Information Quality at the Transportation Security Administration

ABSTRACT

Historical data is an important component of business analysis. This presentation will discuss several examples and techniques employed at the Transportation Security Administration (TSA) to build controls and checks surrounding data inputs. Using a combination of several COTS applications, TSA is building real-time data warehousing. This presentation will discuss several requirements and the solutions created to better ensure information quality, in some instances by leveraging existing data. Lack of proper data collection may result in uninformed decision making. We will discuss some of the collaboration techniques within groups of business owners and the development team in creating modules that have resulted in higher levels of user adoption in the field. As well, we will discuss current solutions for data sharing within TSA as well as with other government agencies.

BIOGRAPHY

Jim Watts
Program Manager
Office of Operational Process and Performance Metrics,
Office of Security Operations
Transportation Security Administration

Jim has a Masters degree in Business Administration from Winthrop University and an undergraduate degree in Mathematics. He is product and customer certified in Siebel and MicroStrategy business intelligence applications. He has worked for 25 years in consulting for various federal clients including the Office of the Secretary of Defense, the Army, the Air Force, the Army National Guard, the General Services Administration, and the Department of Labor. For the past three years, he has been Program Manager for the Office of Operational Process and Performance Metrics, with the Transportation Security Administration. His responsibilities include creating and tracking enterprise metrics. He is currently responsible for the developing a series of solutions to collect and track operational activities for the 450+ federalized airports.

Information Quality at the Transportation Security Administration

July, 2010

Operational Process & Performance Metrics

Transportation Security Administration

Introduction

Transportation Security Administration

- **Why information quality is so important from the perspective of the Performance Management Information System (PMIS) program.**
- **What is being done to ensure info quality.**
- **What is working well.**

2

Overview of PMIS

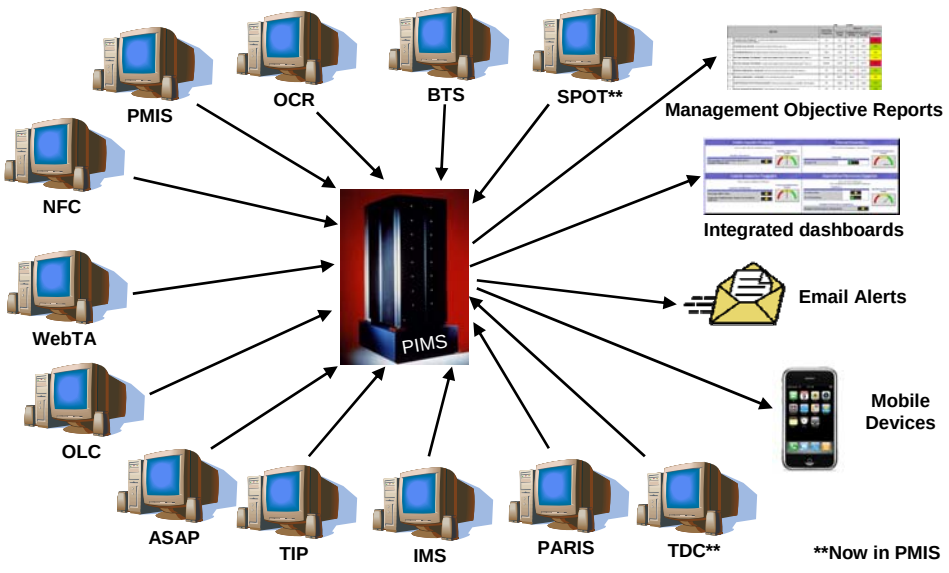
Transportation Security Administration

- **Performance Measurement Information System (PMIS)**: The Performance Measurement Information System is a web-based application used to collect TSA metrics and measures. Data entry is accomplished by web browser or hand-held device. PMIS directly supports TSA's goal of becoming a performance-based organization.
- **Business Intelligence (BI) Tool**: The Performance Information Management System (PIMS) is a state-of-the-art tool which supports analysis, dashboarding, graphing, and reporting from a consolidated data warehouse. PIMS today reports on data from 18 TSA data sources.
- **Airport Information Management (AIM)**: Next-generation data entry system to assist airports in managing their day-to-day business. Provides airports a consistent national interface with headquarters' support and ports existing field applications to this national enterprise application. Supports real-time business intelligence reporting.

