Operational Business Intelligence:
Transforming the Way You Do Business

Solve your business problems with Intelligent **Solutions**

Claudia Imhoff, PhD

Intelligent Solutions, Inc.

CImhoff@IntelSols.com

www.intelsols.com

Blog: http://www.b-eye-network.com/blogs/imhoff/

Claudia Imhoff

President and Founder
Intelligent Solutions, Inc.

A thought leader, visionary, and practitioner in the rapidly growing fields of business intelligence and customer focused-strategy – Claudia Imhoff, Ph.D., is an internationally recognized expert on analytical CRM, business intelligence, and the infrastructure to support these initiatives – the Corporate Information Factory (CIF). Dr. Imhoff has co-authored five highly-regarded and popular books on these subjects and writes monthly columns (totaling more than 100) for technical and business magazines.

Email: cimhoff@intelsols.com
Phone: 303-444-6650

Presentation Topics

- **Operational BI**
- Its Impact on Existing Environments
- Getting Started and 10 Mistakes

What is Operational BI?

A set of services, applications and technologies for monitoring, reporting on, analyzing and managing the business performance of an organization's daily business operations

Operational BI Environment: The Business Case

- Enables more informed business decisions by directly supporting specific business processes and activities

- Supports faster business decisions by seamlessly integrating BI with business processes to create a closed-loop decision-making environment

- Provides a more dynamic business environment where the business can learn, adapt, and evolve based on analysis of its operational business performance

Example: Location-Based Offers

- Empower local stores to do own special events and promotions
  - Means non-technical, in-store personnel must be able to select customer groups based on local criteria
- Appropriate reminder and incentive offers
  - Help busy people manage their tasks (favorite meal options, etc.)
- Exclusive invitations, coupons, etc., pushed to mobile devices based on consumer history, proximity to store

