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Advanced Analytics in Continuous Auditing

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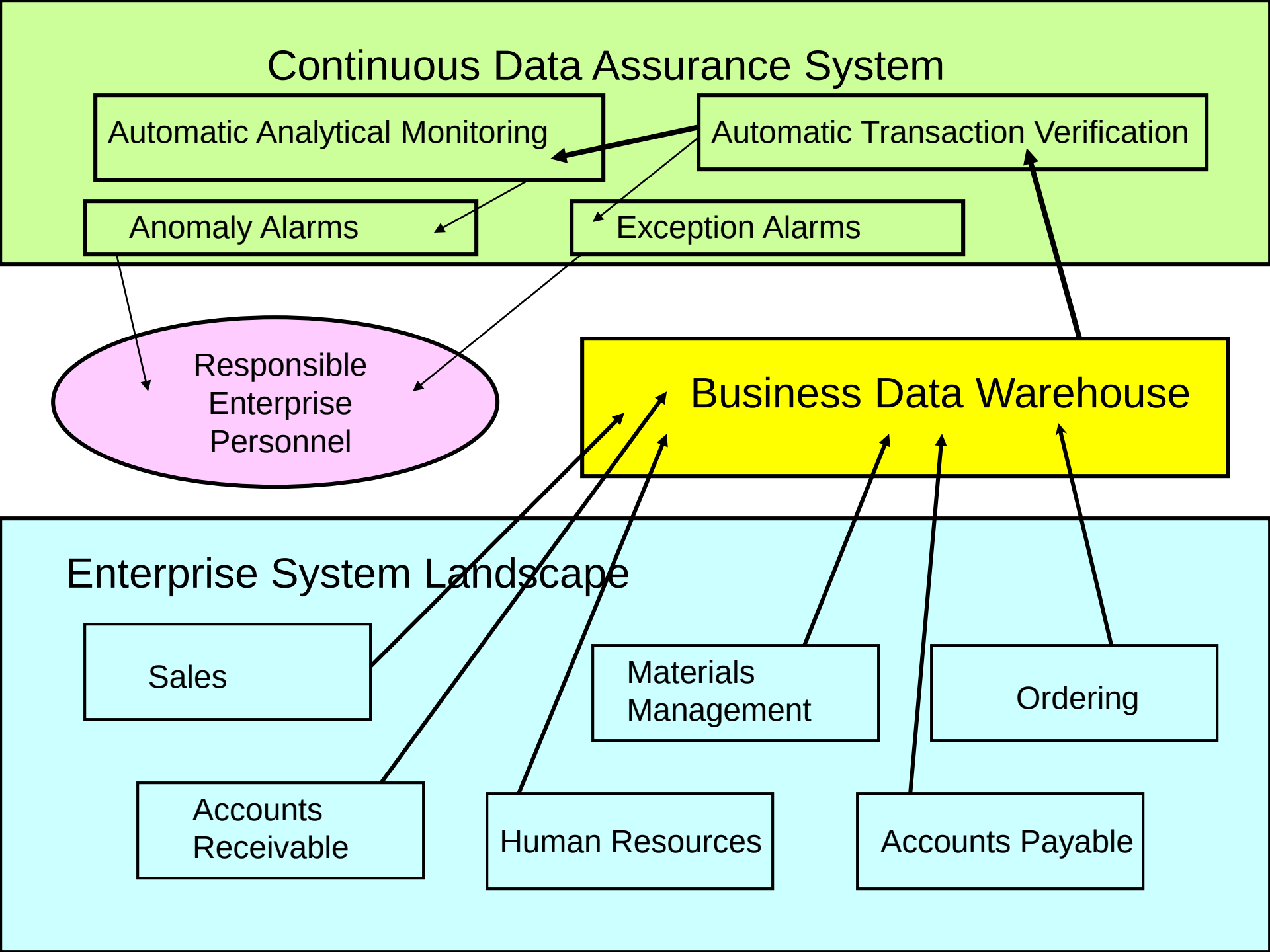
Analytical Procedures in CA

- Analytical procedures are used in the planning, substantive testing, and reviewing stages of an audit. We focus on substantive testing.
- Conventional auditing: First, apply **analytical procedures** to identify potential problems. Then, focus **detailed transaction testing** on the identified problem areas.
- In CDA the **sequence is reversed**:
  1. Apply automated **detailed transaction tests** to all the transactions and filter out identified **exceptions** for resolution.
  2. Apply automated **analytical procedures** to the filtered transaction stream to identify unforeseen problems.
  3. Alert **humans to investigate anomalies.**

Continuous Data Assurance

- Automation of **Transaction Testing**:
  - Formalization of business process rules as transaction integrity and validity constraints.
  - Verification of transaction integrity and validity → detection of **exceptions** → generation of **alarms**.
- Automation of **Analytical Procedures**:
  - Selection of critical business process metrics and development of stable business flow (continuity) equations.
  - Monitoring of continuity equation residuals → detection of **anomalies** → generation of **alarms**.


Continuous Data Assurance System
Automatic Analytical Monitoring
Automatic Transaction Verification
Anomaly Alarms
Exception Alarms
Responsible Enterprise Personnel
Business Data Warehouse
Enterprise System Landscape
Sales
Materials Management
Ordering
Accounts Receivable
Human Resources
Accounts Payable

Examples of Advanced Analytical Modeling

- **Continuity Equations:**
  - Stable probabilistic models of highly disaggregated business processes, used as the expectation models for process-based analytical procedures.
  - Expectation models can be inferred using various statistical methodologies, e.g., linear regression, simultaneous equations, multivariate time series modeling.
  - Anomalies are identified as actual values outside the interval predicted by the model.
- **Clustering:**
  - Anomalies are identified is either observations that are far from cluster centers, or as all observations in small and remote clusters.