3

Integrated Data Sources - PMIS

Transportation Security Administration



4

Program History – Results

Transportation Security Administration

2002
Prohibited Items are recorded in PMIS on a regular basis

2002
Payroll data feeds were uploaded into PMIS

2003
PMIS Mobile is released.

2004
PIMS BI Tool launched to run reports based on PMIS data

2005
2:1 Configuration checkpoints are able to be recorded in PMIS

2008
Addition of WCO, TDC, and ICMS modules. Also, release of PMIS Lite.

2009
PIMS BI Tool version 3.0 is released includes enhanced features to run reports more effectively

EPMP Future Objectives
Enterprise-wide metrics support
Enterprise-wide BI reporting
Efficient field operations
Reduce # of field interfaces

2002 2003 2004 2005 2006 2007 2008 2009 2010 Future

2002
PMIS is launched for collection of TSA data from the airports

2002
Complaints/ Compliments are recorded in PMIS

2002
Wait Times are recorded in PMIS on a regular basis

2004
Throughput is recorded in PMIS on a regular basis

2005
Data call module launched to enable collection of ad-hoc information from the field

2006
Lane Relationships are added to PMIS so customer throughput submissions can be linked to a WTMD and X-Ray. Added MANPADs and AAACE.

2007
Introduction of several new modules including the Surge Module, ADASP (now Playbook), and the tracking of IED Drills

2008
Customer Throughput at the minute level is added to PMIS to create more accuracy in tracking throughput

2009/2010
Current initiatives underway include the Airport Information Management (AIM) Modules with Real-time business intelligence, SPOT, Net 2.0 migration, and Improved User Role Management, GIS, Performance Architecture Pilot

5

Integration alternatives

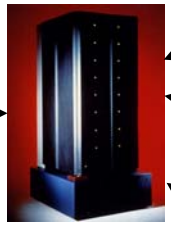
Transportation Security Administration

Each program office can be granted access to different areas of the TSA BI data warehouse

This flexibility enables each business unit the ability to control its own data while pushing select elements agency-wide

OSO

TSA BI Data Warehouse



Application Server

Human Capital

Other Business Units

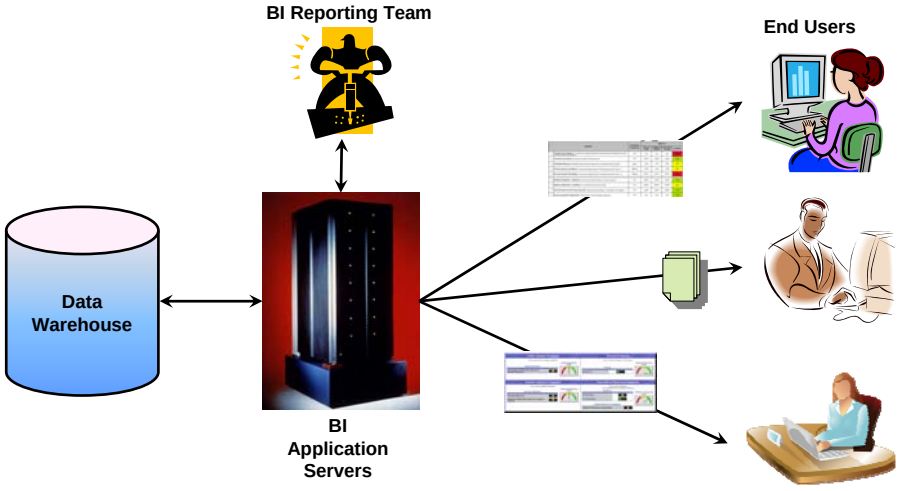
6

Integration option – currently in use

Transportation Security Administration

Option 1 – Standard Development Process

BI analytical team creates and maintains all publicly-available reports for a program office; users are allowed to create private "ad-hoc" reports within the application.