Example: Algorithmic Trading

- Used in capital markets to indicate when to buy or sell stocks

- Applies event processing by calculating complex algorithms on the fly

- Example: When IBM's price is .5% higher than average price in last 30 seconds, buy 10,000 share of Microsoft every 3 seconds until average price drops
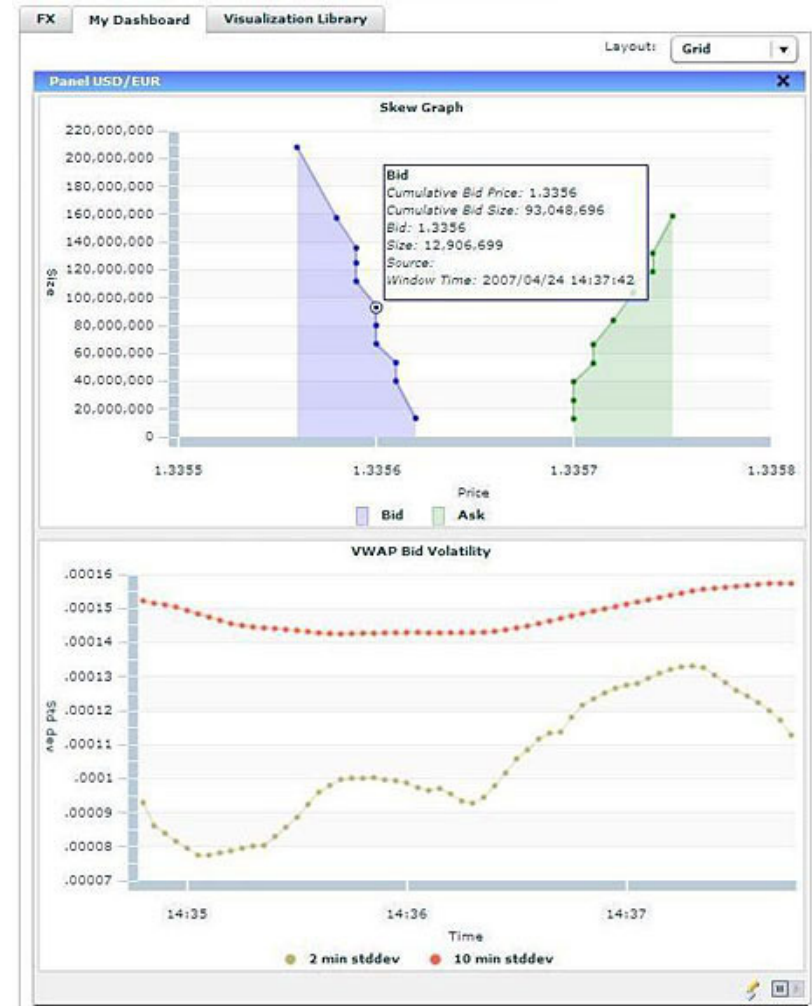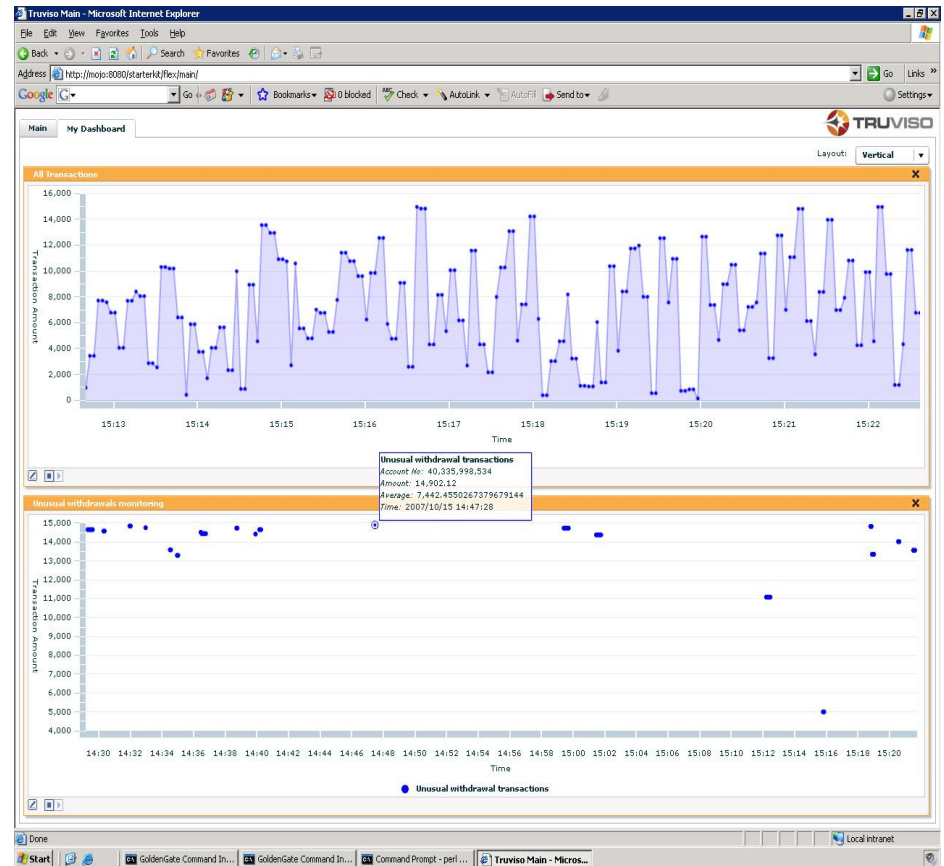

Source: www.truviso.com

Example: Retail Supply Chain Automation

- Use RFID tags to automate supply chain
  - Can track, trace, and move items wherever they are, at any time, in real time
  - RFID-sourced events must be quickly collected, organized, managed by data management infrastructure
- Event data volumes may not always be very large but events have to be handled rapidly
  - Raw, granular composition of RFID data requires intermediate layer of transformation services to turn data into usable information

Example: Fraud Detection

- Idea is to catch fraudulent transactions faster

- Fraud applications monitor, analyze, and act on event streams to identify patterns of potential abuse

- The business can intercede while transactions are happening

Source: www.truviso.com

Other Operational BI Examples

- Web analytics
- Loan and credit card application processing
- Improving airline customer satisfaction (flight delays, baggage handling, call-center handling)
- Monitoring and optimizing equipment servicing and quality management
- Package shipment, routing, and delivery optimization
- Equipment outage tracking and prediction

Review: The Three Types of BI

|	Strategic BI	Tactical BI	Operational BI
Business objectives	Achieve long-term business goals	Manage tactical initiatives to achieve strategic goals	Monitor & optimize operational business processes
Primary consumers	Executives & business analysts	Business analysts, & LOB managers	LOB managers & operational users Operational processes
Time-frame	Months to years	Days to weeks to months	Intra-day to daily
Data	Historical data	Historical data	Real-time, low-latency, & historical data
Mode of operation	User driven Data centric	User driven Data centric	User and event driven Process centric

