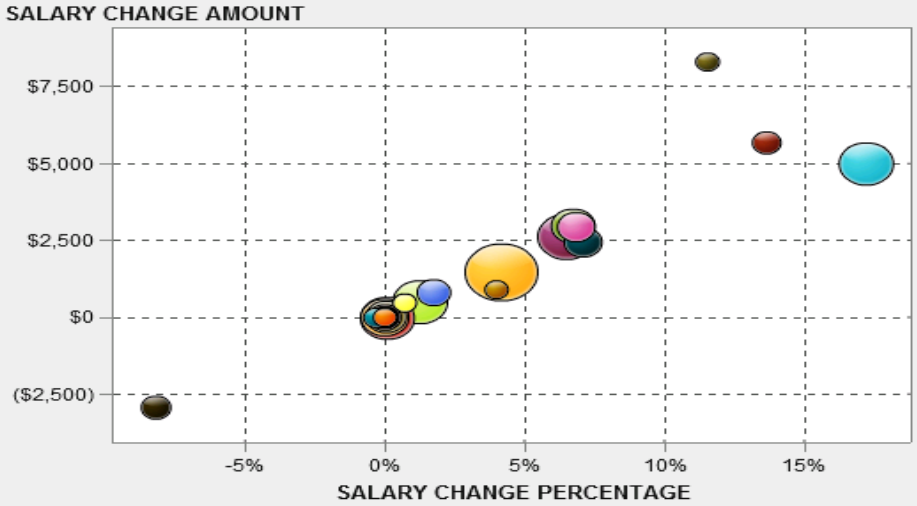


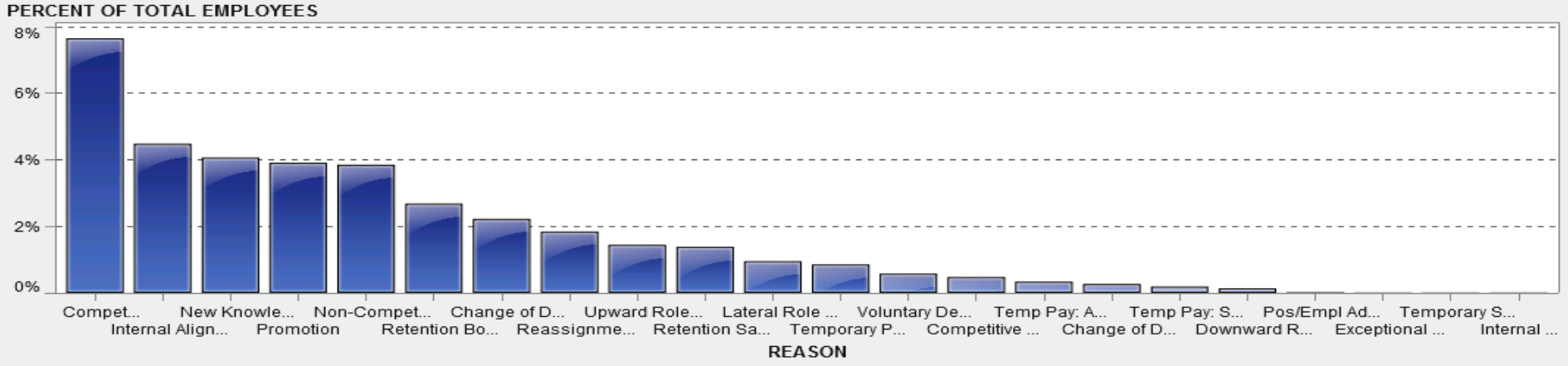


Pay Practices

Pie Chart 6

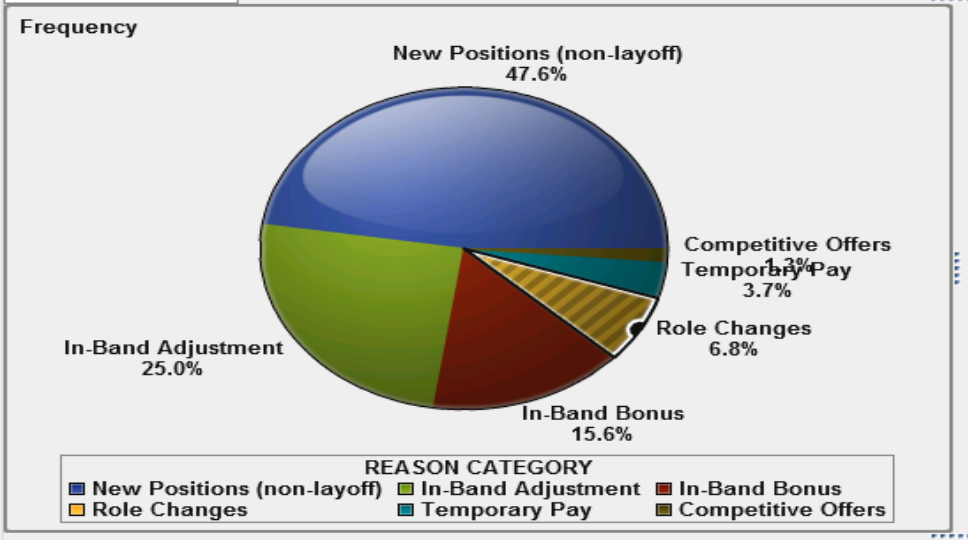


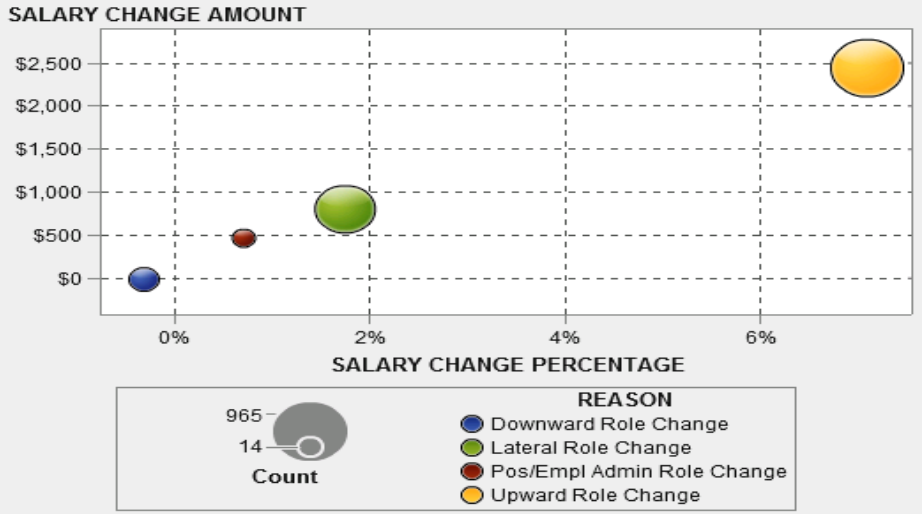


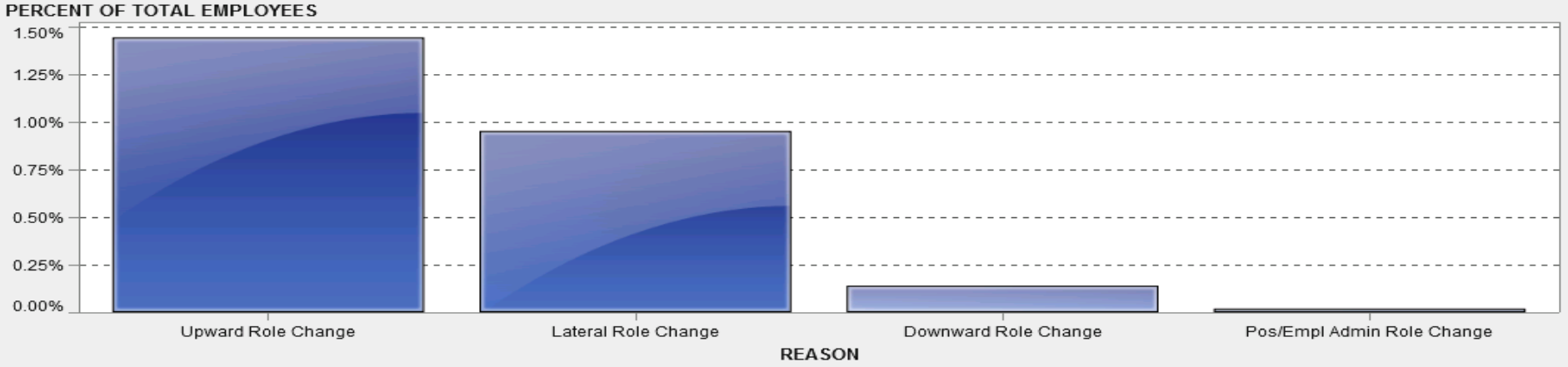


Pay Practices

Pie Chart 6







Agency Name

Employee ID	count	Total Disciplinary Actions
15299	19	7
14646	18	6
8952	12	6
6334	21	6
23345	14	6
3560	14	5
9759	21	5
6245	17	5
11838	16	5
21783	13	5
10551	5	4
15116	6	4
19981	15	4
140	9	4

