

# Analysis Patterns

## Reusable Object Models

4 pattern groups • 19 patterns • Domain model diagrams • EA mapping

### Accountability

6 patterns

### Observations

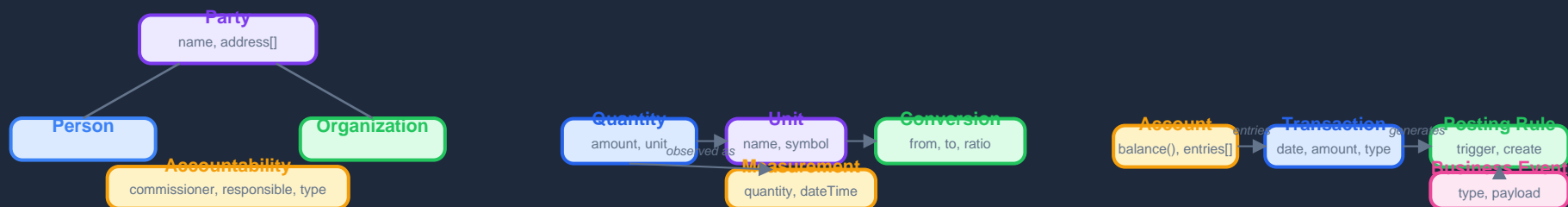
5 patterns

### Temporal

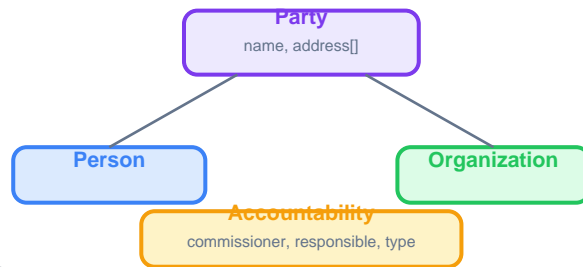
5 patterns

### Planning & Trading

6 patterns



# Accountability Patterns — People, Organizations & Responsibilities



## Party & Accountability pattern

Root abstraction for any person or organization. Person/Org specialize it. Roles are separate objects, NOT subtypes.

Insight: Prevents "one class per role" explosion. Customer today, Supplier tomorrow — same Party, different Role.

EA: Maps to Business Actor in ArchiMate. Foundation for CRM, HR, IAM.

## Organization Hierarchy

Recursive tree: Organization contains Organizations. Divisions, departments, legal entities.

Insight: Use for stable trees. For matrix/dotted-line/virtual teams, use Organization Structure instead.

EA: ArchiMate Composition between Business Actor elements.

## Organization Structure

Type-based flexible org. StructureType defines valid relationships. Matrix orgs without code changes.

Insight: Same data model supports tree, matrix, and network. Change type rules, not code.

EA: StructureType becomes reference data — configuration service, not hard-coded logic.

## Accountability

Commissioner (Party) → Responsible (Party), typed by AccountabilityType.

Insight: Type defines nature: employment, management, regulation. Knowledge Level constrains valid combinations.

EA: ArchiMate Assignment and Serving. Every EA model uses this implicitly.

## Knowledge Level

Meta-rules: which AccountabilityTypes valid between which PartyTypes.

Insight: Example: "Only Organization can employ." "Person cannot regulate Person directly." Governance at model level.

EA: Architecture repository constraint rules that validate model correctness.

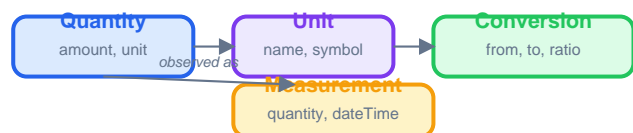
## Party Type Generalizations

Subtype by nature (Person/Org), role by assignment. Roles are temporal, not permanent.

Insight: One Party entity with dynamic roles replaces dozens of specialized types across the enterprise.

EA: Prevents class explosion. Maps to actor with multiple role assignments.

# Observation & Measurement Patterns — What We See and Measure



## Quantity Unit, Conversion & Measurement

Amount + Unit. Never store naked numbers. "150" meaningless; "150 km/h" is a Quantity.

Insight: Prevents unit mismatch — Mars Climate Orbiter crashed from pounds vs newtons (1999). Highest-impact data quality pattern.

EA: Every data model with measurements, financials, or physics should use this.

## Unit & Conversion

Units have dimensions (length, mass, time). Conversions link them (1 mile = 1.609 km). Compounds: km/h, \$/kg.

Insight: Enables transparent unit translation. Users see preferred units; storage uses canonical form.

EA: Shared Unit Reference Data service consumed by every measurement-producing system.

## Measurement

Quantity observed at specific DateTime by identified observer using specified protocol.

Insight: Foundation for all time-series: sensors, financials, health vitals, IoT telemetry, KPI tracking.

EA: Maps to Data Objects in ArchiMate. Temporal dimension critical for analytics and audit.

## Observation

Generalization of Measurement: categorical (pass/fail), ordinal (1-5 stars), textual (notes).

Insight: Unifies all evidence types. Not just numbers — any recorded evidence under one abstraction.