Operational BI: Terms to Understand

- Types of Data
  - Real-time (current) data
  - Low-latency (intra-day) data
  - Historical data

- Types of Processing
  - Event analytics
  - Embedded BI services
  - Traditional BI results

Operational BI Environment

Event analytics
Process Analytics
Stream Analytics

Embedded BI services

Traditional data analytics
Strategic BI
Tactical BI
Operational BI

Operational BI Environment
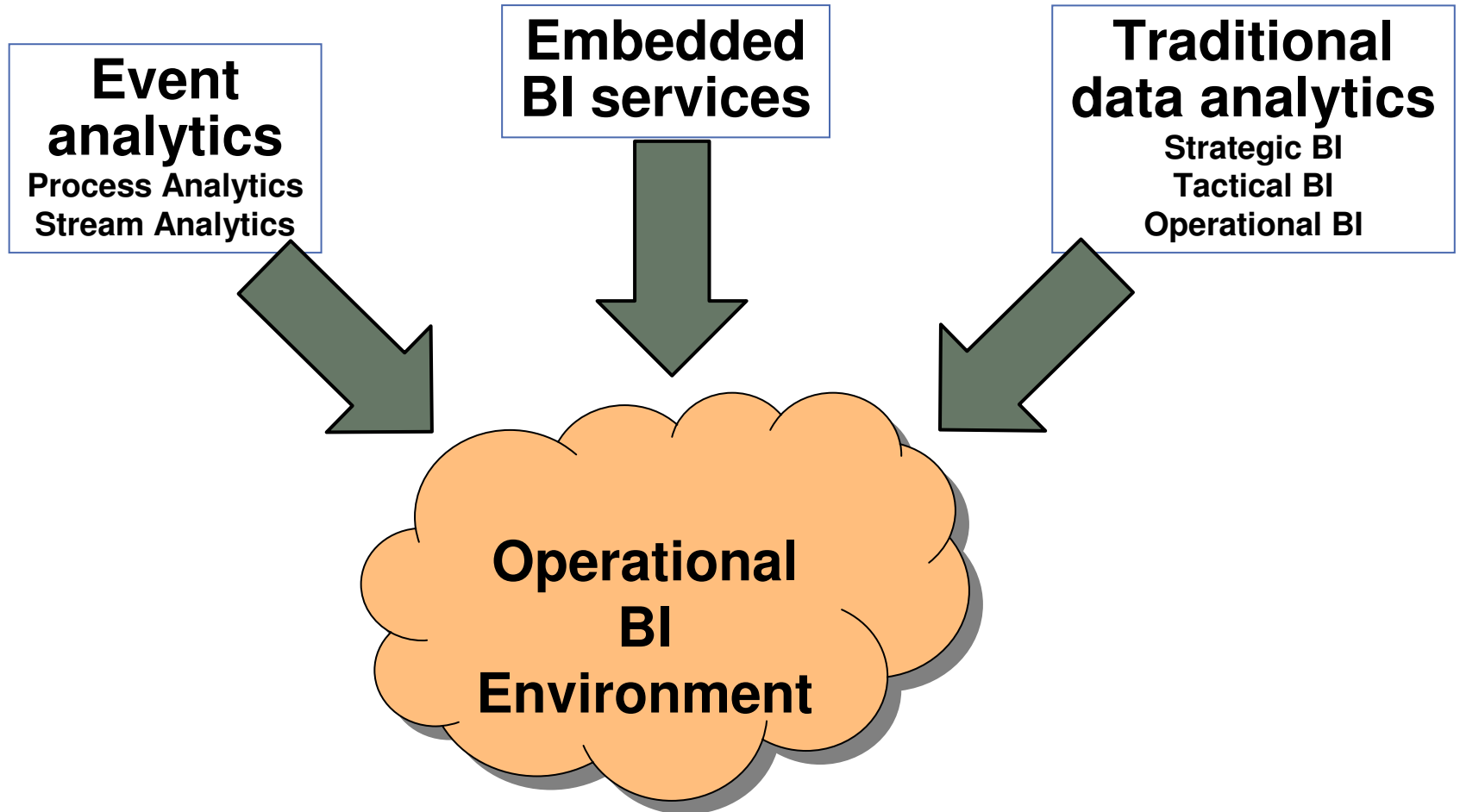
Relationship of Traditional Data and Event Analytics