Employee ID	Transition Effective Date	REASON CATEGORY	REASON
41	2003/07/01	Recognition	Recognition Award Leave Hours
41	2003/12/25	Role Changes	Upward Role Change
41	2004/01/20	Disciplinary Actions (non-separation)	LWOP: Suspension Pend Invstgtn
41	2004/02/23	Rehires	Rehire - Category IV
41	2004/02/23	In-Band Adjustment	Internal Alignment Salary
41	2004/05/10	Recognition	Recognition Award Leave Hours
41	2004/08/16	Recognition	Recognition Award Monetary
41	2009/10/01	Retirements	Service Retirement
140	2003/01/25	Hires	Rehire (Re-Establish)
140	2004/12/17	Disciplinary Actions (non-separation)	LWOP: Suspension Stan of Cndct
140	2004/12/23	Rehires	Rehire - Category IV
140	2005/03/24	Disciplinary Actions (non-separation)	LWOP: Suspension Stan of Cndct
140	2005/04/01	Disciplinary Actions (non-separation)	LWOP: Suspension Stan of Cndct
140	2005/04/01	Rehires	Rehire - Category IV

Employee ID ▲	Transition Effective Date ▲	REASON CATEGORY	REASON
473	2004/01/23	Removals	Removed: Violation / Conduct
473	2004/01/23	Disciplinary Actions (separation)	Removed: Violation / Conduct
517	2005/02/10	In-Band Adjustment	Internal Alignment Salary
517	2005/02/10	Role Changes	Upward Role Change
517	2009/03/06	Disciplinary Actions (non-separation)	LWOP: Suspension Pend Invstgtn
517	2009/04/15	Rehires	Rehire - Category IV
517	2010/09/06	Recognition	Recognition Award Monetary
517	2012/05/07	Recognition	Recognition Award Leave Hours
517	2012/05/25	Recognition	Recognition Award Leave Hours
517	2013/05/06	Recognition	Recognition Award Leave Hours
533	2002/07/23	Disciplinary Actions (non-separation)	LWOP: Suspension Stan of Cndct
533	2002/08/06	Rehires	Rehire Return From Suspension
533	2002/10/04	Disciplinary Actions (non-separation)	LWOP: Suspension Stan of Cndct
533	2002/11/01	Rehires	Rehire Return From Suspension

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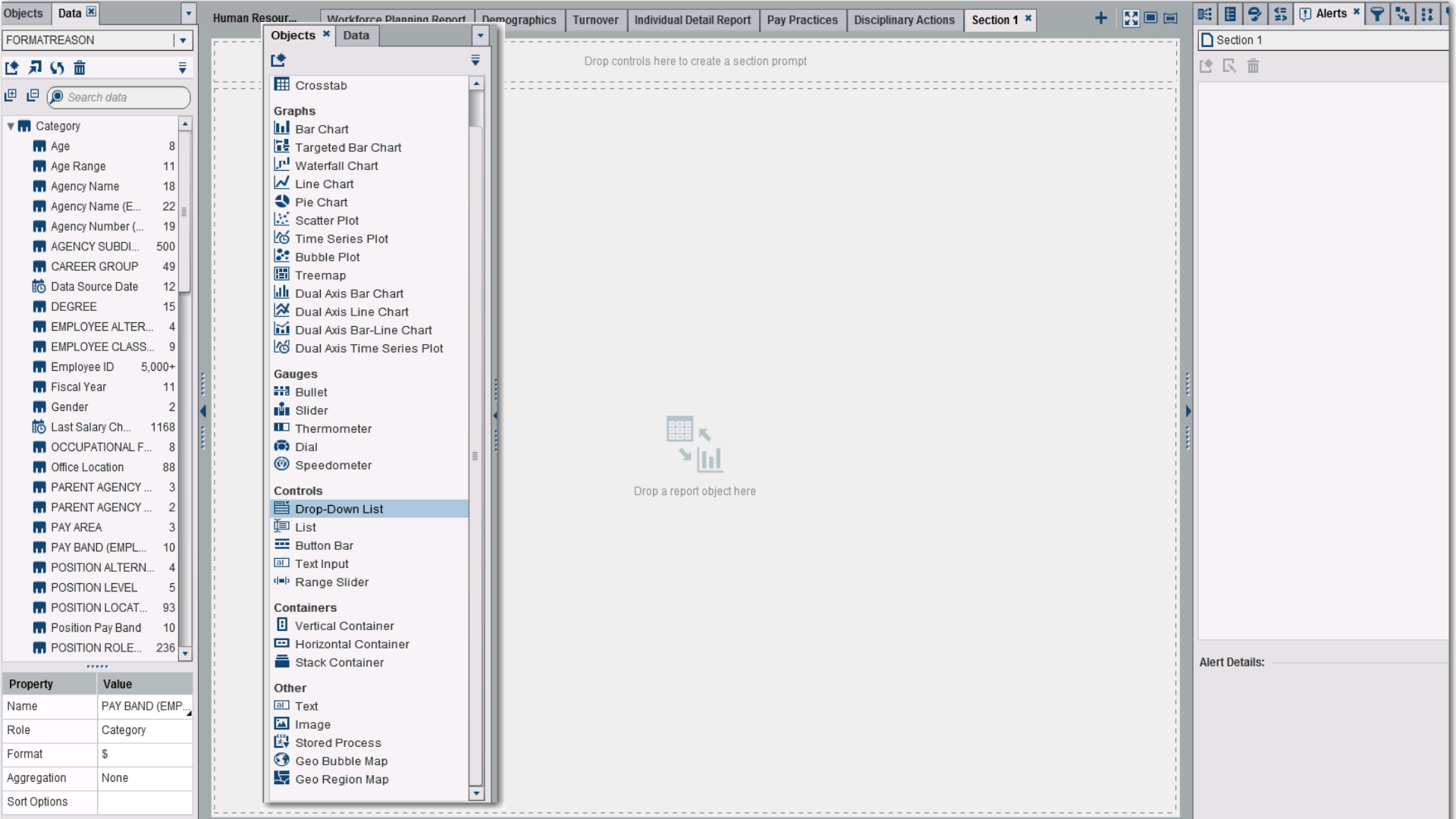
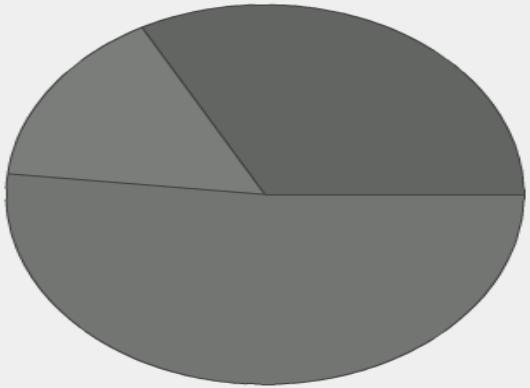

