



Justice Data Warehousing and Court Business Intelligence

Technical Introduction

It begins with a Data Management Foundation

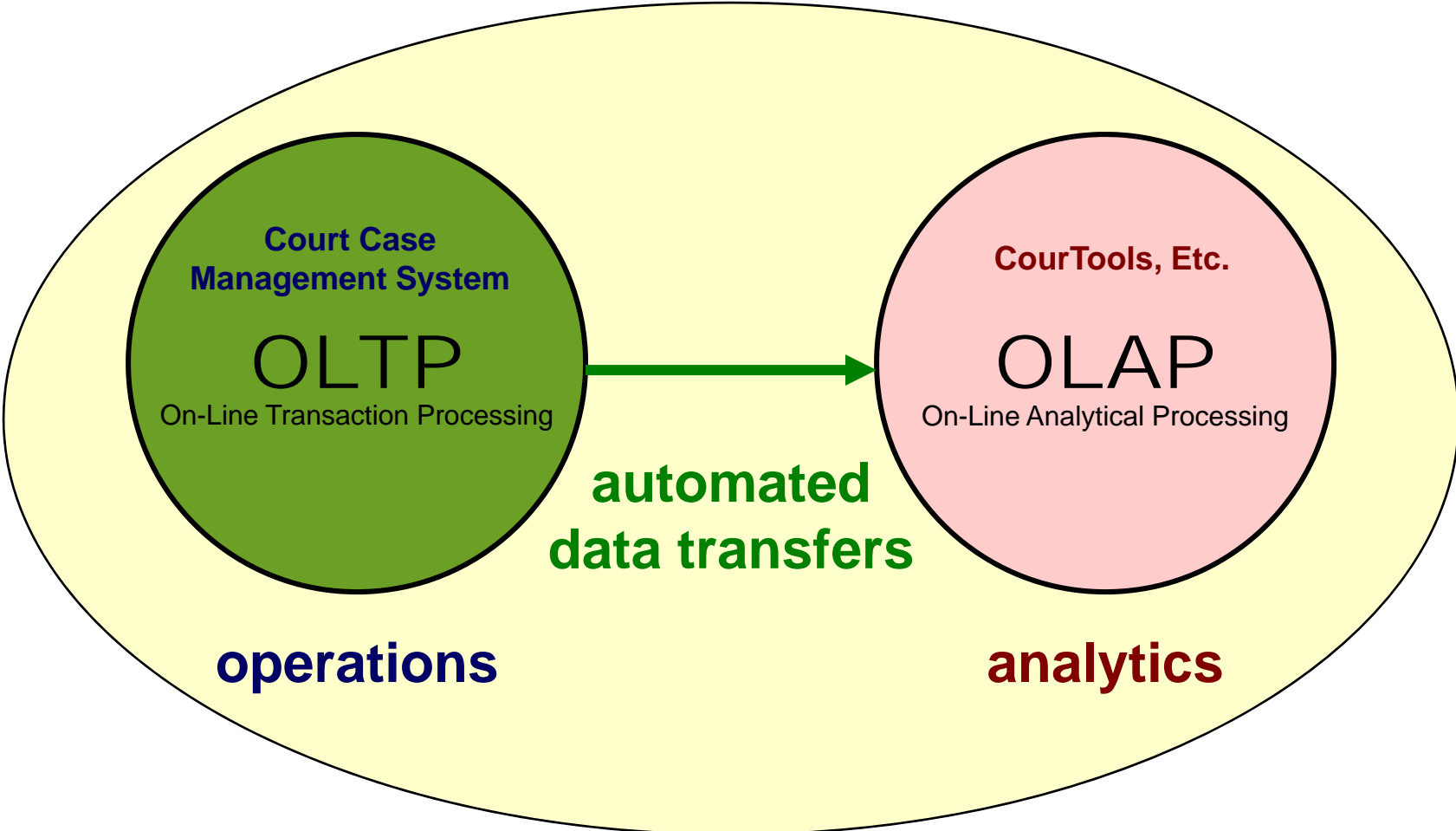
Court Business Intelligence is supported by a Data Warehousing environment developed specifically for activity reporting, trending, and monitoring.

OLTP (transaction processing) vs. OLAP (analytical processing)