- Operational BI uses traditional data analytics and event analytics
  - Traditional data analytics support intra-day, daily, weekly, monthly, and annual analytics
  - Event analytics supports real-time, near real-time analytics
  - There may be some overlap for near real-time analytics
- The more we drive toward real-time analytics, the more it becomes event-driven & process-centric

Event Analytics: Near-Real-Time Processing

- Event analytics enable organizations to analyze events (business actions, business messages, and system events) closer to real time

- With services-based approach, a BI service can constantly monitor and analyze real-time event data and produce required analytics

- Analytical results may be sent to a persistent store

- Event analytics may be supported by:
  - Traditional BI products (e.g., BI operational dashboards)
  - Business process management products (e.g., business activity monitoring, BAM)
  - Stream analytics products (e.g., using complex event processing, CEP)

Types of Analytics

Data Analytics	Event Analytics
Intraday, daily, monthly	Real time, near real time, intraday
Static data	In-motion data
On demand	Event driven
User centric	User and application centric
Point-in-time data metrics	Continuous process metrics

Embedded BI Services: Application Examples

- BI processing is called as a service at appropriate points in an operational workflow
  - Fraud detection
  - Loan processing
  - Supply chain management
  - Event-based marketing
- Can also be used by operational SaaS applications
  - Salesforce.com analytics
  - CRM analytics
  - ERP analytics

Presentation Topics

- Operational BI
- Its Impact on Existing Environments
- Getting Started and 10 Mistakes

Pitfalls in Implementing Operational BI

- What's different from traditional BI?
  - Significant increase in number of users
  - Significant growth in volume of data
  - Significant pressure for faster performance
  - Significant availability requirements
  - Significant change to standard operating procedures

Impact on BI Environment – Users

- Numbers of users increase significantly
  - Traditional BI rarely supported a few hundred, maybe a thousand or so users
  - Opening BI up to operational personnel means ramping up into tens of thousands of users
    - These users have very different interface requirements
    - Means BI implementers must rethink how BI is delivered to business users
  - Means tighter and faster connectivity of enterprise decision support environment to rest of the company
  - These users can be more naïve, less technically savvy, less analytical in their thinking…

Impact on Operational Environment – Users

- Workforce may need to be revamped
  - Operational BI changes "normal operating procedures"
  - Will likely require retraining of operational personnel
    - How they make decisions
    - How they access and use information flowing from BI application
    - How they monitor impact of their decisions
  - Training needs to be ongoing and flexible
  - Some may not make the leap
    - May have to hire replacements

Impact on BI Environment – Volumes of Data

- Volumes of data increase substantially
  - Detailed intraday snapshots of data are trickle-fed into data warehouses or operational data stores
  - Tens of terabytes to hundreds of terabytes are not unusual storage requirements for operational BI
  - Scalability now a mandatory requirement in any BI technology
    - Whether in processing and integration of data, storage of massive volumes, or retrieval of query responses
  - Granularity is significantly different
    - Operational BI requires much more detailed data to support specific operational functions

Impact on BI Environment – Performance

- ## Faster performance
  - Query performance must mimic or emulate response times in operational systems
    - Sub-second to just a few seconds to return data from a query.
  - Ability to prioritize queries not only according to their importance but also their response requirements is mandatory success criterion
    - This last feature has stumped many BI implementers and BI vendors
    - Must have ability to handle mixed work load gracefully and simultaneously – short operational BI queries & larger, more intense strategic ones

Impact on BI Environment – Availability

- Operational BI directly supports transactional business processes
  - Must adhere to stringent service levels
  - 24 X 7
  - 365
- An outage of operational BI will have a direct impact on enterprise's ability to do business!

Impact on Operational Environment – Procedures

- Impact on operational procedures and processes
  - Operational BI applications can cause big changes to operational procedures or processes
  - Changes are usually needed to ensure that operational BI information is being used optimally
    - Since these apps are new and different, traditional processes have to be rewritten to ensure proper execution
    - Workflow procedures must integrate steps to examine BI results before action is taken
    - Alerts or alarms may have to be incorporated if processes are not followed or ignored

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Getting Started – Assess Reality

- Honestly assess existing data delivery capabilities
  - Available technologies
  - Maturity of the BI architecture
  - Existing personnel, etc.