Objects
Data
FORMATREASON
Search data
Category
Age 8
Age Range 11
Agency Name 18
Agency Name (E... 22
Agency Number (... 19
AGENCY SUBDI... 500
CAREER GROUP 49
Data Source Date 12
DEGREE 15
EMPLOYEE ALTER... 4
EMPLOYEE CLASS... 9
Employee ID 5,000+
Fiscal Year 11
Gender 2
Last Salary Ch... 1168
OCCUPATIONAL F... 8
Office Location 88
PARENT AGENCY ... 3
PARENT AGENCY ... 2
PAY AREA 3
PAY BAND (EMPL... 10
POSITION ALTERN... 4
POSITION LEVEL 5
POSITION LOCAT... 93
Position Pay Band 10
POSITION ROLE... 236
Property
Value
Name
PAY BAND (EMP...
Role
Category
Format
$
Aggregation
None
Sort Options
Human Resour...
Workforce Planning Report
Demographics
Turnover
Individual Detail Report
Pay Practices
Disciplinary Actions
Section 1
Drop controls here to create a section prompt
Drop a report object here
Objects
Data
Crosstab
Graphs
Bar Chart
Targeted Bar Chart
Waterfall Chart
Line Chart
Pie Chart
Scatter Plot
Time Series Plot
Bubble Plot
Treemap
Dual Axis Bar Chart
Dual Axis Line Chart
Dual Axis Bar-Line Chart
Dual Axis Time Series Plot
Gauges
Bullet
Slider
Thermometer
Dial
Speedometer
Controls
Drop-Down List
List
Button Bar
Text Input
Range Slider
Containers
Vertical Container
Horizontal Container
Stack Container
Other
Text
Image
Stored Process
Geo Bubble Map
Geo Region Map
Alerts
Section 1
Alert Details:

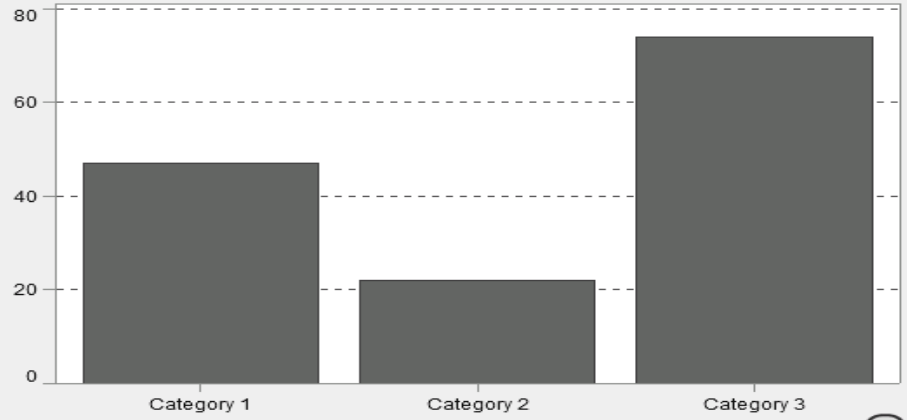
Drop controls here to create a section prompt

Measure



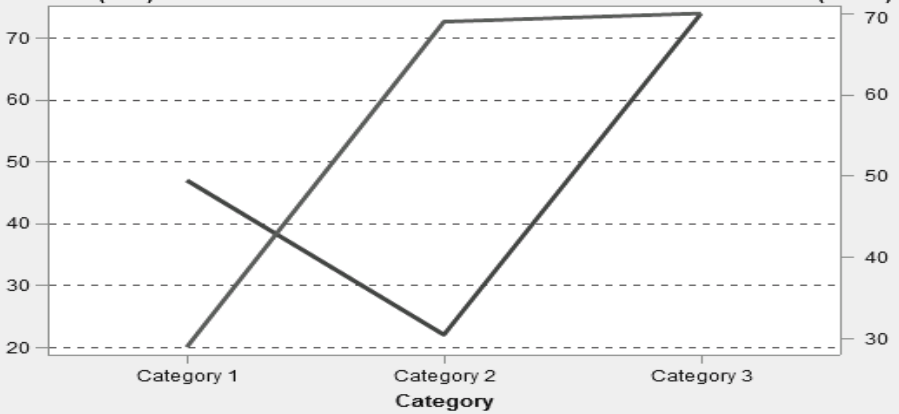
Category
Category 1 Category 2 Category 3

Measure



Category

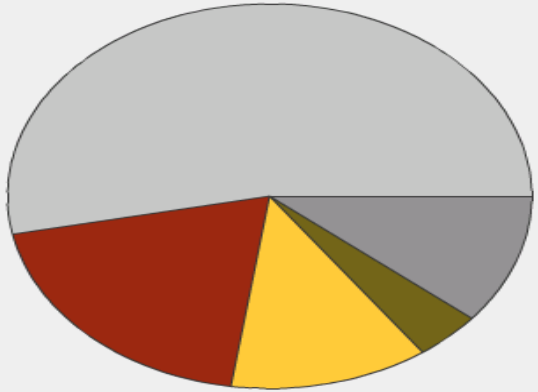
Measure (line) Measure (line 2)



Geo Bubble Map 1

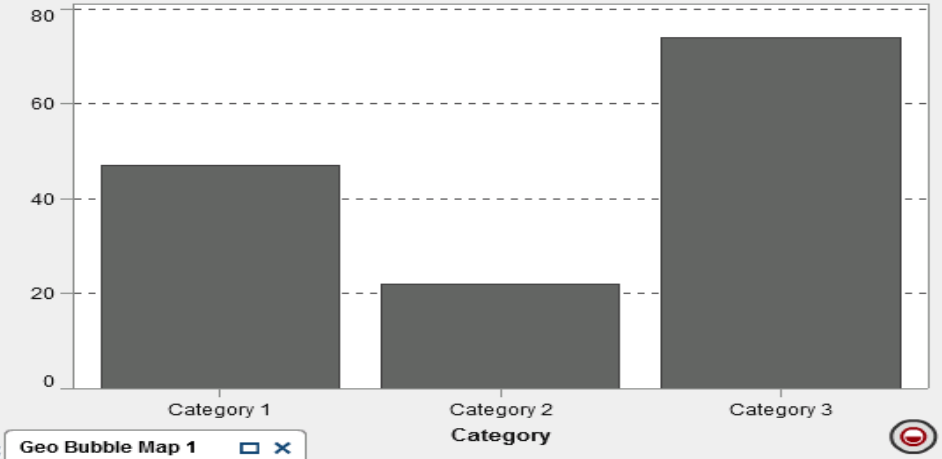
Drop controls here to create a section prompt

Frequency

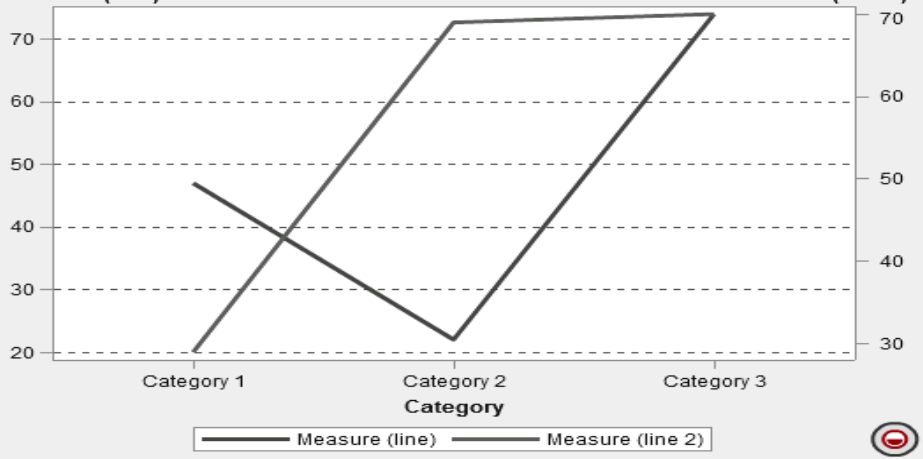


EMPLOYEE CLASSIFICATION
(missing) Paraprofessional Professional Service/Maintenance Other

Measure



Measure (line) Measure (line 2)

