ARCHITECTURE REFERENCE

# ODT-CDA


## Conditions, Indicators, and Thresholds – structured approach

*Architecture Reference*

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# CONDITIONS, INDICATORS, AND THRESHOLDS – STRUCTURED APPROACH

1. How to structure a **Condition**
2. How to structure **Indicators**
3. How to structure **Thresholds**
4. Your examples, but encoded in that structure

## 1. CONDITION – STRUCTURE IT SO THE "SENTENCE" IS ASSEMBLED, NOT TYPED

Instead of one big free-text box, model a condition as **slots + enums** that the UI composes into a sentence.

### 1.1 Condition core fields

```
Condition:
  id: COND-001
  category:        # ENUM
  domain:          # ENUM
  subject_type:    # ENUM
  subject_ref:     # FK to AOI/Unit/Route/etc
  state_type:      # ENUM
  risk_direction:  # ENUM
  time_horizon:    # ENUM
  main_metric_id:  # FK to Indicator/Metric
  logic_profile:   # ENUM
  description_text # OPTIONAL, constrained free text
```

### 1.2 Suggested enums (for dropdowns)

**category** (what part of the end state):

- `SECURITY`
- `GOVERNANCE`
- `ESSENTIAL_SERVICES`
- `TERRAIN_CONTROL`
- `FORCE_GENERATION`
- `FREEDOM_OF_MOVEMENT`
- `INFORMATION_ENVIRONMENT`
- `CIVIL_SUPPORT`

**domain** (where it "lives"):

- `PHYSICAL`
- `INFORMATION`
- `COGNITIVE`
- `CYBER`
- `EMS`

**subject_type**:

- `ROUTE`
- `URBAN_AREA`
- `KEY_TERRAIN`
- `POPULATION_GROUP`
- `SECURITY_FORCE`
- `INFRASTRUCTURE_SITE`
- `GOVERNMENT_BODY`
- `SERVICE_SYSTEM` # e.g. power, water, comms

**state_type** (the state of the environment, NOT action verbs):

- `SECURE`
- `OPEN`
- `FUNCTIONAL`
- `DEGRADED`
- `NEUTRALIZED`
- `CONTAINED`

- `INDEPENDENTLY_CAPABLE`
- `STABLE`
- `DENIED` # for adversary
- `PERMISSIVE` # for friendly ops

**risk_direction**:

- `IMPROVING`
- `DETERIORATING`
- `STABLE`
- `UNKNOWN`

**time_horizon**:

- `IMMEDIATE` # 0–72h
- `NEAR_TERM` # < 30 days
- `MID_TERM` # 30–180 days
- `LONG_TERM` # > 180 days

**logic_profile** (how indicators combine):

- `SINGLE_METRIC`
- `ALL_INDICATORS_REQUIRED` # logical AND
- `ANY_INDICATOR_SUFFICIENT` # logical OR
- `WEIGHTED_SCORE` # MOE-style

### 1.3 Validation rules for Conditions (form-level)

These are the guardrails you asked for.

1. **No actions**
2. Reject conditions where description_text contains patterns like:
   - `"conduct"` `"execute"` `"deploy"` `"train"` `"advise"` `"attack"`
   - Force the user to pick **state_type** instead.
3. **Single subject**
4. Only **one** `subject_type` and `subject_ref` allowed.
5. If the user tries to encode "MSR Red **and** MSR Blue," force them to create two conditions:
   - `ROUTE: MSR Red`
   - `ROUTE: MSR Blue`
6. **Binary / threshold based**

7. Require at least one `main_metric_id` **and** at least one linked Threshold (see section 3).
8. Condition cannot be saved without a **machine-readable** threshold.
9. **Independent (no bundle)**
10. Disallow "and/or" in description_text:
    - Regex check rejects `\b(and|or)\b` unless in a predefined allowed phrase.
    - UI hint: "If you need AND/OR, create multiple Conditions."
11. **Measurable**
12. At least one linked Indicator with:
    - numeric or categorical data type
    - defined data source
    - threshold attached.