Operational Systems are optimized for Data Collection

Business Intelligence Systems are optimized for Data Consumption

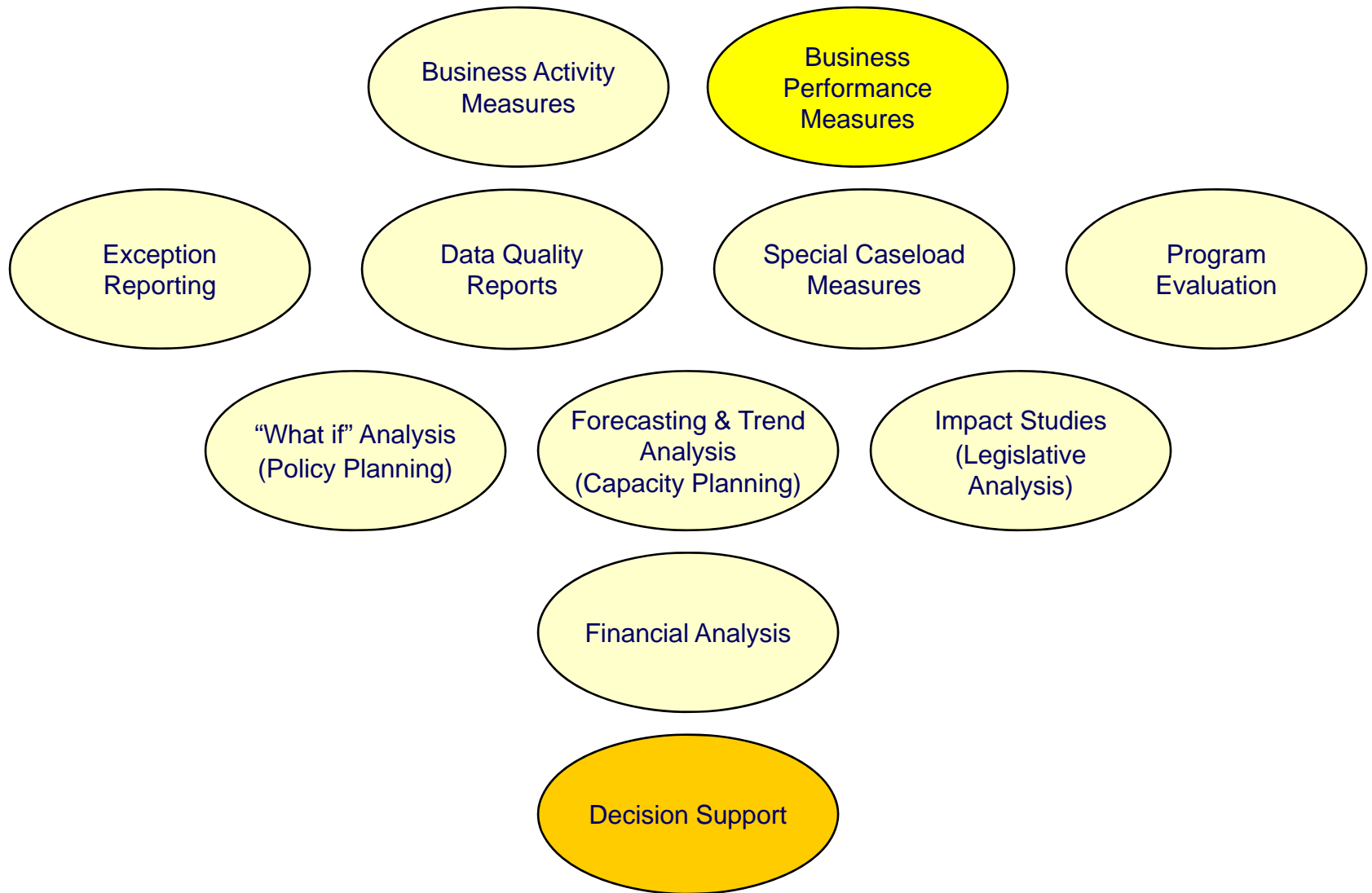
Conceptual Model



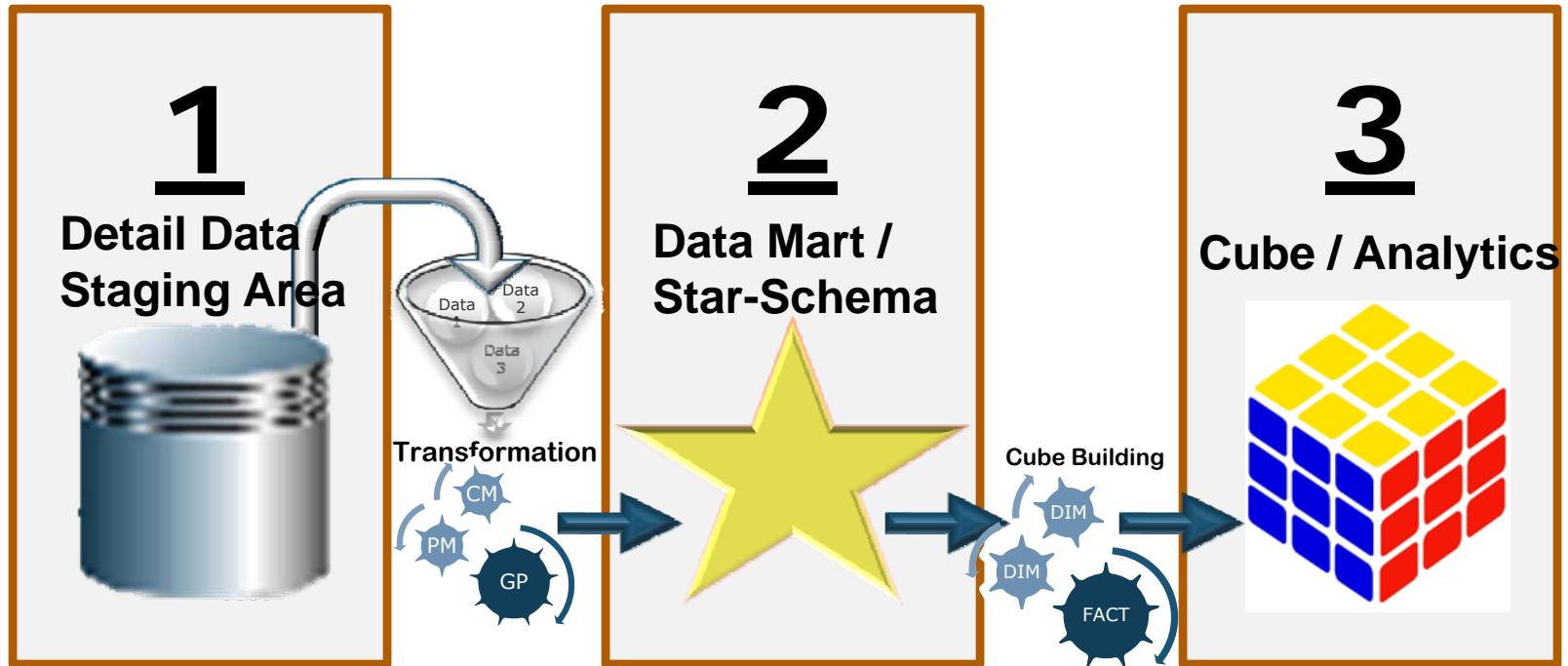
The Court/Justice Data Warehouse

- **Specialized data structures are developed that focus on key business measures or key performance indicators (KPI's)**
- **These data structures are developed using a different set of architectural constructs and design guidelines than transaction processing systems.**
- **Data is extracted from Justice Systems, transformed, and loaded into Court Data Warehouse systems optimized for Analytics/Reports.**