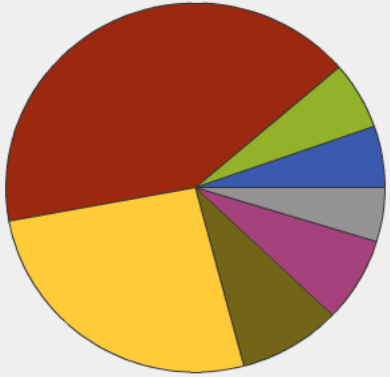


Geo Bubble Map 1

Drop controls here to create a section prompt

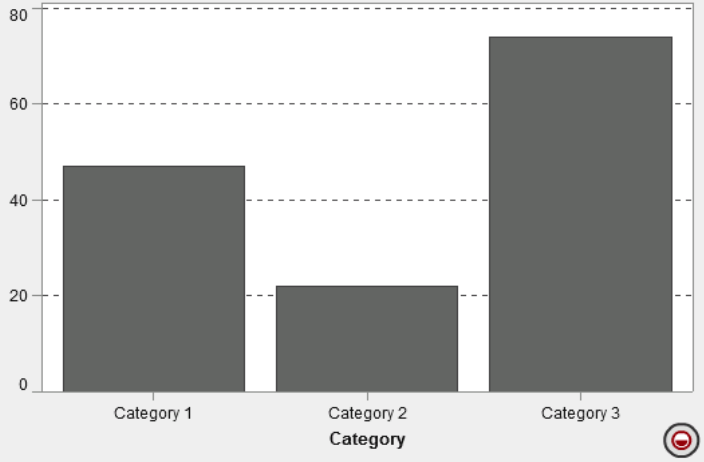
Pie Chart 5

Frequency



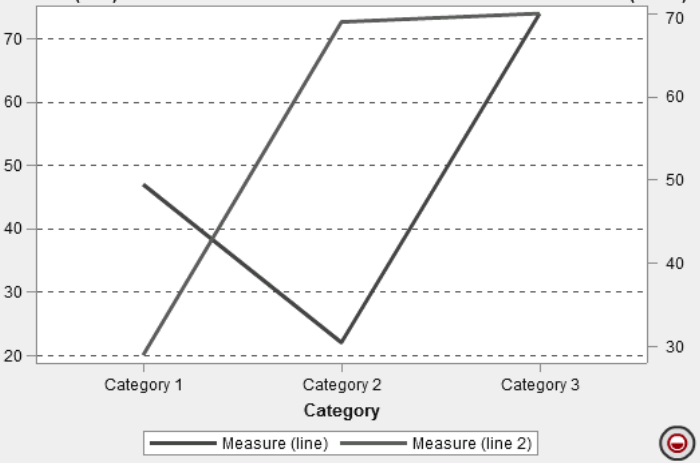
EMPLOYEE CLASSIFICATION
Office or Clerical
Official or Administrator
Paraprofessional
Professional
Service/Maintenance
Technician
Other

Measure



Measure (line)

Measure (line 2)



Pie Chart 5

EMPLOYEE CLASSIFICATION

Add Filter

EMPLOYEE CLASSIFICATION

All

Office or Clerical

Official or Administrator

Paraprofessional

Professional

Protective Service Worker

Service/Maintenance

Skilled Craft Worker

Technician

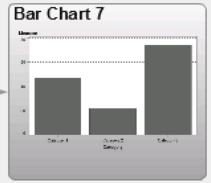
Include missing values

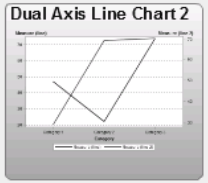
Auto

Apply

Cancel

Interactions View - Section 1





Sections

- Workforce Planning Re...
- Demographics
- Turnover
- Individual Detail Report
- Pay Practices
- Disciplinary Actions