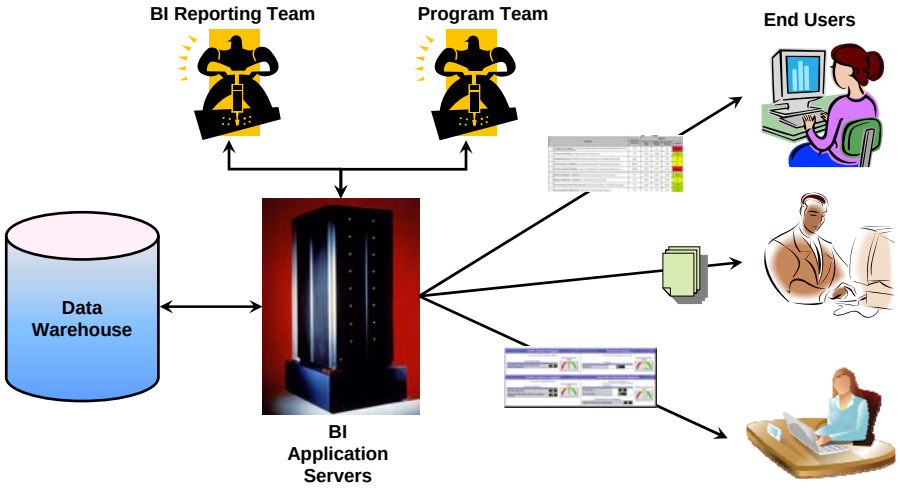
7

Integration option – currently in use

Transportation Security Administration

Option 2 – Collaborative Development Process

BI analytical team and program office developers create and maintain all publicly-available reports for a program office; users are allowed to create private "ad-hoc" reports within the application.



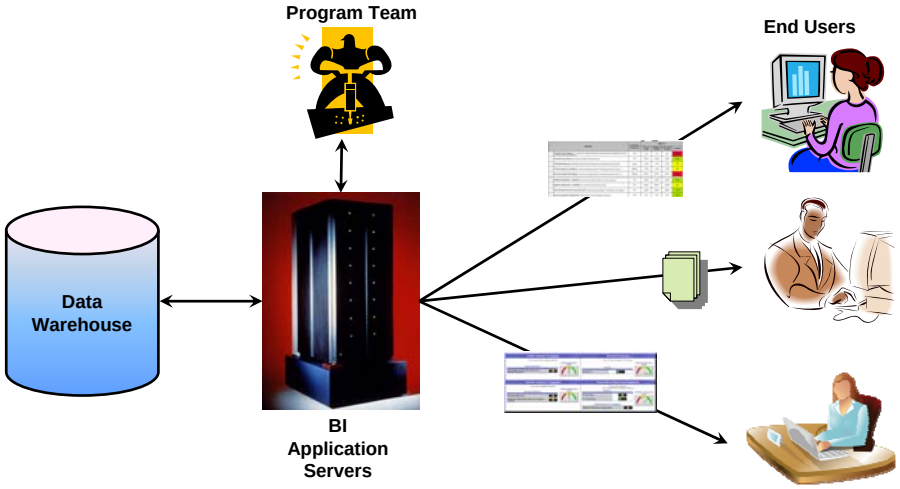
8

Integration option – currently in use

Transportation Security Administration

Option 3 – Program Office Development Process

Program office team creates and maintains all publicly-available reports for a program office; users are allowed to create private "ad-hoc" reports within the application.



9

Data design and collection considerations

Transportation Security Administration

Custom hierarchies with integrated data collection and reporting.

Data collection methodology:
- Mapped to business process
- Requirements include data values consistent within multiple systems
- Working with master data

One "safe source" of operational data shared across multiple applications and program offices

Testing throughout the development cycle.

10

Testing (Quality Control)

Transportation Security Administration

Work Product Category	Tool(s)	Verification Method(s)	Validation Method(s)
Requirements	Rational RequisitePro, BugZilla	Peer Reviews	Formal Reviews, QA Audits, Prototypes, Customer Acceptance of Requirements Specification.
Designs	Rational RequisitePro, AllFusion ErWin	Peer Reviews	Formal Reviews, Customer Acceptance of Design Specification.
Software	Subversion, Visual Studio, Rational ClearQuest	Peer Reviews, Unit Testing, Integration Testing, System Testing, Quality Audits	User Acceptance Test (UAT), Customer Acceptance of Software.
Documentation	Rational ClearQuest	Peer Reviews	Formal Reviews, QA Audits, Customer Acceptance of documents.
Test Procedures	Rational TestManager, Rational ClearQuest	Integration Testing, System Testing	Customer Acceptance of Test Specification.