B.I. Domain Model



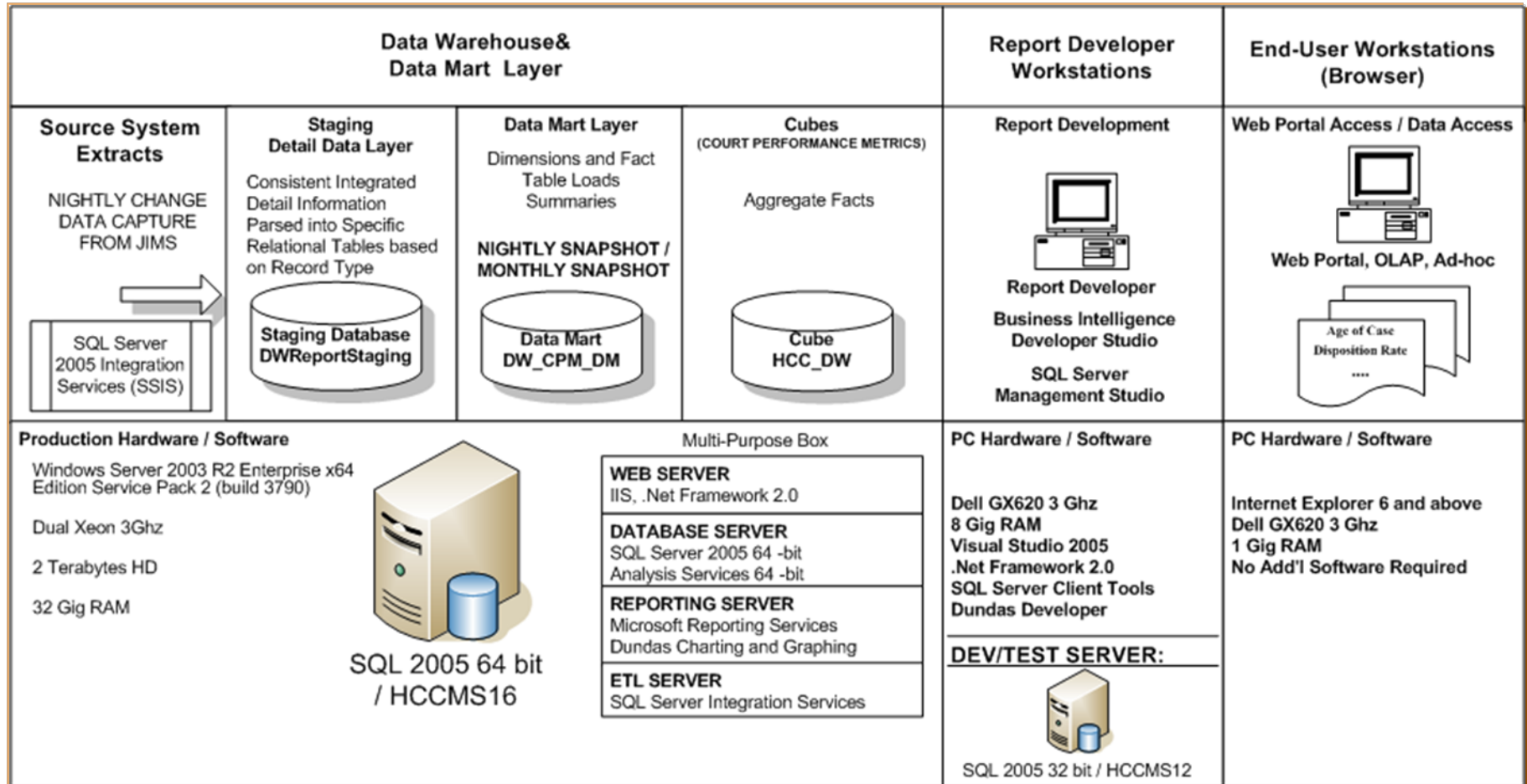
Data Availability



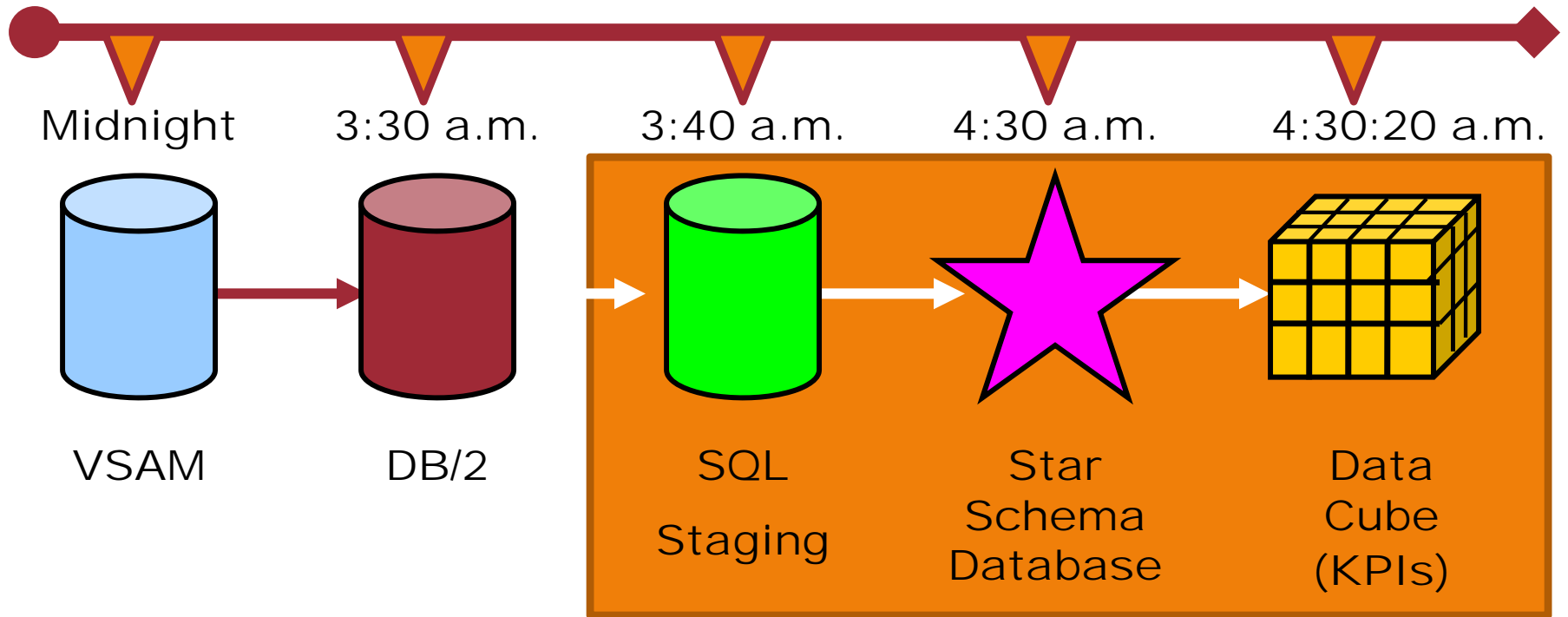
Technical Overview

TECHNOLOGY:

SQL Server 2005
Reporting Services
Analysis Services
Web Portal written in .Net



ETL Process Timeline



1

**Detail Data /
Staging Area**



- **Closely resembles data sources**
- **Detailed case level data (Case Master, Person Master, Code Tables)**
- **Data is extracted and loaded from Source Systems on a NIGHTLY BASIS**
- **Minimal transformations of data**
- **Persistent data store that contains all current data**

Most Common Types of Users

- **Data Analysts**
- **Researchers**



Staging Area (Detail Layer)

Server: HCCMS16

Database Name: DWReportStaging

CRIMINAL VSAM

Case Master	Person Master	General Purpose Codes	Fee Master
AA, AD, AN, JJ, PA0-9, PB0, PB1, SJ, SS, ST0, ST1, SU, YB0, YB1, YD0, YD1, YG, YH0, YH1, YJ0, YJ1, YK0, YK1, YM, Y00, Y01, YP, YT	AA, AC, AD, IZ0- 3, JZ, JZA, JZI, JZJ, JZK, JZP, JZR, JZS0, JZS1, JZT, JZV, XP, YJ0, YJ1	GP01, GP03, GP05, GP06, GP07, GP09, GP0, GP12, GP13, GP14, GP20, GP23, GP24, GP26, GP29, GP31, GP50	AA, ASC, PH
SQL Table Names: stg_cm_XX	SQL Table Names: stg_pm_XX	SQL Table Names: stgout_gp/NN	

DISTRICT AND COUNTY COURTS



Staging Area (Detail Layer)

Server: HCCMS16
Database Name: M204

PRETRIAL/PIN, CIVIL, FAMILY Model 204

Civil / Family	Pretrial	Bond	Juvenile
Case Summary Case Status History Dispositions Post Judgments Civil Activities Civil Parties Civil Docket	Pretrial Interview	Bond	Juvenile Service Juvenile Detention Juvenile Name Juvenile Dispositions
SQL Table Names: tbl_jdXXX_XX	SQL Table Names: tbl_jdpin_XX	SQL Table Names: tbl_bnd_XX	SQL Table Names: tbl_jdjuv_XX

2

Data Mart / Star-Schema



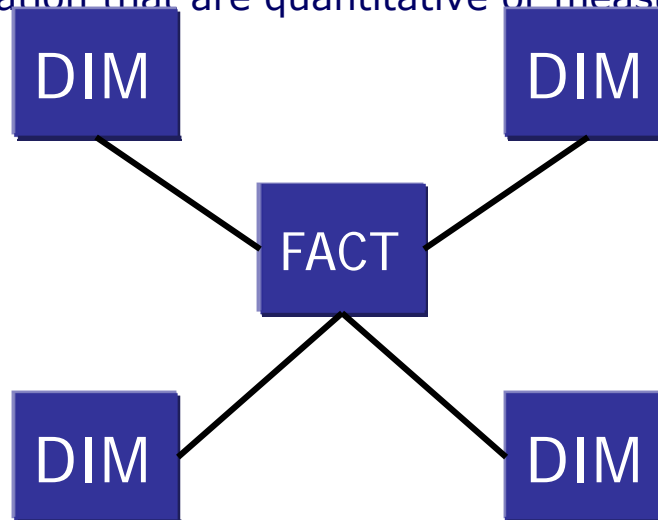
- **Multi-dimensional data (star-schema)**
- **Dimensions (Things / Code Descriptors / Characteristics of Events)**
- **Facts (Business Measures / Events)**
- **Each “star” has a specific business purpose**
- **Historical representation since October 2006**
- **No prior Facts before October 2006 (currently)**
- **Monthly snapshots of KPI’s and accumulates current month totals each night**

Most Common Types of Users

- **Data Analysts**
- **Researchers**
- **Court Administrators / Coordinators**

Star Schema

- ⊕ Organizes information in ways decision makers think about the information
 - ⊕ Called Star Schema or Multi-Dimensional Modeling
 - ⊕ Organizes information into two different things
 - ⊕ Dimensions (DIM)
 - ⊕ Dimension tables contain the business descriptions of how to 'slice and dice' the business performance measure information.
 - ⊕ Facts
 - ⊕ Business measures that reflect activity, events, or transactions in the organization that are quantitative or measurable.