Interactions

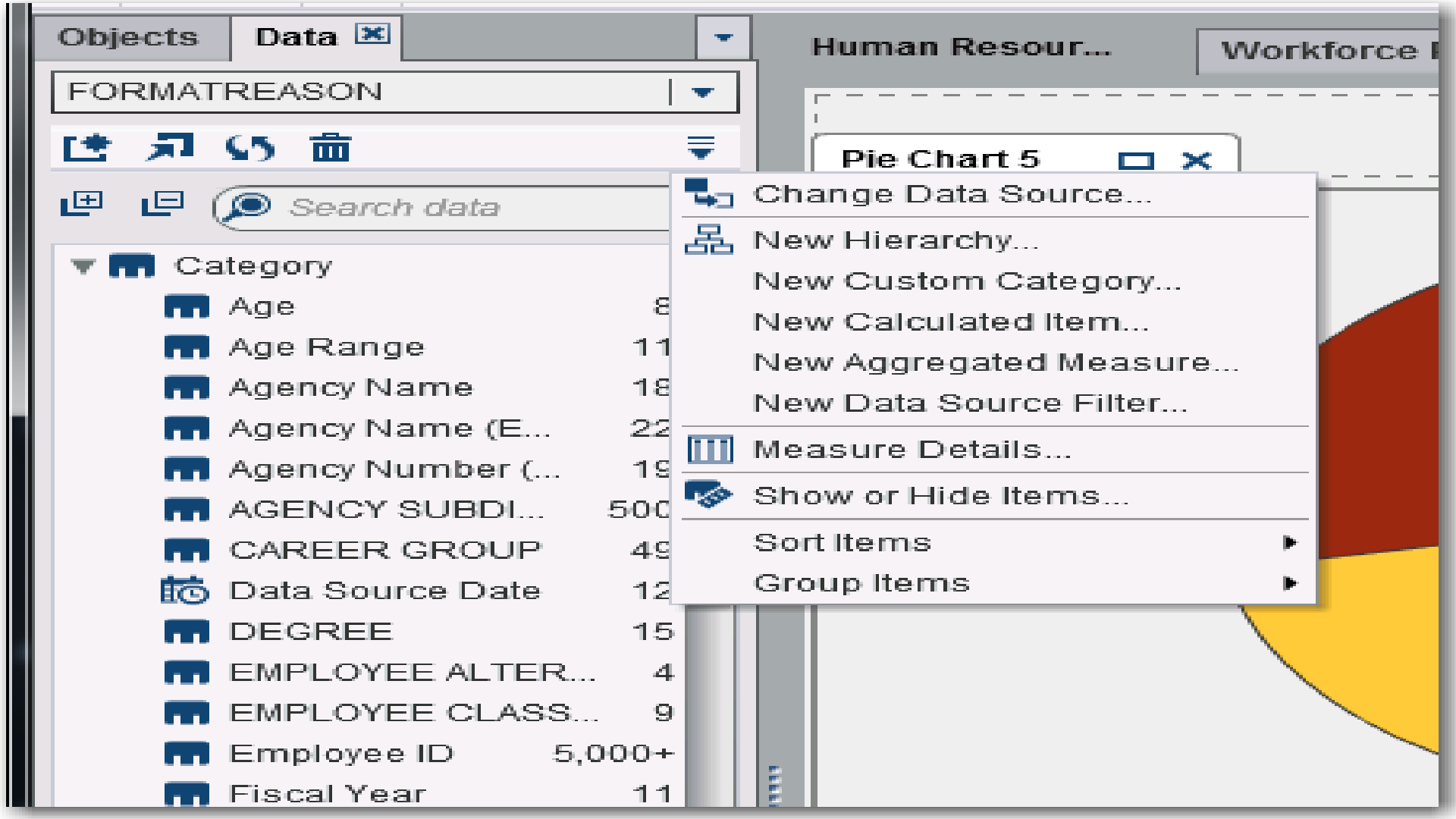
Pie Chart 5

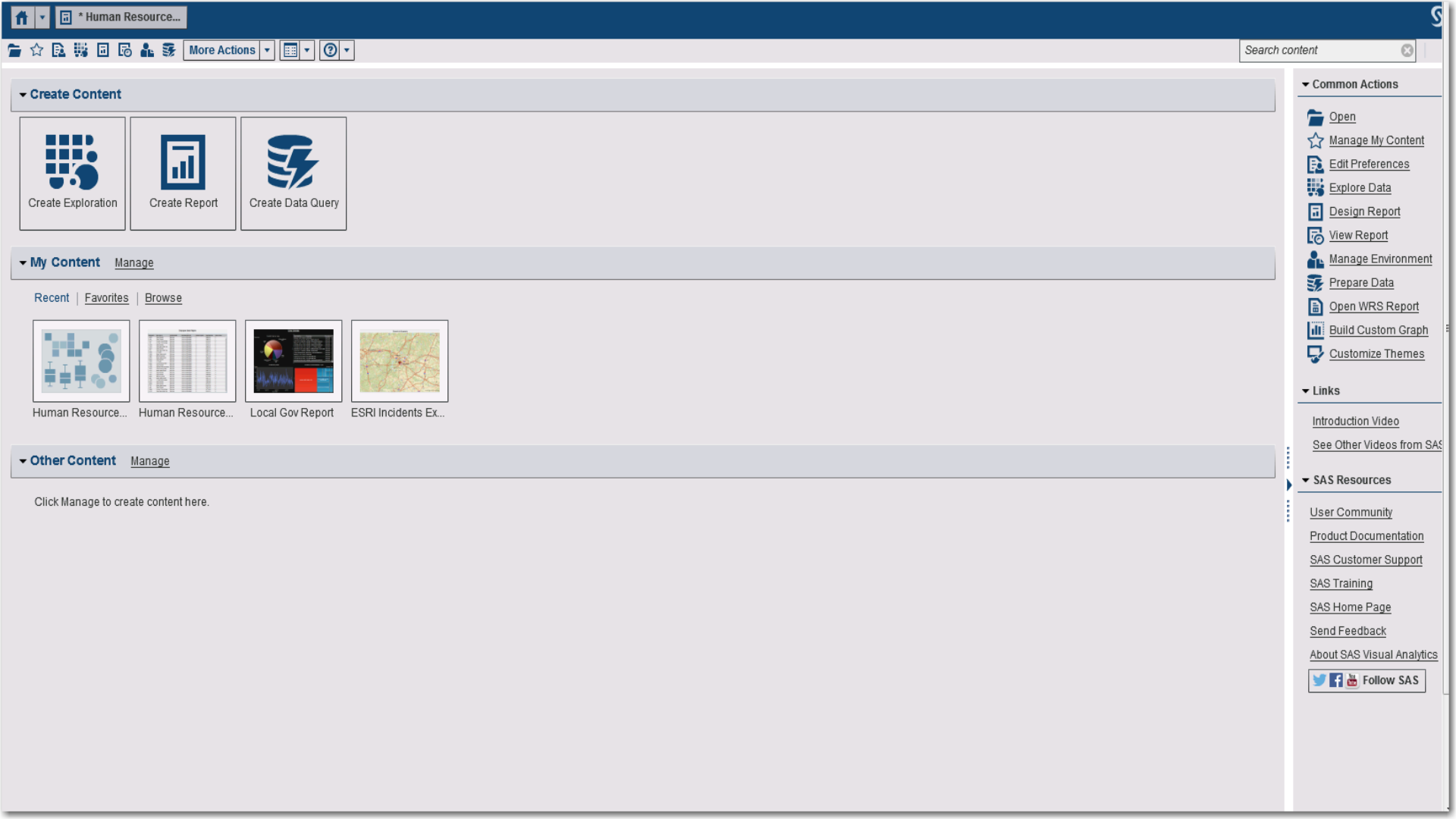
New | Interactions View

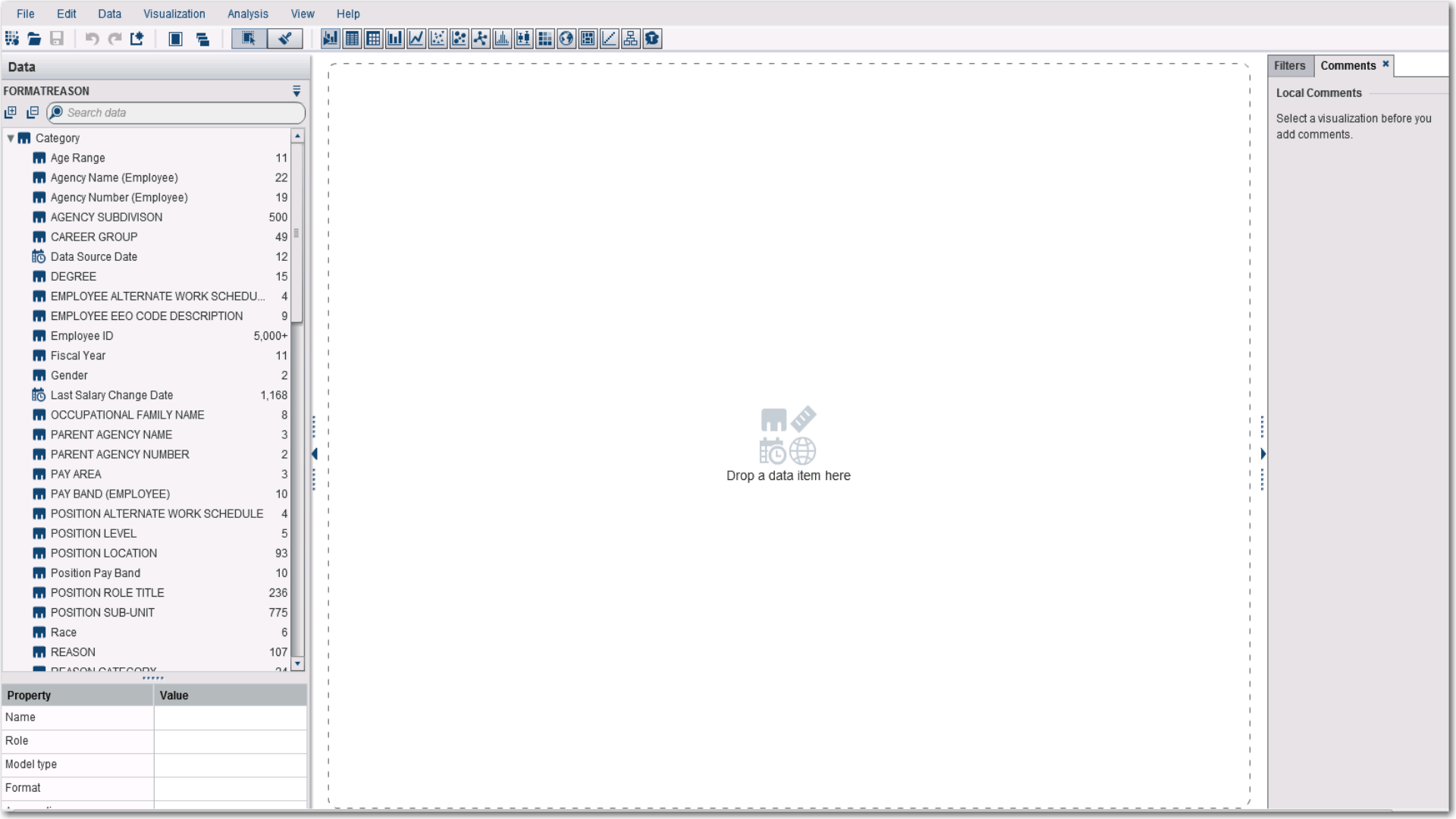
Interactions for Pie Chart 5

Filters Bar Chart 7

Show derived interactions | Close


Objects
Data
FORMATREASON
Search data
Category
Age
Age Range
Agency Name
Agency Name (E...
Agency Number (...
AGENCY SUBDI...
CAREER GROUP
Data Source Date
DEGREE
EMPLOYEE ALTER...
EMPLOYEE CLASS...
Employee ID
Fiscal Year
5,000+
Human Resour...
Workforce
Pie Chart 5
Change Data Source...
New Hierarchy...
New Custom Category...
New Calculated Item...
New Aggregated Measure...
New Data Source Filter...
Measure Details...
Show or Hide Items...
Sort Items
Group Items


* Human Resource...
More Actions
Search content
Create Content
Create Exploration
Create Report
Create Data Query
My Content
Manage
Recent
Favorites
Browse
Human Resource...
Human Resource...
Local Gov Report
ESRI Incidents Ex...
Other Content
Manage
Click Manage to create content here.
Common Actions
Open
Manage My Content
Edit Preferences
Explore Data
Design Report
View Report
Manage Environment
Prepare Data
Open WRS Report
Build Custom Graph
Customize Themes
Links
Introduction Video
See Other Videos from SAS
SAS Resources
User Community
Product Documentation
SAS Customer Support
SAS Training
SAS Home Page
Send Feedback
About SAS Visual Analytics
Follow SAS