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## 2. INDICATORS – PRE-DEFINED, TYPED, AND RE-USABLE

Indicators should be **library objects** you select, not free text.

### 2.1 Indicator structure

```
Indicator:
  id: IND-001
  name:              # controlled phrase
  metric_code:       # short code, e.g. "ATTACKS_PER_WEEK"
  data_type:         # ENUM
  unit:              # ENUM
  aggregation:       # ENUM
  source_type:       # ENUM
  source_ref:        # optional FK
  collection_frequency: # ENUM
  level:             # ENUM (TACTICAL/OPERATIONAL/STRATEGIC)
```

### 2.2 Suggested enums

**data_type**:

- `INTEGER`
- `FLOAT`
- `PERCENTAGE`
- `BOOLEAN`

- `ENUM_CATEGORY`
- `RATIO`

**unit**:

- `NONE`
- `COUNT`
- `PERCENT`
- `KM`
- `MINUTE`
- `HOUR`
- `DAY`
- `CHECKPOINTS`
- `INCIDENTS`
- `VEHICLES`

**aggregation**:

- `AVERAGE`
- `SUM`
- `MAX`
- `MIN`
- `MEDIAN`
- `RATE_PER_TIME`

**source_type**:

- `ISR_FEED`
- `PATROL_REPORTS`
- `MOVEMENT_TRACKING_SYSTEM`
- `POLICE_REPORTS`
- `OSINT`
- `HOST_NATION_REPORTING`
- `PLATFORM_DATASET` # for Foundry / DB

**collection_frequency**:

- `REAL_TIME`
- `HOURLY`
- `DAILY`
- `WEEKLY`

- `BIWEEKLY`
- `MONTHLY`

**level**:

- `TACTICAL`
- `OPERATIONAL`
- `STRATEGIC`

### 2.3 Validation rules for Indicators

- **No free text names** in forms:
- `name` selected from a **pre-approved list**.
- Admins can add new ones via a separate "Indicator Catalog" workflow, not ad hoc in the condition form.
- **Must have a numeric or discrete shape**:
- `data_type` + `unit` required.
- **Must have a source**:
- `source_type` required; optionally `source_ref` (dataset ID, report series, etc.).

## 3. THRESHOLDS – TREAT THEM LIKE SMALL EXPRESSIONS, NOT SENTENCES

Thresholds are where you prove the "binary / measurable" part. Again: no free prose, just an expression builder.

### 3.1 Threshold structure

```
Threshold:
  id: THR-001
  indicator_id:   # FK → Indicator
  operator:       # ENUM
  value:          # numeric or category code
  unit_override:  # optional if different view
  time_window:    # duration label
  evaluation_span: # e.g., "ROLLING_14_DAYS"
  sustainment_requirement: # e.g., "CONSECUTIVE", "NON_CONSECUTIVE"
  interpretation: # ENUM
```

**operator**:

- `LT` # less than
- `LE` # less than or equal
- `GT`
- `GE`
- `EQ`
- `NE`
- `IN_SET` # for categorical
- `NOT_IN_SET`

**time_window**:

- `PER_DAY`
- `PER_WEEK`
- `PER_MONTH`
- `ROLLING_7_DAYS`
- `ROLLING_14_DAYS`
- `ROLLING_30_DAYS`

**sustainment_requirement**:

- `NONE` # snapshot
- `CONSECUTIVE`
- `NON_CONSECUTIVE`

**interpretation**:

- `CONDITION_ACHIEVED`
- `CONDITION_NOT_ACHIEVED`
- `CONDITION_AT_RISK`

### 3.2 Validation rules for Thresholds

- `value` must match `Indicator.data_type` (numeric vs categorical).
- `unit_override` must be compatible with the indicator's unit (no minutes on a % indicator).
- Threshold must be linked to **exactly one** indicator.

