Business Activity Monitoring

Dag Oscar Olsen
Nordic Business Development Manager SOA & RFID
“BAM defines the concept of providing real-time access to critical business performance indicators to improve the speed and effectiveness of business operations.” — Gartner Group.
The Value of Business Activity Monitoring

- **Business Goal:**
  Iterative Process Improvement
  - Modify Process Flow
  - Exception Handling
  - Dynamic Process Assembly

- **Traditional Challenge:**
  Insight to Action Gap
  - Traditional BI Tools manage only what happened last time, not what is happening now
  - No opportunity to take corrective actions while there is still time to avert a crisis
  - No opportunity to leverage arbitrage opportunities

- **Solution:**
  Business Activity Monitoring
  - Monitor, Analyze & Act in real-time
  - Achieve process agility through in-flight change
Business Activity Monitoring: Why it matters?

- BAM enables business users to define and customize web based dashboards and alerts without IT support

- BAM helps detect business/IT problems proactively, find the root cause, and take corrective action

- BAM provides real-time business dashboards and alerts to monitor KPIs, SLAs and business processes
Correlation BAM, BI and CPM

- BAM is largely *born-of*, and is reshaping, two previously distinct technology markets:
  - Analytics and decision making of Business intelligence market
  - Real-time and business process linkage of Enterprise Application Integration (EAI)
- BAM focuses on what is happening, not what has, or might happen
- BAM sits *in-between* the historical and analytical focus of BI and the forward business planning of Corporate Performance Management

“Has happened”
“Happening”
“Could/Should Happen”

BI
(analysis and reporting)

BAM

CPM
(forecasting and data mining)
The BPM Lifecycle

BPM is about
- Process Modeling, Execution and Management
- Continuous Process Improvement
- Business and IT working together to achieve business objectives
- Making IT more responsive to changing business needs and conditions

Model

Simulate

Implement

Deploy

Execute

BPM Lifecycle

Business Process Analysis (BPA)
Three Major Cycles of Enterprise Development

**Business Development Cycle**

**Hand-over Cycle**

**SW/Systems Development Cycle**

**STUDY:** monitor, analyze, simulate, *understand*

**FORMULATE:** plan, *specify what* (without specifying how)

**DESIGN:** (re-)design/refine, simulate/prototype & *specify how* without actually implementing

**REALIZE:** implement, test, deploy & maintain: *construct* and *put to use*
One View of the Business Development Cycle

- Development is moved closer to business
- Language gap between business and IT is reduced
- Business gets analysis (business intelligence) & design tools

**IMPLEMENTATION, ORCHESTRATION: BPEL+**

- Invoke (use) $S_1$. If result is empty, invoke $S_2$. If not empty, invoke $S_3$.}

**BUSINESS DESIGN**

(BPMN, EPC, OD, ...)

**SYSTEM DESIGN & DEVELOPMENT**

(BPMN, EPC, OD, BPEL, ...)

**BUSINESS SIMULATION & RE-DESIGN**

(BPMN, EPC, OD, BPEL, ...)

**BUSINESS ACTIVITY MONITORING (BAM)**

(BPMN, EPC, OD, BPEL, ...)