File
Edit
Data
Visualization
Analysis
View
Help
Data
FORMATREASON
Search data
Category
Age Range 11
Agency Name (Employee) 22
Agency Number (Employee) 19
AGENCY SUBDIVISON 500
CAREER GROUP 49
Data Source Date 12
DEGREE 15
EMPLOYEE ALTERNATE WORK SCHEDU... 4
EMPLOYEE EEO CODE DESCRIPTION 9
Employee ID 5,000+
Fiscal Year 11
Gender 2
Last Salary Change Date 1,168
OCCUPATIONAL FAMILY NAME 8
PARENT AGENCY NAME 3
PARENT AGENCY NUMBER 2
PAY AREA 3
PAY BAND (EMPLOYEE) 10
POSITION ALTERNATE WORK SCHEDULE 4
POSITION LEVEL 5
POSITION LOCATION 93
Position Pay Band 10
POSITION ROLE TITLE 236
POSITION SUB-UNIT 775
Race 6
REASON 107
Property
Value
Name
Role
Model type
Format
Drop a data item here
Filters
Comments
Local Comments
Select a visualization before you add comments.

File Edit Data Visualization Analysis View Help

Data

FORMATREASON

Search data

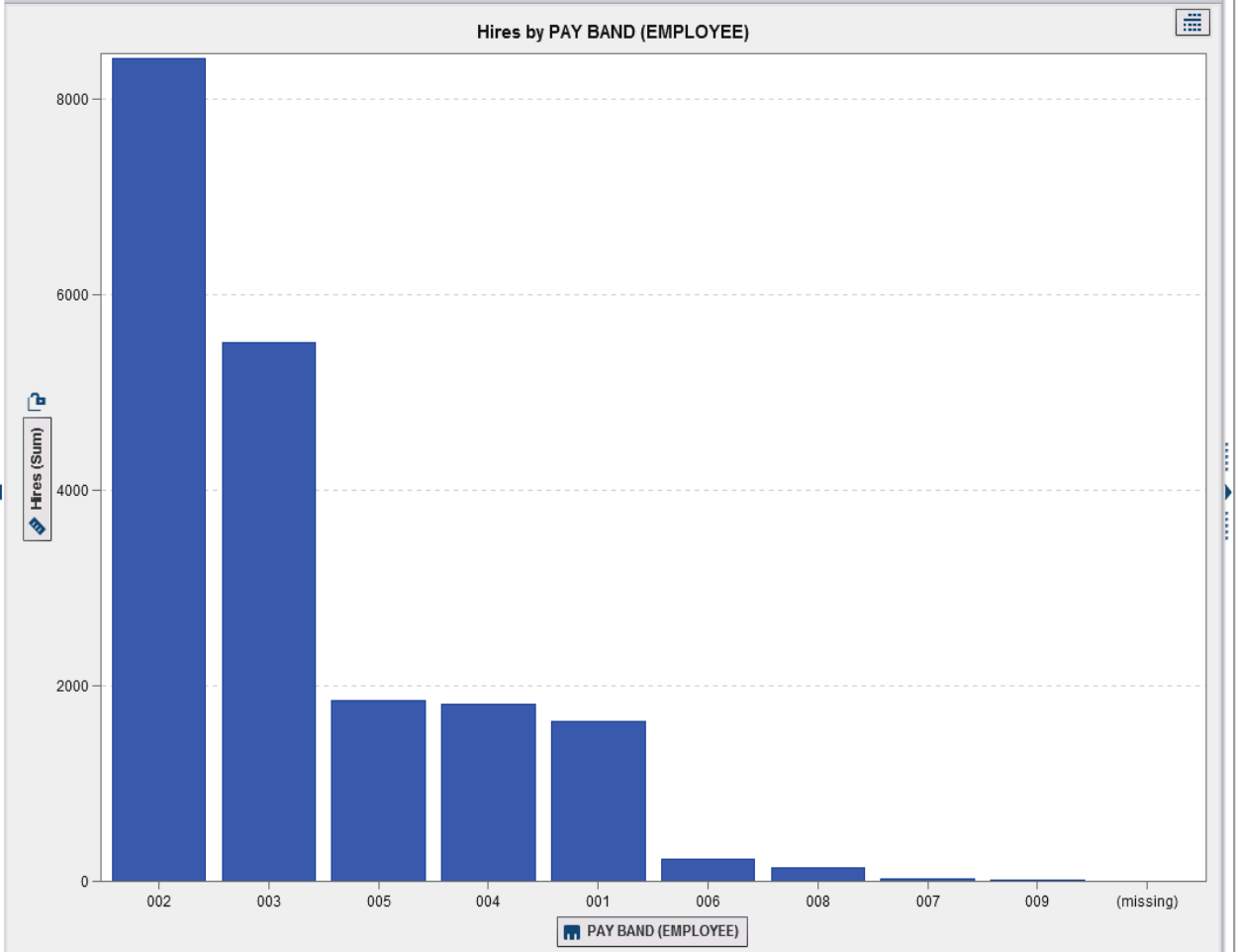
- SECRETARY NAME 5
- SECRETARY NUMBER 5
- SOC CODE 617
- SOC DESCRIPTION 820
- State Begin Date 2,626
- SUBDIVISION 508
- TableFilter 2
- Total Yrs. of Service Range 8
- Transition Effective Date 151
- Veteran Status 2
- When 50 Years Old with 30+ Years of Ser... 44
- When 65 Years Old with 5+ Years of Servi... 59
- When Eligible for Unreduced Benefits 44

Measure

- AGE
- AMOUNT OF CASH AWARD/BONUS
- ANNUAL LEAVE HOURS ADVANCED
- ANNUAL LEAVE HOURS GRANTED
- count
- Disability Leave
- Disciplinary Actions (non-separation)
- Disciplinary Actions (separation)
- Hires
- In-Band Adjustments
- New Positions
- NON-STATE SALARY
- PAYMENT AMOUNT/BONUS
- PERCENT OF AGENCY

Property	Value
Name	
Role	
Model type	
Format	

Visualization 6



Roles | Filt... | Ra... | Pr...