11

Challenge – inconsistent geographic data

Transportation Security Administration

Many TSA systems allow user-entered checkpoint names, machine information, and airport location data. These text-based entries may differ depending on the individual(s) performing data input.

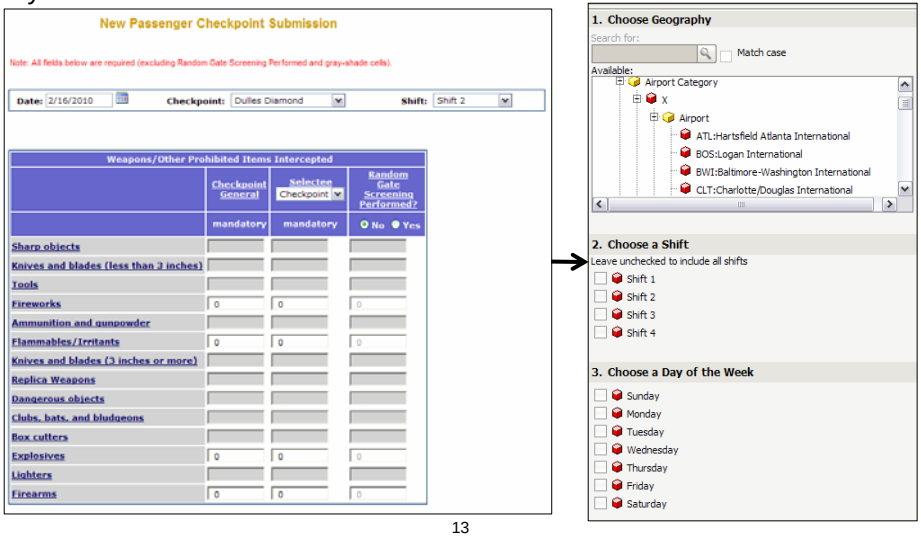
Furthermore, changes to geographic information must be propagated in a timely manner to both data entry and reporting systems.

12

Solution - Custom hierarchies

Transportation Security Administration

Consistent hierarchies for data collection and reporting across PMIS/PIMS/AIM. All geographic values tagged with unique identifier and synchronized via ETL.



13

Challenge – Data quality and privacy across systems

Transportation Security Administration

TSA systems do not employee a standard unique identifier for each user. As such, each application may utilize a different solution for user authentication.

Examples of system identifiers:

- Arbitrary auto-generated integer value
- Social Security Number
- email address
- Network login ID
- Last four digits of social + first two letters of last name
- First letter of first name + last name

14

Solution – cross-system identifier reference

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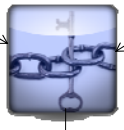
Master reference table containing system identifiers from multiple applications. PII is encrypted using industry-standard algorithm

SSN	Name	Hours	Dollars
123456789	John Doe	40	$1000
987654321	Jane Smith	80	$2000

SSN	Name	Courses taken	Average Score
345345078	Bob Smith	6	90.5
873462961	Robert Doe	15	88.1

Cryptographic Function



User ID	Encrypted SSN	Network ID	External ID #1	External ID #2	Name
10001	1SDF334SFIF34	John.doe	JHDFG123	134523	John Doe
10002	435KLH234J34J	Jane.smith	KJJKH448	435345	Jane Smith
10003	53424234HJ3HL	Bob.smith	98343400	336644	Bob Smith

15

Challenge – Data entry mistakes

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Users may accidentally enter data values that are higher or lower than intended. These values should be flagged for review prior to being reported nation-wide.

