PDMP Insight: A Business Intelligence and Data Warehousing Framework for PDMPs

March 31, 2022
Florida Overdose Data to Action
PDMP Insight
Business Intelligence (BI) Architecture

March 31, 2022
4:00PM to 5:00PM
PDMP Insight

Moderator
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PDMP TTAC Director

Presenters
John Robertson, Data/Business Intelligence Architect
Chief Technology Officer of OmniCore
PDMP Insight

Objectives

• Understand the importance of PDMPs focusing on BI as a holistic capability
• Understand why PDMP Insight measures capability progress against an industry standard maturity scale
• Understand the individual components recommended for BI success
• Understand the power of PDMP Insight to support and deepen insightful decision making for the organization
• Review proof-of-concept visualization developed with PDMP Insight
Key Definitions

- **Business Intelligence** – An umbrella term that includes the applications, infrastructure, tools, and best practices that enable access to and analysis of information to improve and optimize decisions and performance.

- **Insight** – The capacity to gain an accurate and deep intuitive understanding of a person or thing.

- **Data Warehouse** – A storage scheme designed to hold data extract from many source systems. The warehouse then combines that data in an aggregate, summary form suitable for comprehensive data analysis and reporting for predefined business needs.
PDMP Insight

• A multi-tiered, architectural framework designed to empower PDMPs with the capability to implement and sustain a holistic approach to Business Intelligence (BI).

• The capability is implemented based on right-sizing people, processes, and technology to enhance existing analytics maturity and minimize the disruptive impact of organizational change.

• The core component of the data architecture is an elastic, centralized, modern data warehouse (MDW) optimized for data analysis.
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Business Tier

- Continuous Improvement
- Integrated Governance
- Organizational Change Management
- DataDevOps
- Data Tier
- Cognitive Tier
- Infrastructure Tier
- Client Tier
PDMP Insight

Program Tiers

- Business Tier – All organizational program elements required to define, execute, and manage the capability
- Data Tier – Implements primary components of the Data Architecture - including the MDW – executed through a Data Management Framework (DMF)
- Cognitive Tier – Multi-Dimensional Online Analytical Processing (OLAP) and Cognitive Services (Advanced Analytics/AI/ML)
- Infrastructure Tier – Cloud-based services orchestrated for innovation pipelines that are limitless and life-cycle driven
- Client Tier – Consists of tools for developing BI logic, data visualizations, and data analysis
- DataDevOps Tier – DataOps + DevOps = Formal, standardized design/build processes in the development and deployment of BI components
- Organizational Change Management (OCM) Tier – Manages the impact of BI on the organization’s information culture
- Integrated Governance Tier – Seamless integration of PDMPI concerns into the existing operational governance model of the PDMP
- Continuous Improvement (CI) Tier – Prioritizes process improvements, maturity growth, and sustainability for the PDMPI capability
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Program Team

- Architects (BI, Data, Data Warehouse)
- Project Managers
- Epidemiologists
- Business Analysts
- Data Scientists
- Subject Matter Experts
- BI Developers
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E-FORCSE Insight Analytical Maturity Model (AMM)

Analytical Maturity Curve

FL PDMP Target Goal

PDMP Programs

Data Sophistication

- Raw Data
- Reporting Database
- Data Warehouse
- OLAP Cubes
- Big Data
- Snapshot
- Streaming/Real Time
- Heterogeneous Datasource Linking
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* Client Tier *

- Toolset Agnostic
- Standardization recommended for formal artifact development
Online Analytical Processing – Data Cubes for simplified rollup based /drill down/drill through analysis

Cognitive Services

- Machine Learning (ML) deep analysis facilitates entity (patient, drug, etc.) data pattern matching and rationalization of unstructured data sources (fatal OD/non-fatal OD information)

- Artificial Intelligence (AI) greatly enhances the prospect of an enterprise predictive model when informed by deep machine learning, data analysis outcomes, data mining results, longitudinal data trends, and supervised engagement.
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* Business Tier *

- Business Case
- Project Management Plan & Schedule
- Business Requirements Management – Functional, Technical With Traceability Matrix (RTM)
- Business Process Management & Analysis
- Agile Business Processes
- Standards Driven (Modeling, DataDevOps)
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* Data Tier *