**LOG**

Development is moved closer to business

Language gap between business and IT is reduced

Business gets analysis (business intelligence) & design tools
BI + BAM

✓ BAM adds real-time information to Business Intelligence

✓ Business Intelligence adds information context to BAM
# Real-Time DW vs. BAM

<table>
<thead>
<tr>
<th>Real-Time Data Warehousing</th>
<th>BAM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The decision-making process is not event-driven.</strong> Consider a customer making a large</td>
<td><strong>Event-driven decision making</strong> — Rather than depending on batch</td>
</tr>
<tr>
<td>deposit in his/her checking account. Even if the data/event related to the deposit is</td>
<td>extraction, loading into a data warehouse/data mart and running</td>
</tr>
<tr>
<td>loaded in the data warehouse in near-real time, no one in the bank will know about the</td>
<td>reports to check operational status, pure-play BAM systems are</td>
</tr>
<tr>
<td>event; therefore, the bank will miss an up-sell opportunity.</td>
<td>automatically triggered and updated by events that are important to</td>
</tr>
<tr>
<td></td>
<td>the business. Analytics are run on the events as they are</td>
</tr>
<tr>
<td></td>
<td>generated and actions are taken immediately.</td>
</tr>
<tr>
<td><strong>Dynamic modeling and use of business rules to define action are not supported.</strong> Data</td>
<td><strong>Rules-based monitoring and reporting</strong> — BAM products permit</td>
</tr>
<tr>
<td>models in the data warehouse cannot be changed easily and may require weeks or months of</td>
<td>dynamic modifications to data models and business rules on the fly,</td>
</tr>
<tr>
<td>data reloading and re-indexing to reflect changed models. Business rules cannot be</td>
<td>thanks to architectures that can be driven by business rules. The</td>
</tr>
<tr>
<td>specified to indicate action to be taken when thresholds are crossed.</td>
<td>more powerful and flexible the rules-driven capabilities, the better</td>
</tr>
<tr>
<td></td>
<td>the BAM implementation.</td>
</tr>
<tr>
<td><strong>Correlation of events over a time series is not possible.</strong> Many business scenarios</td>
<td><strong>Real-time integration of event and context data</strong> — By far the</td>
</tr>
<tr>
<td>require continuous monitoring of certain metrics over a period of time in order to</td>
<td>greatest technological challenge comes from dynamically combining</td>
</tr>
<tr>
<td>differentiate between a spike and a trend. Lack of time series processing may cause an</td>
<td>event data with contextual information to enable decisions to be</td>
</tr>
<tr>
<td>organization to overreact or have false positives.</td>
<td>made using a combination of operational, historical, plan and</td>
</tr>
<tr>
<td></td>
<td>forecast data. The best BAM systems will be those that employ</td>
</tr>
<tr>
<td></td>
<td>architectures that are highly tuned for this purpose.</td>
</tr>
<tr>
<td><strong>Tremendous latency is introduced.</strong> Loading large volumes of event data into a data</td>
<td><strong>No latency; comprehensive exception-alert capabilities</strong> — Events</td>
</tr>
<tr>
<td>warehouse can delay action on events significantly, especially because reports can only</td>
<td>are acted upon as soon as they occur by using an event-driven</td>
</tr>
<tr>
<td>be run after data has been loaded. This latency also precludes continuous monitoring of</td>
<td>processing model and streaming architecture that minimizes latency.</td>
</tr>
<tr>
<td>metrics or trends to inform business users about what action to take when exceptions</td>
<td>BAM products are highly optimized for minimizing latency between</td>
</tr>
<tr>
<td>occur.</td>
<td>event and action.</td>
</tr>
</tbody>
</table>
Oracle BAM Dashboard Examples
Key Concepts
#1-- Business Events Integration

**Business Apps**
- Business Events, state transitions

**RFID and Sensors**
- Active and Passive
- Location, Temperature, Moisture, Motion, etc.

**Messaging Systems**
- JMS, TIBCO, MQSeries
- Various Message Bus

**Security**
- Authentication, authorization, audit trail

**Business Process Management**
- Monitoring activities, states
- BPEL, ESB, OEMS, CEP, BEM

**System Management**
- Performance metrics, alerts, logs

**Database**
- Streams
#2 – Analyze Processes, Trends and Context

Monitor a Single Process
- Track each process step
- Identify failures

Process Aggregations
- Averages, KPIs, SLAs
- Identify bottlenecks

Complex Event Processing
- Correlate independent events
- Identify threats & opportunities

Context
- Historical performance
- Rolling average

Jan '04  Jan '05  Past 4 Hours
#3 – Interface for Business

**Users**

**Personalized Dashboards**
- Role-based access
- User defined and built

**Personalized Alerts**
- User defined alert rules
- Multi-channel delivery

**Embedded Actions**
- One-button response
- Initiate response workflow
Events and Services Work Together

Service and Event Network

- Service Consumer
- Service Provider
- Event Generator
- Event Object

**Event Generator**

**Event Object**

**Service Provider**

**Service Consumer**

**Loan Applicant**

**Web Application**

**Service: Apply for Loan**

**Event: Loan Request**

**Event Processor (BAM Server)**

**Event: High-Value Loan**

**Loan Manager**

**Workflow Service**

**Service: Queue Request**

**Service: Expedite Loan**

**Service: Apply for Loan**

**Service: Expedite Loan**
How Events Work

Example Technologies

The Event

Event Generator

- Application code
- Process engine
- RFID tag reader

Event Object

- XML message
- Binary encoding

Event Processor

- BAM
- CEP engine
- Application code

Response Service

- Web service
- Application code
- Automatically or Manually Invoked
BAM Methodology & Key Concepts

1. Sensors
2. Composite Events
3. Metrics and KPIs
4. Dashboards/Alerts
5. Response
BAM Methodology: Sensors

Sensors
Composite Events
KPIs
Alerts/Dashboards
Response

Sensors receiveInput invokeRD InvokeSM receivedRD receivedSM userReviewStart userReviewComplete InstanceCompletion
BAM Methodology: Composite Events