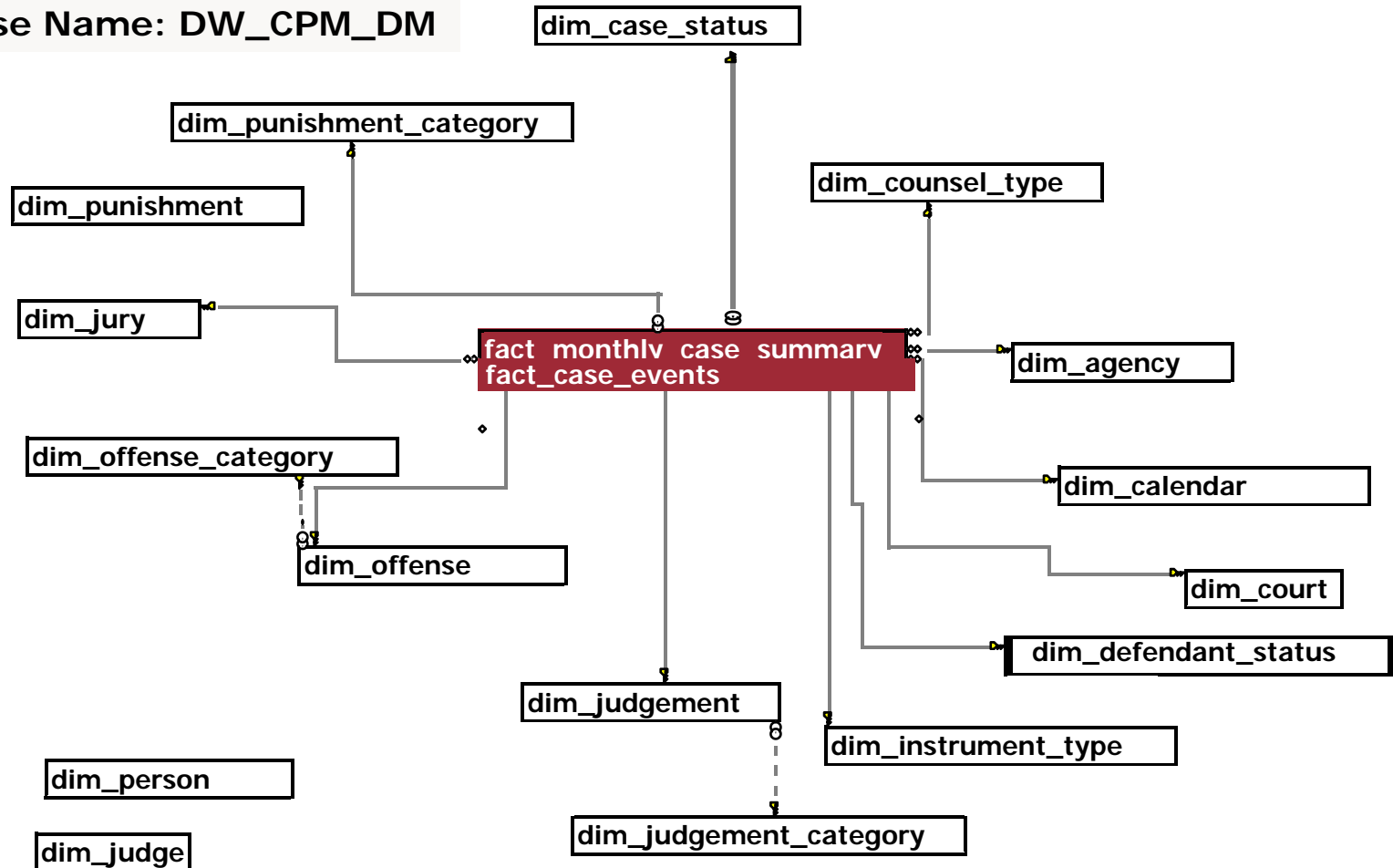
**** Timeline for KPI's/Facts start October 2006**



Court Data Mart (Case Master Star)

Server: HCCMS16

Database Name: DW_CPM_DM





Court Data Mart (Case Master Star)

• Dimensions

- Case
- Instrument Type
- Court
- Court Division
- Counsel Type
- Offense Category – Offense
- Case Status
- Judgment Category / Judgment
- Punishment Category / Punishment
- Counsel Type
- Defendant Status

• Facts

- Fact Monthly Summary (court level)
 - Active Cases Pending
 - Inactive Cases Pending
 - Number Incoming
 - Number Outgoing
 - Time to Disp (0-30;31-60; etc...)
 - Age of Cases (0-30;31-60; etc...)
 - Number of Settings
 - Number of Appointed Attorneys
 - Number of Hired Attorneys
 - Motions to Revoke Probation
 - Shock Probation
- Fact Case Events (case level)
 - Log and timestamp of changes in case
 - Instrument Type, Court, Court Division, Case Status, Agency, Punishment, Counsel Type

**** Timeline for KPI's/Facts start October 2006**



Court Data Mart (Data Structures)

Staging Area

Case
Master
Record
Types

Person
Master
Record
Types

General
Purpose
Codes

Data Mart

Fact Tables Contain references to Dimension Primary Keys

Fact Case Events (Case Level)

Key1 Key3 Key5 Key7 Key9 Fact1 Fact2 Fact3 Fact4 Fact5

Fact Monthly Case Summary (Court Level)

Key2 Key3 Key4 Key5 Fact1 Fact2 Fact3 Fact4 Fact5

Case Dimension (Dim_Case) – HYBRID DIM

Key1 Dim1 Dim2 Dim3 Dim4 Case # Fact Fact Fact Fact

Case Level Facts
inside the DIM

Dimensions Contain generated Primary Keys (surrogate)

Other Dimensions (Court, Offense, etc...)

Key2 Dim1 Dim2 Dim3 Dim4 Key5 Dim1 Dim2 Dim3 Dim4

Key3 Dim1 Dim2 Dim3 Dim4 Key6 Dim1 Dim2 Dim3 Dim4

Key4 Dim1 Dim2 Dim3 Dim4 Key7 Dim1 Dim2 Dim3 Dim4

Monthly Snapshot Process

m1 Key1 Key2 Key3 Key4 Key5 Fact1 Fact2 Fact3 Fact4 Fact5

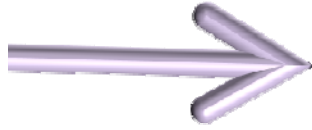
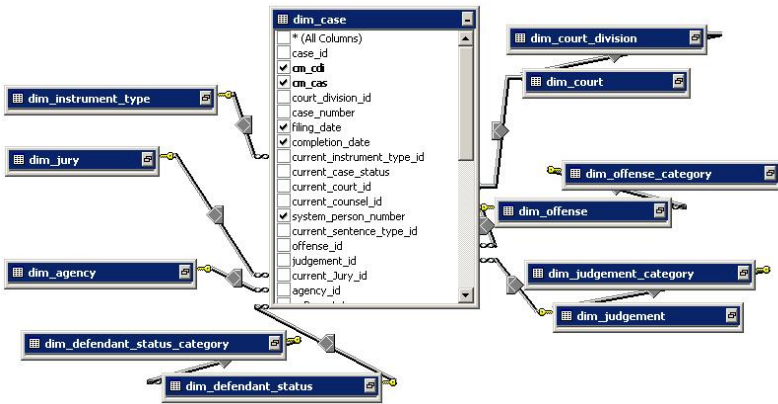
m2 Key1 Key3 Key5 Key7 Key9 Fact1 Fact2 Fact3 Fact4 Fact5