- Combine with solid understanding of business requirements
  - Document or at least define how these will be performed

- Important to understand weaknesses discovered in assessment that will be exaggerated as things speed up
  - If ETL process is weak link, it will only get worse
  - If data quality process is weak, it will only get worse
  - If data delivery technology is weak, it will only get worse

Getting Started – Understand Business Community

- What are their skills?
  - Naïve users?
  - Maestros with the mouse?
- What are their needs?
  - Deep analytics?
  - Operational reports?
  - Short & long term trends, patterns?
- What are their characteristics?
  - Mobile workers?
  - Virtual workers?
  - Executives to front line workers?
- Where and how do they work?

Getting Started: Pick Feasible Project

- Look for workflow activities that have significant impact on costs or revenues
  - Bottlenecks today that can be made more efficient through use of operational BI
  - Gaps in operations where operational BI could help
  - Manual activities with big impact on costs or revenues
- Don't make big changes to operational processes
  - Just speed up or make more efficient processes you already have in place
  - You will have to retrain personnel and retool standard operating procedures

Getting Started: Architectural Needs

- BI is no longer standalone
  - Must tie BI applications with operational applications and – more importantly – with operational processes
- Develop an architecture that is component-based, loosely couple – move toward SOA
  - Determine if vendors involved in operational BI initiative are SOA-compliant or moving in that direction
  - Determine time frame for data – do you need real-time or will low latency data work?
- What data must flow from BI application into next step in workflow?

Getting Started: Operational BI Requirements

- **Mechanism to present events, triggers, alarms, etc.**
  - Tool for the operational manager to monitor events
  - Displays key operational metrics
- **Must be self-contained and easy to use**
  - Configurable to individual manager's needs
    - Self-service enabled
    - Can change the metrics or thresholds being tracked
    - Can change type of presentation & placement of metrics
  - Easily changed as business scenarios (situations) change
    - Ability to change business rules on the fly

Getting Started: Solid Data Integration Infrastructure

- Must have sound data integration infrastructure for a highly evolved business
  - Make use of all data integration technologies
  - Determine when to use each technique and technology
- Ensure infrastructure can ramp up to meet increasing pressure from operations for more…
- Ensure data security around operational BI is as tight as it is around operational systems
- Plan for future integration needs

Getting Started – Solid Data Integration Infrastructure Variables*

Source data type

structured
semi-structured
unstructured
packaged application
EAI/Web service
metadata

Data scale

number of data sources
data store size
data store volatility

Source data transformation

restructuring
reconciliation
cleansing
aggregation

Data integration technique & mode

consolidation
federation
propagation
changed data capture
synchronous/asynchronous
on-demand pull/event push

Source data organization

homogeneous/heterogeneous
centralized/distributed
federated/dispersed

Target data currency & access

real-time
near-real-time
point-in-time
read-only/read-write

Data integration technology

ETL (event/demand)
EAI, EDR
EII, ECM

* Thanks to Colin White for this slide

Mistake One

Mistake One: Assuming All Analytics Must Come from the Data Warehouse Environment

- The data warehouse is key supplier of data analytics, but not sole supplier of analytics:
  - Embedded BI services: Callable services within an operational workflow
  - Event analytics: may be created even before the transactional data is stored in an operational system
- Combination of traditional data analytics, embedded BI services, & event analytics form foundation
  - All three must come together at appropriate points in workflow to provide an effective operational decision-making environment

Mistake Two

Mistake Two: Failing to Match BI Agility with Business Needs

- There is a lag between the time an event happens and the time a company responds to it
  - Preparing data for analysis, running analysis and determining best course of action based on the results
  - Reducing time to action can have significant impact on a company's revenues and reputation = BI agility
  - Requires that action time match business need
- BUT, there are trade-offs
  - Is it timely enough for the business or is it actually too fast?
  - What is the soundness of architectural infrastructure – it should not become fragile just to meet an arbitrary time frame

Mistake Three

Mistake Three: Failing to Determine if the Infrastructure Can Support Operational BI

- Operational BI is different from traditional BI because it is closely tied to daily operations of the business
  - Operational BI system failure can severely impact operations – especially those supporting close to real-time decisions, e.g., fraud detection
- Embedding BI in operational processes, accessing live operational data, & capturing operational data events can all affect performance of operational systems
- Infrastructure of BI system, underlying data warehousing environment, and related operational systems must provide performance, scalability, availability, and reliability to meet operational BI service levels