16

Solution - Boundary definition

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Insert New Boundary

Airport Category: X

Metric	Boundary	Value	Active	Activate
Baggage - Baggage Data - Number of Locks Cut or Broken for Screening - Baggage	High Limit	100	Active	De-Activate
Baggage - LEO Intervention - Cash > $10,000 on International Flights - Baggage	High Limit	2	Active	De-Activate
Baggage - LEO Intervention - Contraband - Baggage	High Limit	2	Active	De-Activate
Baggage - LEO Intervention - Drug Paraphernalia - Baggage	High Limit	2	Active	De-Activate
Baggage - LEO Intervention - Drugs - Baggage	High Limit	2	Active	De-Activate
Baggage - LEO Intervention - Other LEO Interventions for Unresolved Alarms - Baggage	High Limit	2	Active	De-Activate
Baggage - LEO Intervention - Undeclared and/or Loaded Firearms - Baggage	High Limit	2	Active	De-Activate
Baggage - Prohibited Items Identified - Disabling Chemicals and Other Dangerous Items - Baggage	High Limit	25	Active	De-Activate
Baggage - Prohibited Items Identified - Explosive Materials - Baggage	High Limit	5	Active	De-Activate
Baggage - Prohibited Items Identified - Flammable Items - Baggage	High Limit	25	Active	De-Activate
Baggage - Prohibited Items Identified - Loose Ammunition - Baggage	High Limit	100	Active	De-Activate
Baggage - Screener Data - Number of baggage screeners on duty - Baggage	High Limit	100	Active	De-Activate
Baggage - Screener Data - Number of baggage screeners scheduled for work - Baggage	High Limit	100	Active	De-Activate
Baggage - Screener Data - Number of baggage screeners tardy - Baggage	High Limit	10	Active	De-Activate
Baggage - Screener Data - Number of baggage screeners with unscheduled absences - Baggage	High Limit	30	Active	De-Activate
Complaint Counts - Baggage Handling Process	High Limit	5	Active	De-Activate
Complaint Counts - Civil rights/discrimination	High Limit	2	Active	De-Activate
Complaint Counts - Discourteous treatment	High Limit	3	Active	De-Activate
Complaint Counts - Improper handling of property	High Limit	3	Active	De-Activate
Complaint Counts - Inappropriate contact	High Limit	2	Active	De-Activate
Complaint Counts - Lack of privacy	High Limit	2	Active	De-Activate
Complaint Counts - Lax screening	High Limit	2	Active	De-Activate

High and low boundary limits can be set on a per-metric, per-category basis for PMIS submissions. Submissions with values outside of boundaries are automatically flagged.

17

Solution - Flagged submission review

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Each submission can be individually reviewed for accuracy prior to being “promoted” for reporting in the Business Intelligence tool.

Date: 2/3/2010 Submit

Submission Status				
Date	Flagged Submissions	NonFlagged Submissions	Live	Total
2/3/2010	0	1	0	1
Other**	0	0	-	-

Passenger Checkpoint Submissions Review

Date	Airport	Airport Code	Checkpoint	Shift	Action
2/3/2010	Baltimore-Washington Int'l Airport	BWI	Pier A	1	[View] [Perform Review] [Promote for Reporting]

Date: 2/3/2010 Checkpoint: Pier A Shift: 1

Weapons Intercepted at Checkpoint General

Name	Value	Comments
Sharp objects	Old: 0 New:	
Knives and blades (less than 3 inches)	Old: 0 New:	
Tools	Old: 0 New:	
Fireworks	Old: 0 New:	
Ammunition and gunpowder	Old: 0 New:	
Flammables/Irritants	Old: 0 New:	

18

Challenge – inconsistent item category data

Transportation Security Administration

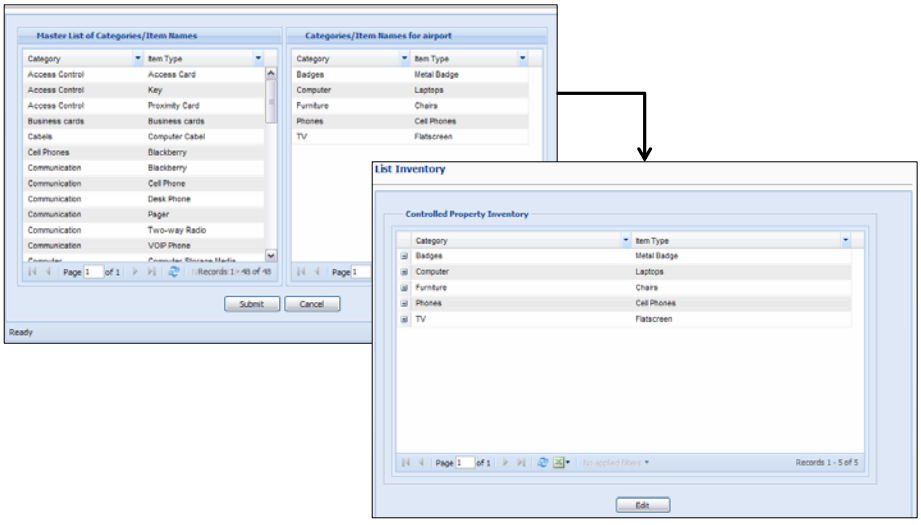
Many TSA systems allow user-entered item names, item groups, and item category data. These text-based entries may differ depending on the individual(s) performing data input.