Current Key2 Key4 Key6 Key8 Key9 Fact1 Fact2 Fact3 Fact4 Fact5

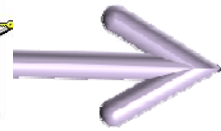




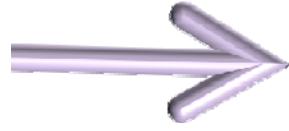
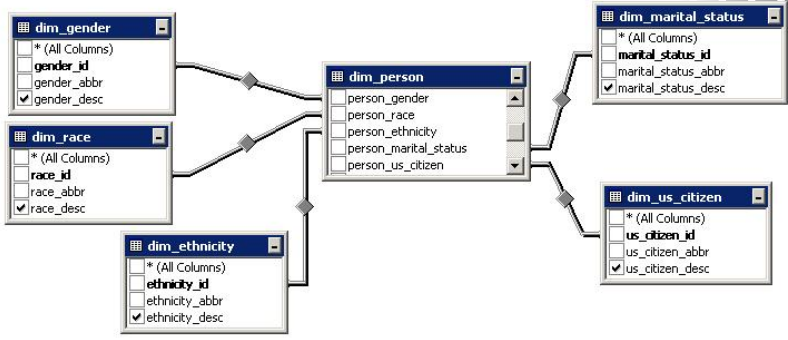
Court Data Mart (Views)



View Case Information



View Case Person



View Person Information

3

Cube / Analytics



- **Summarization of facts at Court Level**
- **Created from the Data Mart**
- **Allows for user to easily build reports, charts, graphs using Reporting Services**
- **Exposes specific dimensions such as Court Division, Offense Categories, etc...**
- **Accessible from any OLAP Browser compatible with XMLA (ie. Excel Pivot Tables)**

Most Common Types of Users

- **Court Management**
- **Judges**
- **Court Coordinators**
- **Court Staff**

**** Timeline for KPI's/Facts start October 2006**



Court Performance Cube

Server: HCCMS16
Database Name: HCC_DW
Cube Name: DW CPM DM

Dimensions

Agency
Calendar
Counsel Type
Court
Court Division
Defendant Status
Judgement
Jury
Offense
Punishment Category

Agency
Calendar
Counsel Type
Court
Court Division
Defendant Status
Judgement
Jury
Offense
Punishment Category

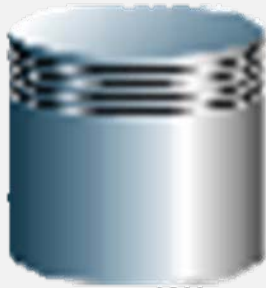
Active Cases Pending
Inactive Cases Pending
Number Incoming
Number Outgoing
Time to Disposition
Age of Case
Number of Settings
Number of Appointed
Number of Hired
Motions
Clearance Rate

Business
Measures /
Facts



Data Access

Detail Data / Staging Area



SQL SERVER:
HCCMS16
DWReportStaging

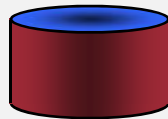
ODBC Access via SAS, MS Access, Web Focus, or directly using Reporting Services

Tabular Reports Data Mining

Year	2004	2005	2006	2007	2008
Net Revenues	2,025	2,229	2,280	2,223	2,225
Net Income	205	233	252	215	225
Earnings per share	2.12	2.34	2.52	2.12	2.27
Return on total assets	10%	10%	11%	10%	10%
Costs & all investments	202	197	197	200	200
Good Assets	200	200	200	200	200
Investment Equity	200	200	200	200	200

RESEARCH

Data Extracts
SAS Extracts



Data Mart / Star-Schema



SQL SERVER:
HCCMS16
DW_CPM_DM

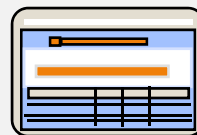
ODBC, Query Tool, Reporting Services, MS Access, Excel, Web Focus

Report Builder

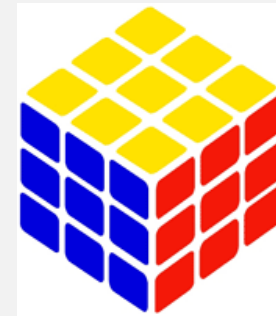


FACTS

Ad hoc Query



Cube / Analytics



ANALYSIS SERVICES:
HCCMS16
HCC_DW

Court Intelligence Web Site
<http://hccms12/dw>
ODBC or directly using Reporting Services

Portal Reports, Charts, Graphs



Slicing and Dicing / Reports, Olap Browser

Data Access / Reports (Reports Sampling)

- Key Performance Indicators (Court Dashboards)

For the Courts and Court Management Office

- Active Cases Pending
- Time to Disposition
- Age of Caseload
- Clearance Rate
- Settings

- Operational Reports

- Caseload Explorer
- Case Summary
- Activity Summaries
- Daily Dockets
- Disposed Cases by Offense
- Judgments

- Analytic Features

- Trends, Charts, Gauges, Alerts
- Drill-Downs, Slicing & Dicing



Data Access / Reports (Court Intelligence Web)

Server: HCCMS16

URL: <http://hccms16/dw>



Court Business Activity Measures
and Key Performance Indicators

Search Harris County
 Search

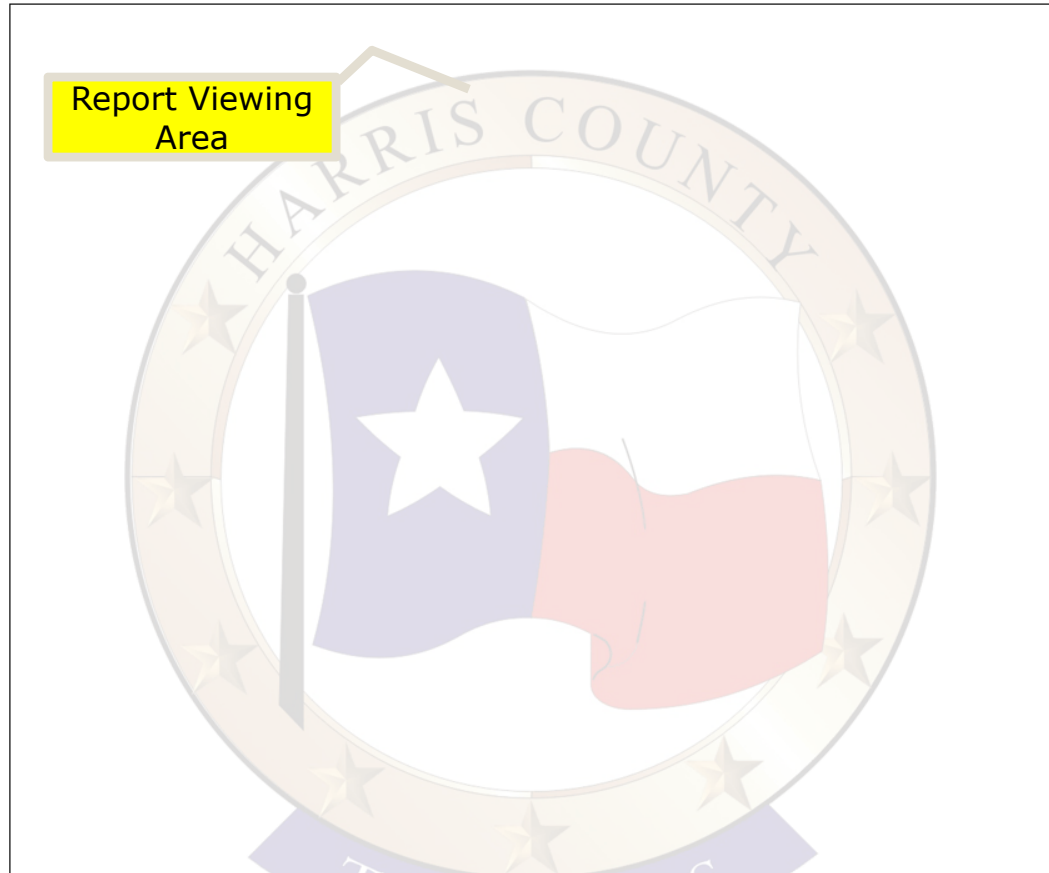
Navigation
Tree

Court Intelligence

- ▼ Research
 - ▶ StageInfo
 - ▶ RecordCounts
 - ▶ Query Case Dimension
 - ▶ Model 204 Tables/Record Types
 - ▶ Task Response System
- ▼ Reports
 - ▶ Active Cases Pending
 - ▶ Active Cases Pending (Trend)
 - ▶ Activity Summary For Judgments
 - ▶ Age of Caseload
 - ▶ Case Summary
 - ▶ Clearance Rate (Last Month)
 - ▶ Clearance Rate (Trend)
 - ▶ Court Dashboard
 - ▶ Court Manager Dashboard
 - ▶ DailyDocket
 - ▶ Disposed Cases By Offense Category
 - ▶ Future Settings Calendar
 - ▶ Incoming Cases (Last Month)
 - ▶ Incoming Cases (Trend)
 - ▶ Incoming Cases By Instrument Type
 - ▶ Incoming Cases By Offense Category
 - ▶ KPI Dashboard Thresholds
 - ▶ Settings To Disposition (Last Month)
 - ▶ SettingsTo Disposition (Trend)
 - ▶ Time to Disposition
- ▼ Dimensions
 - ▶ Court
 - ▶ Court Division
 - ▶ Counsel Type