EA: Essential for healthcare, QA, inspection — domains where observations are not purely numeric.

## Range

Upper/lower bounds for Quantity. Blood pressure 90/60-120/80. Tax bracket \$44K-\$95K → 22%.

Insight: Explicit Range objects replace magic numbers scattered through business rules. Single source of truth.

EA: Every compliance domain. Explicit modeling enables automated validation and bracket classification.

# Temporal Patterns — Modeling Time, History & Change

## Effectivity

validFrom, validTo

## Temporal Prop

history of values

## Snapshot

current state

## Bi-temporal

valid + transaction time

### Effectivity

Four temporal approaches: Effectivity, Temporal Property, Snapshot, Bi-temporal

Valid-from / valid-to on any record. Tax rates, roles, contracts. Multiple versions coexist.

Insight: Without effectivity, cannot distinguish current from historical. No overwrites, no data loss.

EA: Non-negotiable for compliance. Every master data record should carry effectivity dates.

### Temporal Property

Property value changes over time with full history. Each change = new entry with dates.

Insight: Answers: "what was value at time T?" Critical for audit, compliance, analytics, reporting.

EA: Foundation of SCD Type 2 in data warehousing. Without it, cannot reproduce historical reports.

### Snapshot & History

Snapshot = current state (fast). History = full timeline (complete audit trail). Need both.

Insight: Most enterprise systems need operational queries (Snapshot) AND audit/analytics (History).

EA: Maps to CQRS: read-optimized current projection + write-optimized event/history store.

### Audit Trail

Who changed what, when, why. Immutable append-only log. Never delete audit entries.

Insight: Every change is a first-class event: actor, timestamp, change type, reason. Forensic history.

EA: Maps to event sourcing. Audit requirements often drive adoption of temporal modeling.

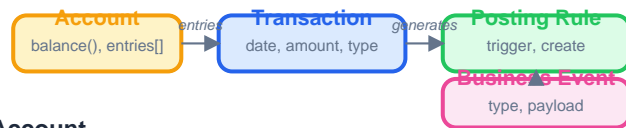
### Bi-temporal

Two axes: transaction time (when recorded) + valid time (when true). Both tracked independently.

Insight: Enables: "as of Jan 15, what did we know about Dec 31?" Corrections fully traceable.

EA: Essential for financial restatements, regulatory as-of reporting, late-arriving data corrections.

# Planning & Trading Patterns — Accounts, Transactions & Scenarios



## Account

Account → Transaction → Posting Rule, triggered by Business Event

Accumulator of entries with running balance. Not just financial: loyalty, capacity, inventory, carbon credits.

Insight: Most universal tracking abstraction. Any quantity that accumulates and depletes through transactions.

EA: ArchiMate Business Object with deposit/withdraw/balance Services. In virtually every domain.

## Transaction

Atomic business activity creating account entries. Immutable: correct by reversals, never editing.

Insight: Foundation of double-entry bookkeeping. Immutability enables complete, trustworthy audit trails.

EA: Maps to Business Events in ArchiMate. Immutability is the key architectural constraint.

## Posting Rule

Auto-generates entries on events. Sale → debit inventory, credit revenue. Change rules, not data.

Insight: Separates "what happened" from "accounting consequence." Policy changes without data migration.

EA: Event-driven architecture for accounting. Events trigger rules producing entries.

## Scenario

What-if planning: budget optimistic/conservative, with/without acquisition. Same Account structure.

Insight: Reuses actual Account/Entry model. No separate data model. Compare projected vs actual.

EA: Enables enterprise planning without polluting actual data.

## Contract

Binds parties to terms with effectivity. Bridges Accountability (who?) and Temporal (when valid?).

Insight: Insurance, loans, SLAs, employment. Links multiple pattern groups together.

EA: ArchiMate Contract (passive element). Links Party + Effectivity.

## Portfolio

Groups contracts for collective management. Insurance books, loan portfolios, investment funds.

Insight: Aggregation enables portfolio-level risk, valuation, and reporting.

EA: ArchiMate Aggregation of Contracts. Portfolio-level analysis and reporting.

# Cross-Pattern Relationships & How to Apply

## Accountability → Temporal

Accountabilities have effectivity. Employment valid from hire to termination.  
Every accountability instance should carry effectivity. Temporal Property tracks role changes.

## Accountability → Planning

Contracts bind Parties to Terms. Accounts track what Parties owe or own.  
Contract connects accountability to financial obligations. Portfolio groups contracts per Party.

## Observations → Temporal

Measurements are inherently temporal — every observation has a timestamp.  
Combine Measurement with Temporal Property for full time-series. Add Bi-temporal for corrections.

## Observations → Planning

Account balances are Quantities. Transactions create Measurements of economic activity.  
Quantity ensures all financials carry currency unit. Posting Rules generate Measurements.

## Temporal → Planning

Scenarios project future temporal states. Contracts have effectivity. Transactions are immutable.  
Bi-temporal enables as-of financial reporting. Scenario uses temporal projections.

Apply these patterns in real architecture projects

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