Mistake Four

Mistake Four: Assuming that Operational BI is Just a Technology Solution

- Yes, technology is important, but just as important are standard operating procedures (SOPs) to be followed
  - Many BI implementers do not realize that their OBI solution impacts how people perform their jobs
  - Without understanding how SOPs will be affected, the OBI team can cause severe problems with operations or find their solutions being ignored or circumvented
  - OBI applications can cause big changes to processes and procedures so determine how the SOPs must change
  - Also determine which personnel will be affected by the new procedures and what training they will need

Mistake Five

Mistake Five: Assuming that Operational BI Simply Involves Capturing More Timely Data

- Although real-time or low-latency data is important for operational BI, there are other factors to be considered
  - The time it takes to analyze data increases the time it takes for a business user or an application to make a decision
  - Optimize queries for good performance
- Ensure efficient delivery of results to the BI consumer
  - Delivery medium (dashboard, portal, mobile device, action message) must be selected to match action time requirements
  - Availability of automated decision-making features (alerts, recommendations, decision workflows) help business users make faster decisions

Mistake Six

Mistake Six: Assuming Existing Data Quality Procedures Will Work for Operational BI

- Most data quality procedures are reactive; they detect and fix errors in data after it has been created.
    - True source of error (operational system) does not get corrected and continues to produce errors so the more you manipulate data after the fact, the more latency you introduce

- Operational BI requires dynamic environment, & the faster it gets, the more data quality processes have to speed up
    - Ideally for operational BI, data quality processes are proactive
    - BI team should understand how "perfect" data must be
    - In some situations, data may not be perfect but is good enough for the operational BI application

Mistake Seven

Mistake Seven: Failing to Realize that Operational BI is Process-Centric Rather than Data-Centric

- Strategic & tactical BI are data centric – providing data analytics for performance at specific time points
  - Data points rarely allow users to see performance of an individual, ongoing business process
  - Operational BI focuses on performance of specific business processes and business activities that make up that process
  - Event analytics enable organizations to spot bottlenecks in operations and identify activities that should be optimized
- Operational BI is process centric not data centric
  - Processes / workflows that are potential targets for operational BI must be well understood & documented for success

Mistake Eight

Mistake Eight: Assuming that Operational BI IT Skills are Same as Those for Other BI Types

- Growth occurs in analytical applications built by BI teams *and* in analytical solutions built by other groups
  - Operational Web analytics, content analytics, & operational applications groups are using technologies like business activity monitoring (BAM) and CEP for event analytics
  - Operational analytical applications require skills that may not exist in traditional BI organizations
  - Net result can be political battles, project control disagreements, budget fights & incorrect use of technologies
- Best practice – remove dividing lines between application development groups, create single development group with pooled skills and resources

Mistake Nine

Mistake Nine: Assuming that Users of Operational BI are the Same as Those for Other Types of BI

- Most traditional BI environments support a few 100 to a few 1000 users
  - Opening up BI to operational and front-line personnel means ramping up support to potentially thousands of users
  - Operational personnel need query response times to mimic other operational systems – sub-second to few seconds
- OBI users have different interface requirements, may be less technically savvy and analytical in their thinking
  - BI implementers – rethink how BI is delivered and study dashboards, portals, or other interfaces accordingly
  - Monitor usage patterns to revamp / revise interfaces as needed

Mistake Ten

Mistake Ten: Failing to Monitor and Audit Automated Decision Making

- Operational BI processing may need more automation for real-time or near-real-time responsiveness
  - How? Include rules-driven alerts and recommendations, decision workflows, data mining models, and decision engines
  - All are reliant on business rules based on business user expertise or by analyzing business trends and patterns

- Automated / semi-automated decisioning relies heavily on quality of rules for decisions & recommendations
  - Level of expertise of users creating rules and changing business circumstances have impacts
  - Important that these rules, and the decisions made based on these rules, are validated and audited regularly

Questions

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President
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www.IntelSols.com
CImhoff@Intelsols.com

About Intelligent Solutions

- Founded in 1992 by Claudia Imhoff
- Received outstanding recognition for client satisfaction (Dun and Bradstreet survey of our clients)
- Internationally recognized industry expertise
- Full line of Corporate Information Factory courses
- BI and Data Warehousing Consulting services
  - Mentoring
  - Assessment and Planning
  - Management
  - Design and Implementation
- International client base in all industry verticals