Click Report to
View

Report Viewing
Area

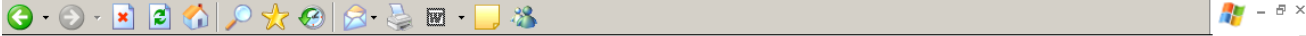



Done

Local intranet



Data Access (Court Intelligence)




Court Business Activity Measures and Key Performance Indicators
Search Harris County Search

Court Intelligence

- ▼ Research
 - ▶ StageInfo
 - ▶ RecordCounts
 - ▶ Query Case Dimension
 - ▶ Model 204 Tables/Record Types
 - ▶ Task Response System
- ▼ Reports
 - ▶ Active Cases Pending
 - ▶ Active Cases Pending (Trend)
 - ▶ Activity Summary For Judgments
 - ▶ Age of Caseload
- ▼ Dimensions
 - ▶ Court
 - ▶ Court Division

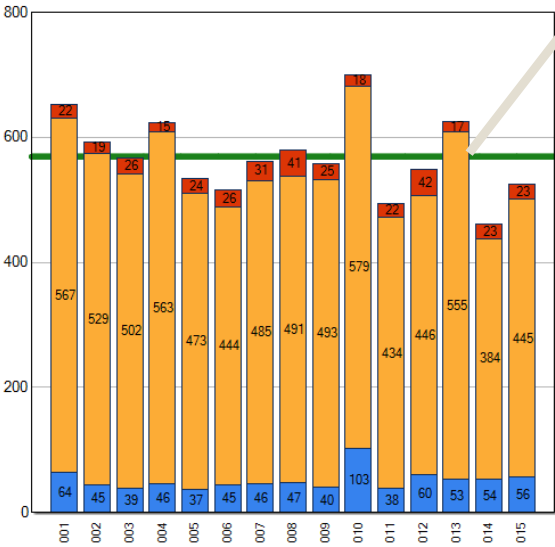
Report Parameters

Division Code: County Criminal Courts
 <Select a Value>
 County Criminal Courts
 District Criminal Courts

View Report

Active Cases Pending
 for the Harris County Criminal Courts at the Start of Business on Wednesday, October 24, 2007

Court	Cases
001	653
002	593
003	567
004	624
005	534
006	515
007	562
008	579
009	558
010	700*
011	494
012	548
013	625
014	461
015	524
Total	8,537
Average	569