Automatic Chart

Use Bar Chart

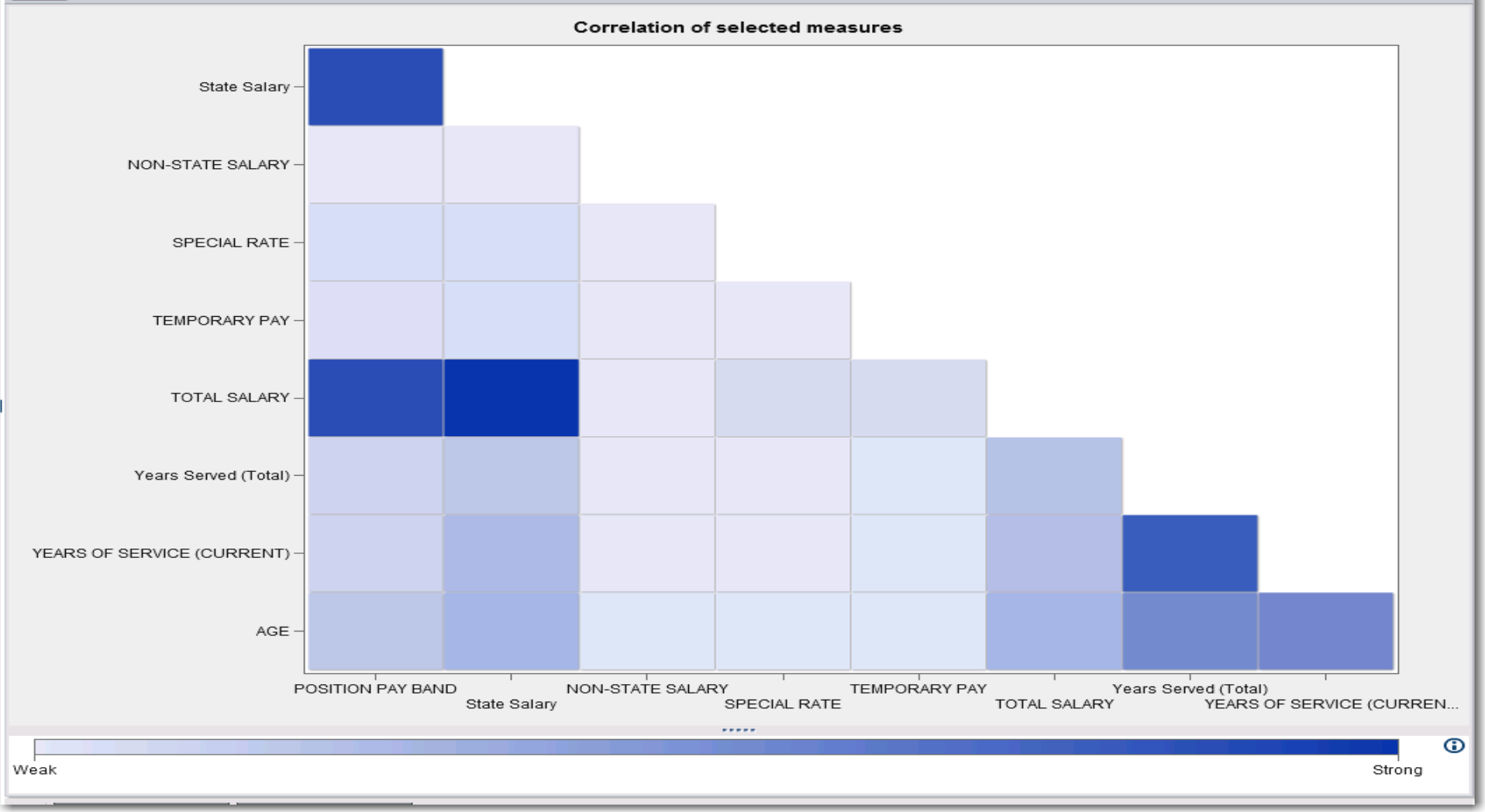
Categories

PAY BAND (EMPLOYEE)