Furthermore, changes to item information must be propagated in a timely manner to both data entry and reporting systems.

19

Data Quality - Submission data integrity

Transportation Security Administration



Drop-down lists and data entry screens can be customized according to individual airports' needs while maintaining standard category definitions.

20

Challenge – data feed monitoring

Transportation Security Administration

The TSA business intelligence tool receives daily data feeds from a number of source systems. Each system may experience outages, maintenance, or service interruption during its scheduled data load.

Users at headquarters and in the field must be aware of any data load failures prior to running operational reports the following morning.

21

Solution – data load and interconnection status

Transportation Security Administration

Start Time	Finish Time	Project	
11/10/2009 1:00:36 PM	11/11/2009 2:53:12 PM	9A87A1E847385EA28D762084941373F4	PIMS BI Tool
12/9/2009 6:26:17 PM	12/9/2009 6:32:12 PM	9A87A1E847385EA28D762084941373F4	PIMS BI Tool
12/9/2009 6:48:01 PM	12/9/2009 6:54:48 PM	9A87A1E847385EA28D762084941373F4	PIMS BI Tool
12/9/2009 7:18:53 PM	12/9/2009 7:25:22 PM	9A87A1E847385EA28D762084941373F4	PIMS BI Tool
12/11/2009 1:24:53 PM	12/11/2009 1:25:42 PM	9A87A1E847385EA28D762084941373F4	PIMS BI Tool
12/11/2009 1:31:28 PM	12/11/2009 1:32:04 PM	9A87A1E847385EA28D762084941373F4	PIMS BI Tool
12/12/2009 8:29:40 PM	12/14/2009 2:06:56 AM	9A87A1E847385EA28D762084941373F4	PIMS BI Tool
12/14/2009 2:58:32 AM	12/14/2009 3:40:51 AM	9A87A1E847385EA28D762084941373F4	PIMS BI Tool
12/14/2009 4:33:56 AM	12/15/2009 2:14:51 AM	9A87A1E847385EA28D762084941373F4	PIMS BI Tool
12/15/2009 3:14:24 AM	12/15/2009 3:58:45 AM	9A87A1E847385EA28D762084941373F4	PIMS BI Tool
12/15/2009 4:50:44 AM	12/15/2009 5:19:01 AM	9A87A1E847385EA28D762084941373F4	PIMS BI Tool
12/16/2009 2:58:24 AM	12/16/2009 4:00:15 AM	9A87A1E847385EA28D762084941373F4	PIMS BI Tool

REPORT DETAILS

Report Filter:
(Date (ID) Between 2/9/2010 and 2/15/2010)

Data rows: 7 | Data columns: 6

Date Metrics	PMIS Captured Metric Count	PMIS Throughput Metric Count	Number of IMS Inquiries	Number of PARIS Inspections	Number of PARIS Incidents	Number of PARIS Investigations
2/15/2010	69,517	35,860	7	36	54	18
2/14/2010	77,676	39,133	1	23	69	10
2/13/2010	78,037	39,078	1	18	72	12
2/12/2010	79,360	40,358	74	176	86	24
2/11/2010	79,754	39,501	52	232	84	57
2/10/2010	77,778	36,979	85	335	70	34
2/9/2010	78,862	38,418	52	398	109	64

Daily email distributions indicating success or failure of various data interconnections.

22

Challenge – data reporting delays

Transportation Security Administration

The TSA business intelligence tool receives daily data feeds from a number of source systems. Data from these systems may be up to 24 hours old in the data warehouse.

Users at headquarters and in the field have a need for more timely reporting and alerts.