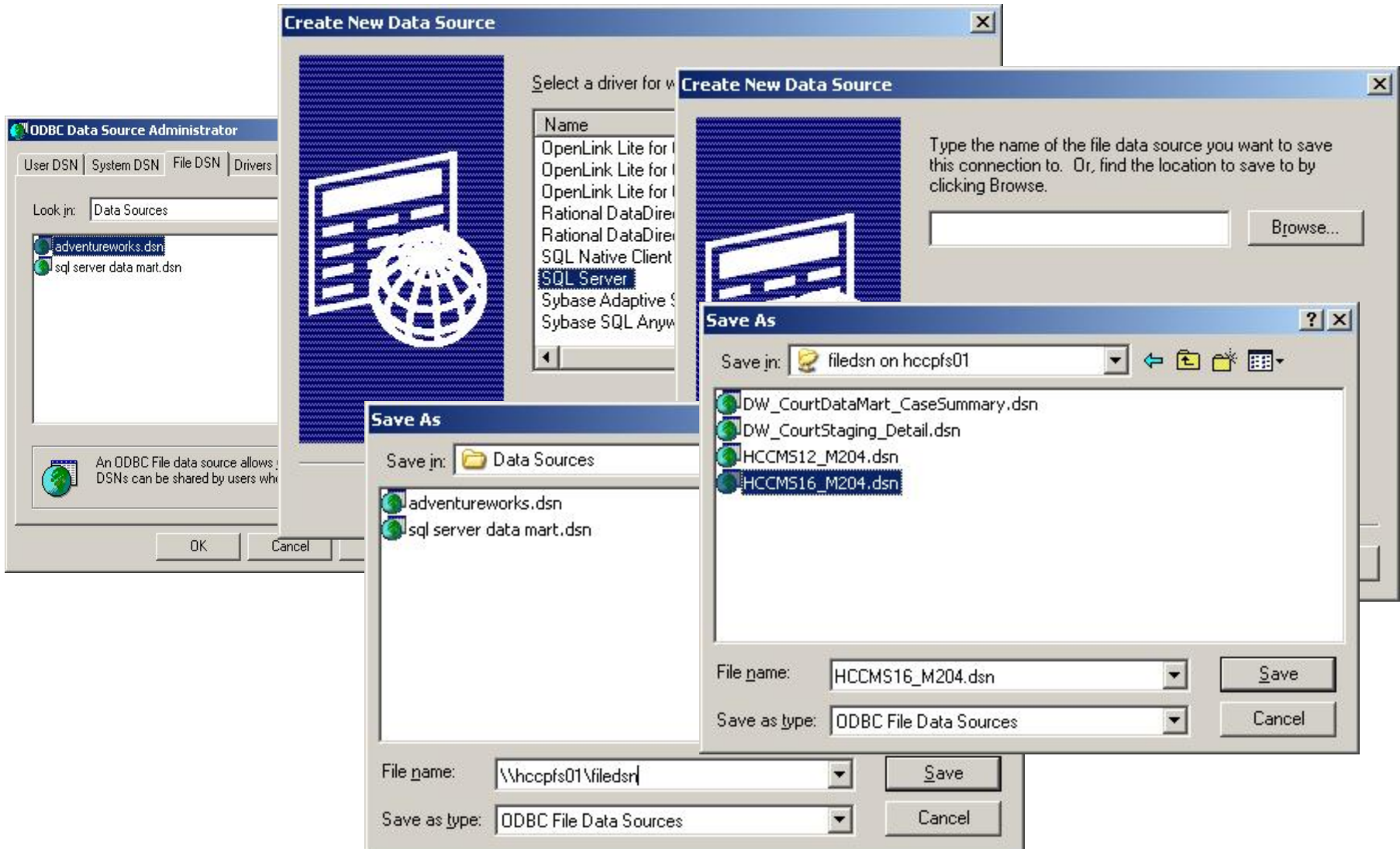
Drill Down From Chart

Tabular view of Data

Local intranet

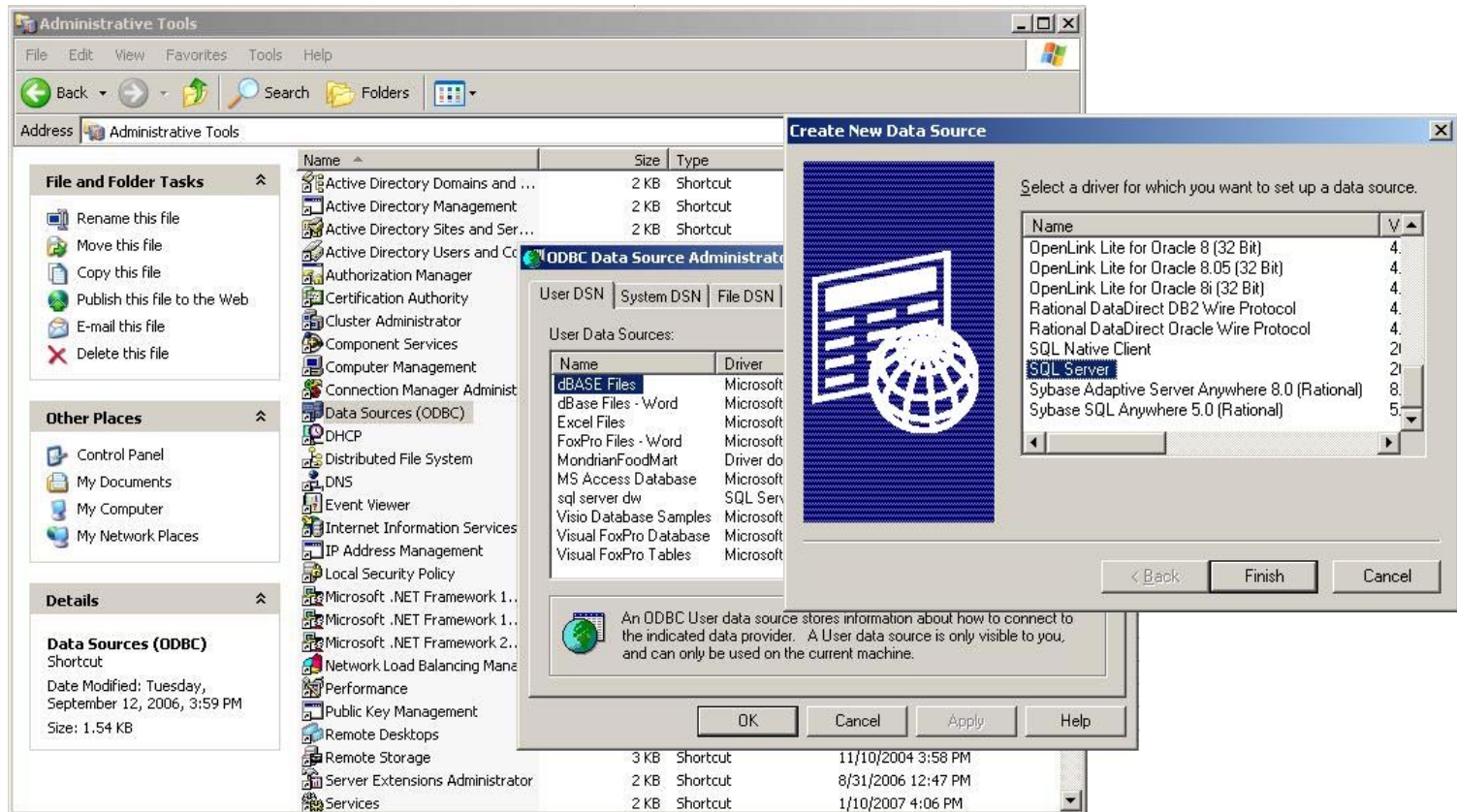
Data Access (ODBC File dsn)

\\hccpfs01\filedsn\



Data Access (ODBC Setup)

Add an ODBC SQL Server Data Source on your desktop



Server: HCCMS16
Change Default Database Name to: DW_CPM_DM

Data Access (from Excel)

2. Return Data to View in MS Query

1. Choose your Data Source

3. Return Data Back to Excel

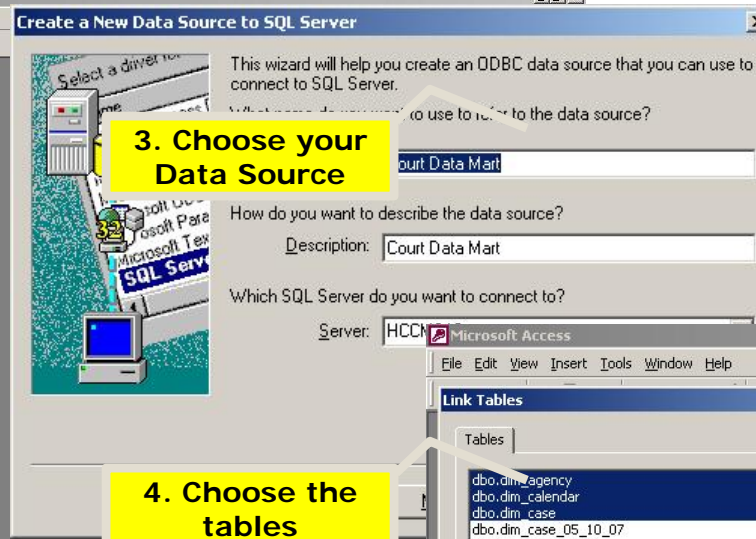
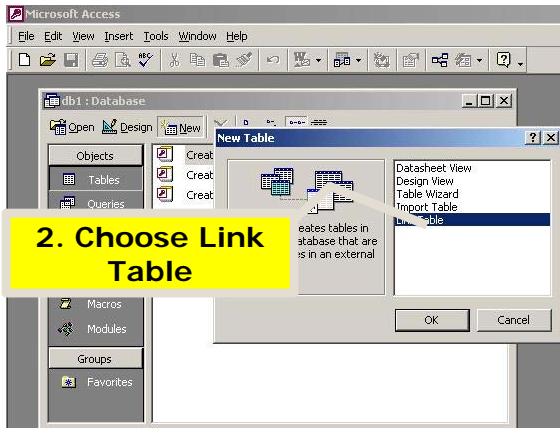
The screenshot displays the Microsoft Excel interface with a spreadsheet containing data in columns A through K and rows 1 through 43. Overlaid on this are several windows from Microsoft Query:

- Choose Data Source:** A dialog box with tabs for 'Databases', 'Queries', and 'OLAP Cubes'. The 'Databases' tab is active, showing a list of data sources including '<New Data Source>', 'Adventureworks', 'Counties.Mart', 'dBase Files - Word', 'Excel Files', 'FoxPro Files - Word', 'M204C3', 'MondrianFoodMart', and 'Microsoft Access'. The 'Use the Query Wizard to create/edit queries' checkbox is checked.
- Microsoft Query (Main):** A window titled 'Query from Counties.Mart' showing a table with columns 'cm_cdi' and 'cm_cas'. The table contains multiple rows of data.
- Microsoft Query (Menu):** A menu with options: 'New...', 'Open...', 'Close', 'Save', 'Save As...', 'Table Definition...', 'Execute SQL...', 'Create OLAP Cube...', 'Cancel and Return to Microsoft Excel', and 'Return Data to Microsoft Excel'. The 'Return Data to Microsoft Excel' option is highlighted.
- SQL Statement:** A small dialog box showing the SQL statement: 'SELECT * FROM Div_CPA_DM dbo.dta_case_det_case where filing_date between '10/01/2007' and '10/05/2007''.