- Dimensionality – Facts & Conformed Dimensions (unique patient identification regardless of data source)
- Data Integration – Multi-sourced and transitioned between bronze, silver, & golden “states”
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* Data Tier * - Data Integration

**Tier I**
- PDMP Data
  - Dispensations
  - Search/Query
  - User Activity

**Tier II**
- HIE
- Nonfatal Overdose
- Fatal Overdose
- Naloxone Administration
- Naloxone/Narcan Dispensing
- Medical Examiner Reports
- DEA
- EMR/EHR
- E911
- Interstate Information
- Sales

**Tier III**
- Drug Related Arrests
- Drug Related Convictions
- Child Welfare Case Information
- Drug Court Case Information
- Medical Marijuana Dispensing
- Risk Ratings – Urine Drug Screens
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* Data Tier * - Dimensional Data Model (PDMP Data)
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* Data Tier * - Dimensional Data Model (PDMP Data)

End User

Prescriber

Patient

Drug

Dispensary

Search/Query Facts

Time
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* Data Tier *

Data Management Framework (DMF)

- Data Governance
- Data Quality Assurance
- Data Meaning via Data Dictionary
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* Data Tier * - Dimensional Data Quality For BI

Data Quality

Accessible
- Available
- Syntax
- Semantics

Interpretable
- Relevant
- Timely

Useful
- Complete
- Consistent
- Credible (Lineage)
- Accurate
- Current
- Non-volatile

Believable
**PDMP Insight**

* Data Tier * - Data Dictionary Documents and Defines Meaning

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**Florida Department of Health**

*Information Data Warehouse Requirements*

*EFI Unified, Standardized Healthcare Data Elements*

**Fiscal Year:** 2020-21  
**Business System Data Source:** ASAP via APPRISS  
**Definition Basis:** Native  
**Data Element Number:** 101005  
**Data Element Name:** Date Sold (Situational)

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### Description

This field is used to determine the date the prescription was dispensed (left the pharmacy), not the date it was prepared. This date could be captured from the point-of-sales (POS) system, if the pharmacy has a POS system, and there is a bidirectional flow with the pharmacy management system in order to capture and report this date. Or it could be captured and reported from a will-call management system, integrated with the pharmacy management system.

### Code  Definition/Example

<table>
<thead>
<tr>
<th>Code</th>
<th>Definition/Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

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**Length:**  8  
**Data Type:** Date  
**Year Implemented:** 2019-20  
**Format:** YYYYMMDD  
**DW Instantiation Points:**

<table>
<thead>
<tr>
<th>(Schema.Table.Column) (Red = Origin)</th>
</tr>
</thead>
<tbody>
<tr>
<td>asapDispensingRecord.DateSold</td>
</tr>
<tr>
<td>dbo.FactDispensing.DateSold</td>
</tr>
</tbody>
</table>

**EFI Notes:** Specify additional subject matter expertise here...

**Extended Reference Data:** [Links to Full Code Table]

**Sample Query:**

```sql
select datesold, count(*) as 'Dispensings' from dbo.FactDispensing group by datesold order by dispensions desc
```

**Change Log:**  
<table>
<thead>
<tr>
<th>Date</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/1/2019</td>
<td>Data element added</td>
</tr>
</tbody>
</table>
PDMP Insight

Drill Down Data Visualization Example From E-FORCSE BI

**Dispensations By County**

**Table 2. Characteristics of schedule II through schedule V prescriptions dispensed to Florida residents 18 years of age and older.**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>NY21</th>
<th>NY20-21 Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescription (Rx)</td>
<td>1,271,825</td>
<td></td>
</tr>
<tr>
<td>Days Supply</td>
<td>33,533,182</td>
<td></td>
</tr>
<tr>
<td>Patient</td>
<td>555,998</td>
<td></td>
</tr>
<tr>
<td>Pharmacy</td>
<td>1,663</td>
<td></td>
</tr>
<tr>
<td>Prescriber</td>
<td>20,114</td>
<td></td>
</tr>
<tr>
<td>Population 18 years and over</td>
<td>2,188,412</td>
<td></td>
</tr>
</tbody>
</table>

**Outcome 2: Reduction of the quantity of pharmaceutical controlled substances obtained by individuals**

Performance Measure: Characteristics of controlled substances reported to the PDMS.

* Miami-Dade County *
Open Discussion
Contact Information

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