23

Solution - Real-time data integration

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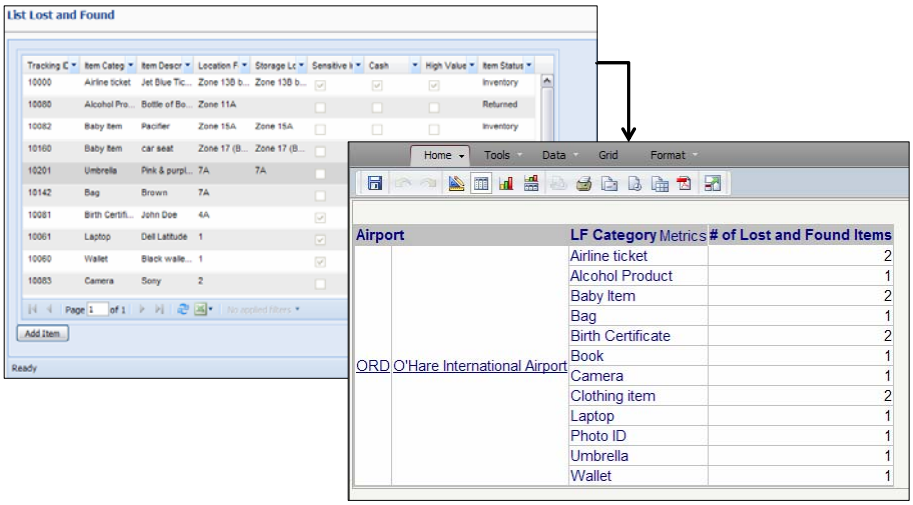


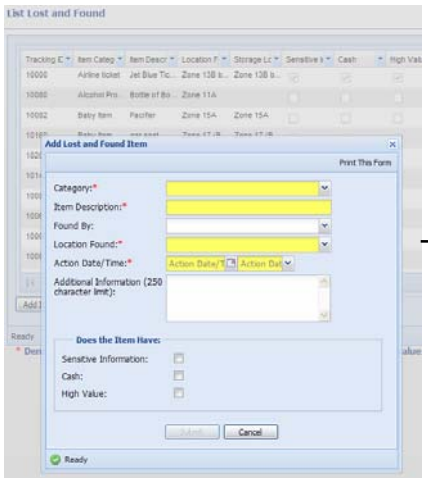
Airport		LF Category Metrics	# of Lost and Found Items
ORD	O'Hare International Airport	Airline ticket	2
		Alcohol Product	1
		Baby Item	2
		Bag	1
		Birth Certificate	2
		Book	1
		Camera	1
		Clothing item	2
		Laptop	1
		Photo ID	1
		Umbrella	1
		Wallet	1

Real-time data entry and reporting integration exists between AIM and PIMS utilizing a shared warehouse for “one safe source” of operational data. Referential data is synchronized in real time.

24

Solution - Real-time data integration

Transportation Security Administration



Alert: New item added to lost & found 2/3/2010 3:38PM

PIMS BI Tool Staging [pmishelpdesk@tsa.dhs.gov]
Sent: Wed 2/3/2010 3:39 PM
To: Smereka, Michael <CTR>

Create Report - Lost and Found Item

Checkpoint	LF Category Metrics	# of Lost and Found Items
Zone 11A	Alcohol Product	1
1	Laptop	1
	Wallet	1
10	Clothing item	1
2	Camera	1
4A	Birth Certificate	1
5	Birth Certificate	1
7	Book	1
7A	Bag	1
	Umbrella	1
TOCC Office	Airline ticket	1
	Clothing item	1
	Photo ID	1
Zone 13B bag claim	Airline ticket	1
Zone 15A	Baby Item	1
Zone 17 (BTP)	Baby Item	1

Event- or time-based alert capability from integrated data warehouse

25

Media Comments

Transportation Security Administration

"The focus on metrics allows the TSA to avoid getting 'hamstrung' because it doesn't rely on intuition to make decisions or have information stored in disparate spreadsheets, data marts and reports."

- Wayne Eckerson
Director of research and services
The Data Warehousing Institute

"PIMS tracks more than 1,000 metrics in total, but TSA has customized dashboards and reports for approximately 30 roles within the agency, including top executives, optimization teams (they're the BI power users), and front-line security personnel."

- Special Report: Business Intelligence Gets Smart
Intelligence Enterprise
September 2008

"If your most recent trek through airport security was less painful than even a year or so ago, thank the Transportation Security Administration's overarching business intelligence project, dubbed the Performance Information Management System, or PIMS."

- BI Efforts Take Flight
InformationWeek
10/13/2008