Sensors

Composite Events

KPIs

Alerts/Dashboards

Response

Composite Event: Orderbooking

```xml
<correlationSet>
  <correlation>
    <event name="LoanRequest" attribute="CustId"/>
    <event name="CreditCheck" attribute="CustId"/>
  </correlation>
</correlationSet>
```

CreditCheck Process

Orderbooking Process
BAM Methodology: Metrics

- Metrics are definitions of values of composite event properties or computed from other metrics and constants. For e.g
  - OrderProcessingTime
  - OrderAmount
- Metrics are a key component of monitoring the activities within an enterprise.
- Functions operate on a single instance of the composite event to derive the metric value.
BAM Methodology: KPIs

- Sensors
- Composite Events
- KPIs
- Alerts/Dashboards
- Response

Diagram:
- Processing Time
- Count Offers
- Count Request Rejects
- Count Requests
- Vendor
- Actual
- Target
- Variance
- Forecast
- Time
BAM Methodology: KPIs (cause & effect)

Sensors

Composite Events

KPIs

Alerts/Dashboards

Response
BAM Methodology: Dashboards

- Sensors
- Composite Events
- KPIs
- Alerts/Dashboards
- Response
BAM Methodology: Alerts

- Sensors
- Composite Events
- KPIs
- Alerts/Dashboards
- Response

Corrective Action

Notification

Sensors

Built-in Processors

BPEL
B2B
ESB
Adapter
The BPM Lifecycle

BPM is about

- Process Modeling, Execution and Management
- Continuous Process Improvement
- Business and IT working together to achieve business objectives
- Making IT more responsive to changing business needs and conditions
Oracle BAM Architecture
Customer Use Cases
In Flight Process Modification Patterns

Challenge: Modify Process Flow

“How do I get this months sales back on target”

“195% improvement in turn-over”

Challenge: Exception Management

“Business Process has too many manual steps!”

“Able to minimize stop-points and human touches”

Challenge: Dynamic Process Assembly

“How do I ensure I have the right items in stock”

“Able to control whole supply chain”
Modify Process Flow

- Rules de-couple decisions from process flow
- BAM allows users to modify Rules based on what's happening now
- Best practice for BPM / SOA applications
  - Dynamically change rules without redeploying process
  - Provide Agility & Transparency
• UK provider of high-risk loans
• Loan Application Approval Process uses BPEL, Rules and BAM processing 25,000 applications/day
• BAM monitors loan volume levels and adjusts approval criteria to trade-off partner SLA against bad debt
• Now “sense & respond” system via BAM, BPEL and Rules Engine
• Loan volume events adjust approval policies and trigger alternate process flows
• 195% improvement in turn-over
Exception Management

- Pro-actively detect exceptions
- Initiate process to resolve issues
- Spot “common” exception, e.g. issue with supplier
- Pause effected processes until resolution
• Unmatched simplicity to complex world of enterprise data center management

• Radically Transform Quote-to-Invoicing

• Simplification of Submit-to-Book Processes to Minimize / Eliminate, Stop-Points and Human Touches.

• Automated PO, Confirmation, Order Status, Adv. Shipment Notice & Invoice

• BAM monitors conformance to SLA’s by Distributors - Enabling management by Exception

• Dramatic Reduction in Order to Invoice Cycle Time
Dynamic Process Assembly

• BAM provides real-time view on end to end process.
• Decisions based on real-time data.
• Process can be assembled from process fragments at run time.
• Third largest retailer worldwide.
• Loss through Out of Stock estimated at 1 Billion € for German retailing.
• Reality is “Not-on-shelf-but-on-stock”
• RFID used for accurate stock management.
• BAM monitors actual and expected inventory levels
• BAM used to warn if inventory levels are below certain thresholds
• Ideal is not to monitor just in-store logistics, but whole supply chain
Oracle BAM
Customers
Cattles Bank:

Business Drivers

• Improved customer and partner service
• Entry into new markets and territories
• Expansion into related business sectors
• Increased cross-selling and up-selling
• Strategic alliances
• Innovative product development
• Growth in business volume
• Smarter business practices
• Increased customer orientation
• Integrated and scaleable systems
• Efficiency improvements in IT delivery
• Reliable and accurate up-to-date management information
Manual Processing

Product Allocation

MIDA Customer Database

EXPERIAN Credit Bureau

Address Targeting

Credit Score & Bureau

Product Allocation

Decision

Data Capture

Manual Processing