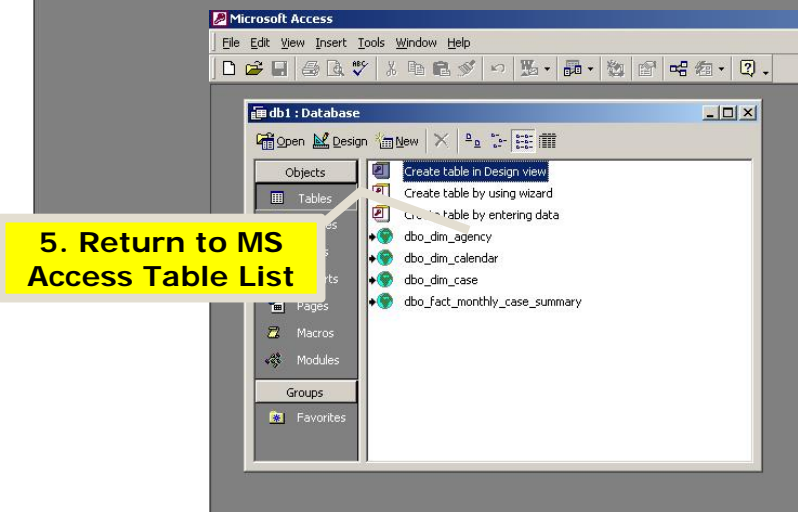
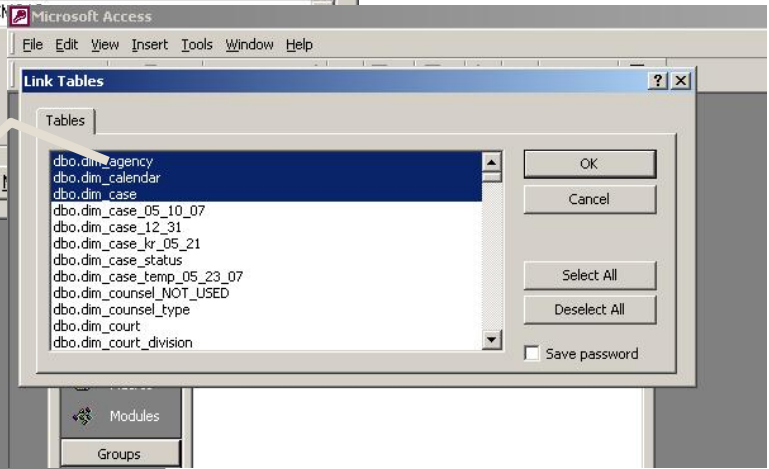
At the bottom of the Excel window, the status bar shows 'Ready' and 'NUM'.

Data Access (from MS Access)

1. Open Blank Database



4. Choose the tables



Data Access (Excel Pivot Table)

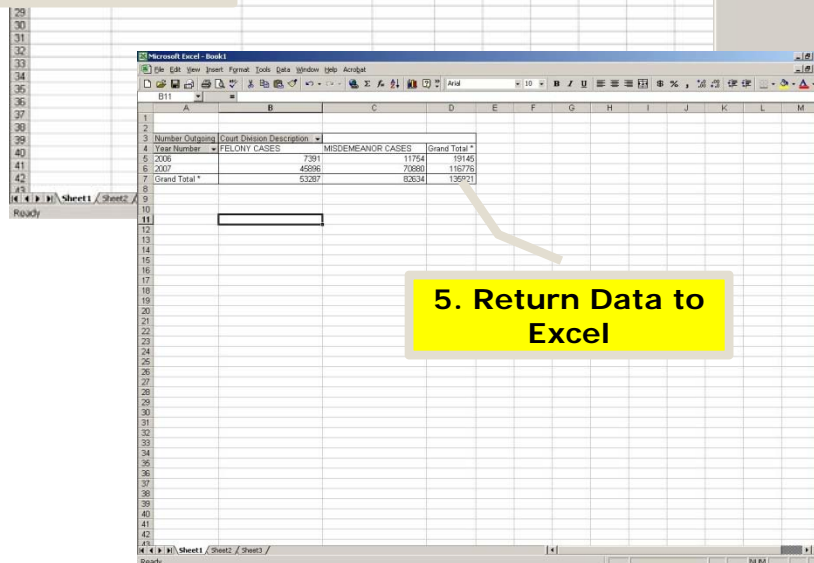
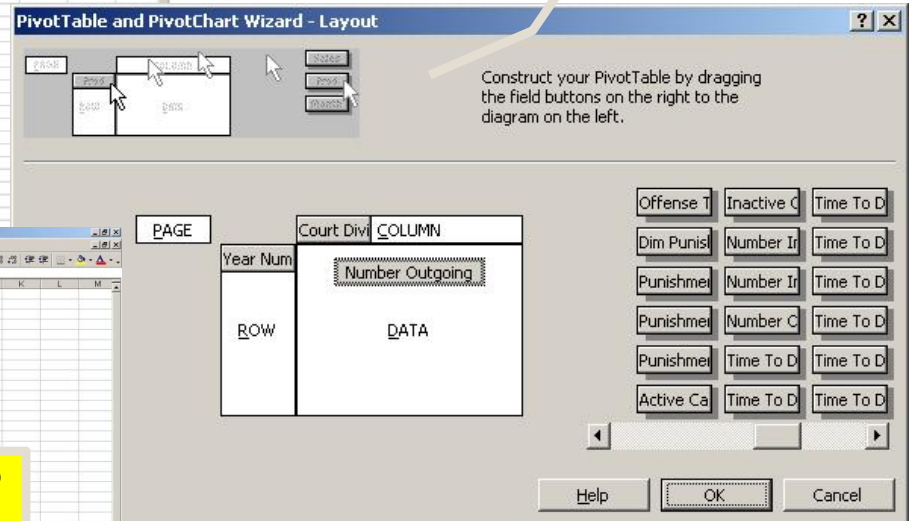
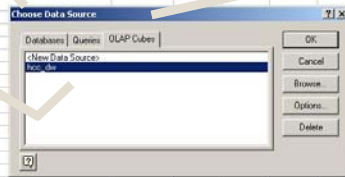
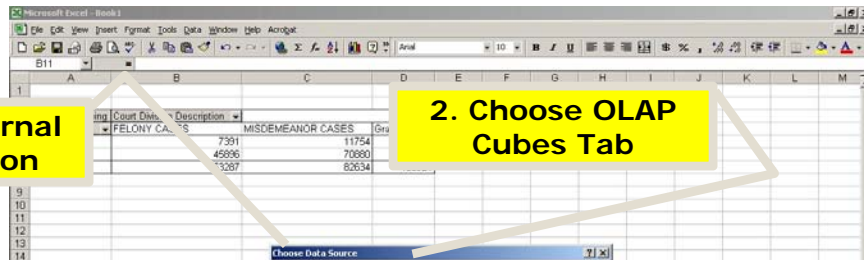
1. Get External Data Option

2. Choose OLAP Cubes Tab

3. Select the Cube Data Source or Create a New Data Source

4. Format Layout of Pivot Table

5. Return Data to Excel



Server: HCCMS16
Database Name: HCC_DW
Cube Name: DW CPM DM

Data Access (Report Requirements)

- ⊕ In Data Warehousing, a new Business Requirement typically begins with a QUESTION that starts with HOW MUCH, HOW MANY, etc... and followed up with "SINCE this date" and/or "FOR this DIVISION". That is a multidimensional question.
- ⊕ Reports in the Courts can be categorized into the following:
 - ⊕ Operational Reports – day to day transaction reporting (daily dockets, case summaries)
 - ⊕ Analytical Reports – management reporting using Key Performance Indicators and allowing OLAP Browsing or slicing and dicing data (Multidimensional Analysis, Cube Browsing, or Pivot Table access in Excel)
 - ⊕ Research Reports – data mining and reviewing patterns in data before producing a final report (Recidivism Studies, etc.)
 - ⊕ Executive Reports – executive reporting using Key Performance Indicators at a specific level of granularity such as Court Division or Court (Court Intelligence / CourTools)

Data Access (Relevant Application)

Detail Data /
Staging Area



Ad-hoc
Research
Requests or
Studies

**New Tables from
JIMS and/or
New Views**

Data Mart /
Star-Schema



New KPI's and
Reusable
Business Rules

**New Fact or
Dimension Tables**

Cube / Analytics



New and
Standard
Presentation
Needs

New Cubes