Measures

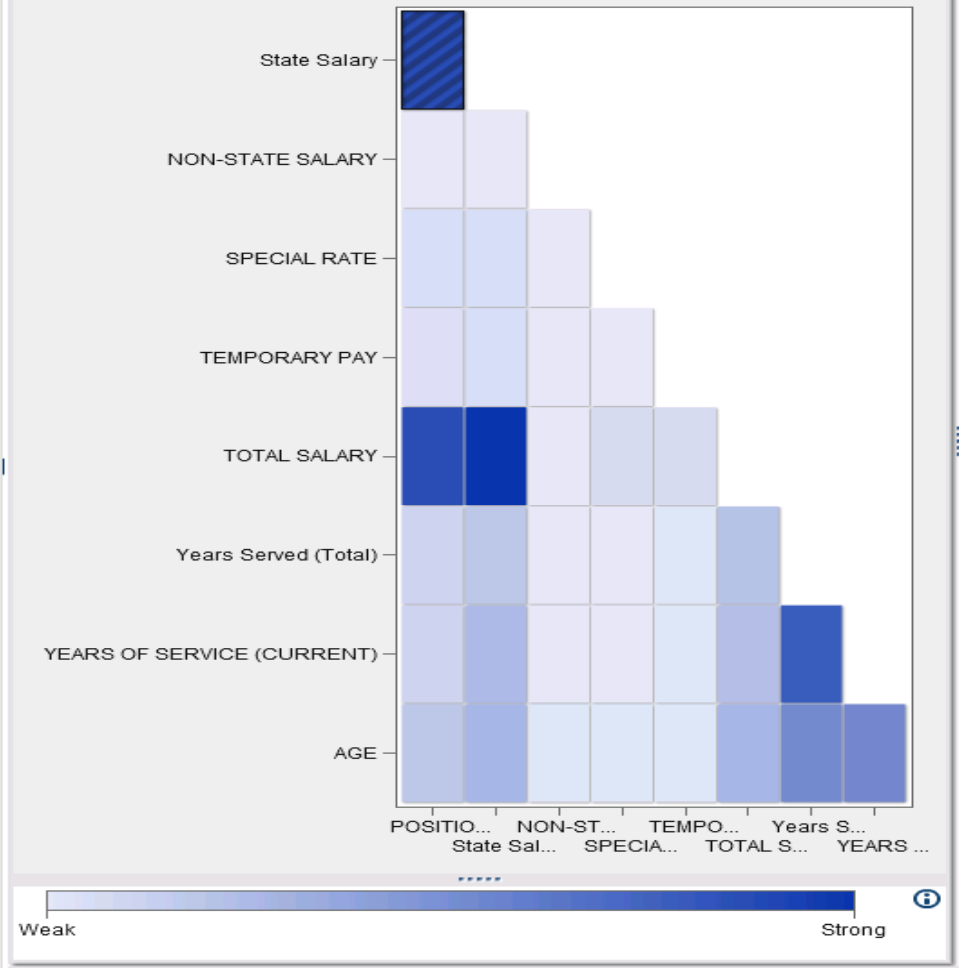
Hires

Visualization 5



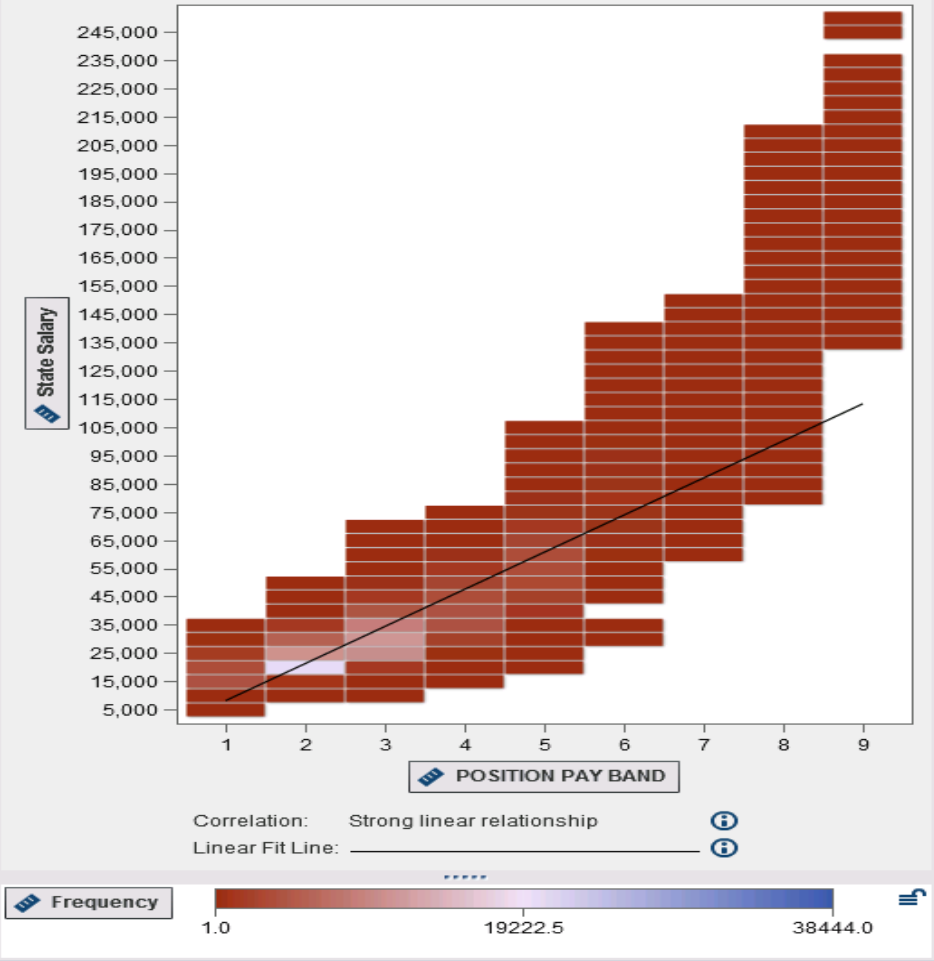
Visualization 5

Correlation of selected measures



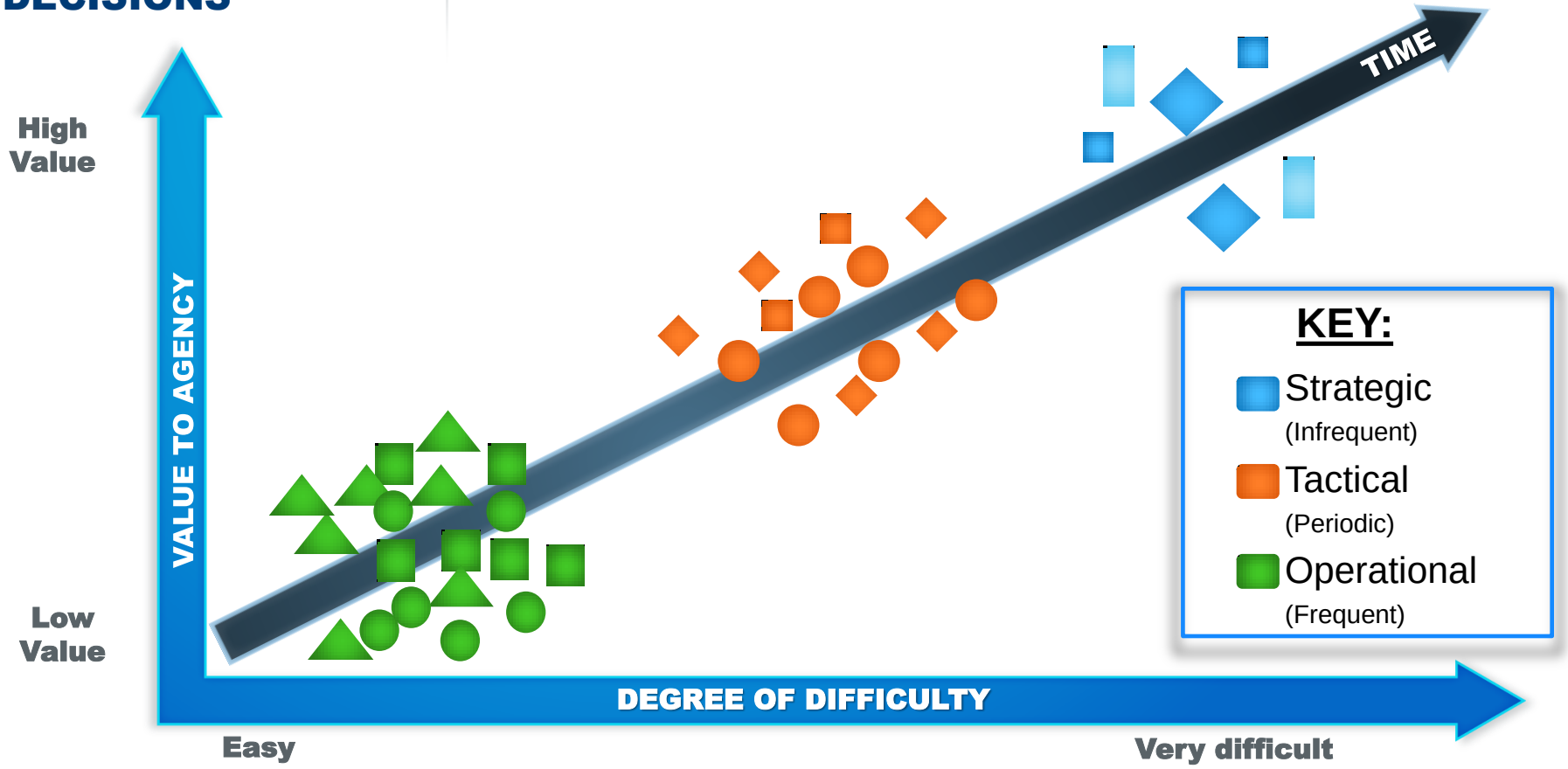
Visualization 6

Frequency of POSITION PAY BAND and State Salary



Visualization 1 | Visualization 4

TYPES OF DECISIONS



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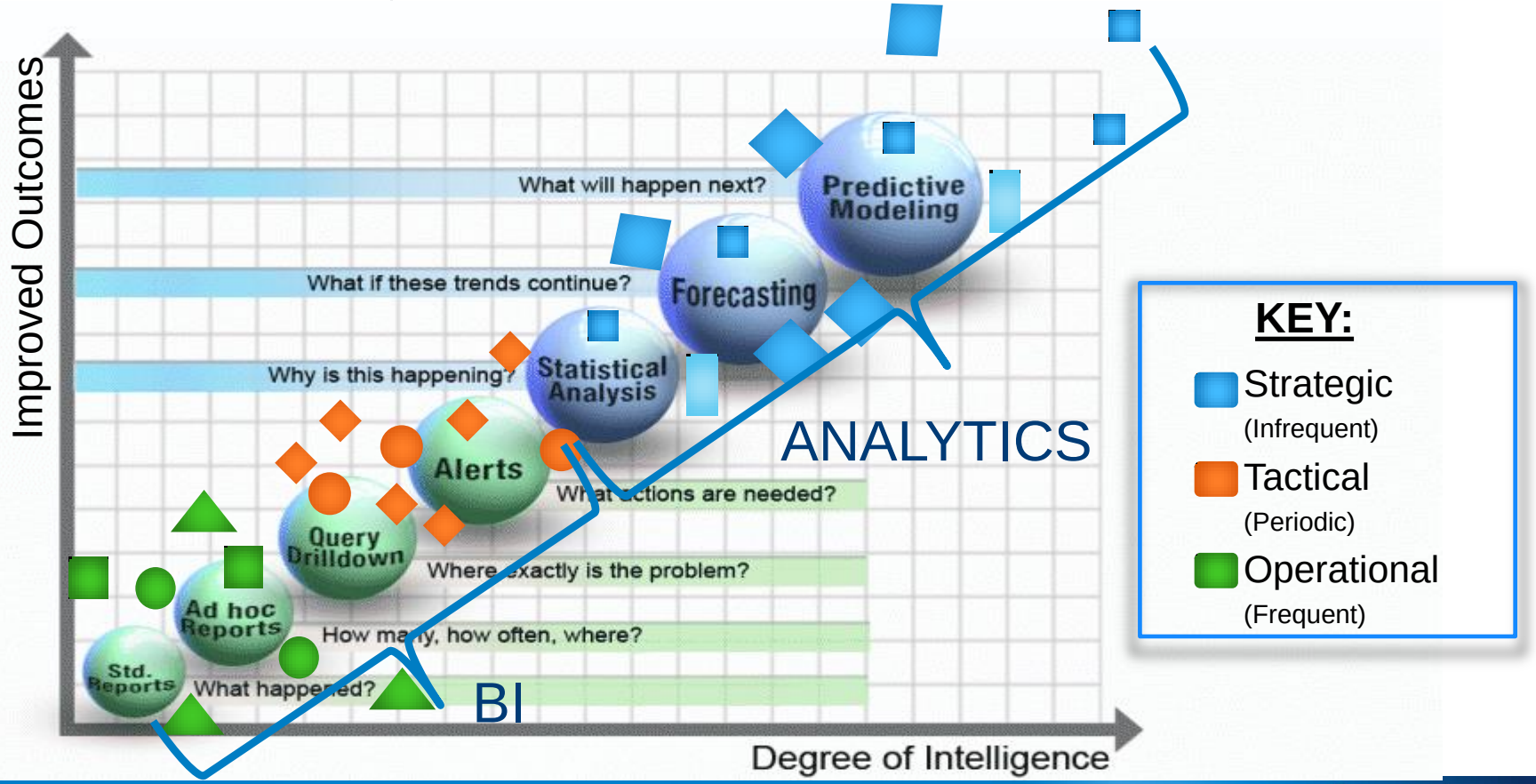
TYPES OF DECISIONS

THE DIFFERENCE BETWEEN BI AND ANALYTICS



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sas THE POWER TO KNOW.