# 4. YOUR EXAMPLES, ENCODED WITHOUT FREE TEXT

## 4.1 Condition: "MSR Red is secure and open."

### Condition record

```
Condition:
  id: COND-ROUTE-MSR-RED-SECURE
  category: FREEDOM_OF_MOVEMENT
  domain: PHYSICAL
  subject_type: ROUTE
  subject_ref: "MSR Red"        # FK to AOI/Route table
  state_type: SECURE
  risk_direction: IMPROVING
  time_horizon: NEAR_TERM
  main_metric_id: IND-ATTACKS-MSR-RED
  logic_profile: ALL_INDICATORS_REQUIRED
  description_text: "MSR Red remains open and secure for friendly logistics use."
```

### Indicators

```
Indicator:
  - id: IND-ATTACKS-MSR-RED
    name: "Number of attacks on MSR Red"
    metric_code: "ATTACKS_PER_WEEK_MSR_RED"
    data_type: INTEGER
    unit: INCIDENTS
    aggregation: SUM
    source_type: PATROL_REPORTS
    collection_frequency: DAILY
    level: OPERATIONAL

  - id: IND-TRANSIT-TIME-MSR-RED
    name: "Average convoy transit time on MSR Red"
    metric_code: "CONVOY_TRANSIT_MINUTES_MSR_RED"
    data_type: FLOAT
    unit: MINUTE
    aggregation: AVERAGE
    source_type: MOVEMENT_TRACKING_SYSTEM
    collection_frequency: DAILY
    level: OPERATIONAL

  - id: IND-ROUTE-CLEARANCE-MSR-RED
    name: "Route clearance operations per week on MSR Red"
    metric_code: "ROUTE_CLEARANCE_FREQ_MSR_RED"
    data_type: INTEGER
    unit: COUNT
    aggregation: SUM
    source_type: PATROL_REPORTS
    collection_frequency: WEEKLY
```

```
    level: TACTICAL

  - id: IND-CHECKPOINTS-MSR-RED
    name: "Operational checkpoints on MSR Red"
    metric_code: "CHECKPOINTS_OPERATIONAL_MSR_RED"
    data_type: INTEGER
    unit: CHECKPOINTS
    aggregation: MIN
    source_type: HOST_NATION_REPORTING
    collection_frequency: DAILY
    level: TACTICAL
```

**Thresholds (from your text)**

```
Threshold:
  - id: THR-ATTACKS-MSR-RED
    indicator_id: IND-ATTACKS-MSR-RED
    operator: LT
    value: 2
    time_window: ROLLING_14_DAYS
    sustainment_requirement: CONSECUTIVE
    interpretation: CONDITION_ACHIEVED

  - id: THR-TRANSIT-TIME-MSR-RED
    indicator_id: IND-TRANSIT-TIME-MSR-RED
    operator: LT
    value: 45
    time_window: PER_TRIP
    sustainment_requirement: NONE
    interpretation: CONDITION_ACHIEVED

  - id: THR-CHECKPOINTS-MSR-RED
    indicator_id: IND-CHECKPOINTS-MSR-RED
    operator: GE
    value: 4
    time_window: PER_DAY
    sustainment_requirement: CONSECUTIVE
    interpretation: CONDITION_ACHIEVED
```

The condition is **ACHIEVED** if all associated thresholds with `interpretation=CONDITION_ACHIEVED` are true.

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## 4.2 Condition: "Host-nation police can independently conduct daily law-enforcement operations."

**Condition**

```
Condition:
  id: COND-HN-POLICE-INDEPENDENT
  category: SECURITY
```

```
  domain: PHYSICAL
  subject_type: SECURITY_FORCE
  subject_ref: "Host-nation police – AO Main City"
  state_type: INDEPENDENTLY_CAPABLE
  risk_direction: STABLE
  time_horizon: MID_TERM
  main_metric_id: IND-HN-OPERATIONS-PER-DAY
  logic_profile: ALL_INDICATORS_REQUIRED
  description_text: "Host-nation police independently conduct routine law-enforcement
operations in AO Main City."
```

**Indicator examples**

- Number of **independent** HN patrols per day
- Percentage of incidents resolved without coalition intervention
- Number of functional HN police stations in AO
- Ratio of HN-led to coalition-led operations

Each one is a structured `Indicator` + `Threshold`, not free text.

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## 5. HOW THIS LOOKS IN A FORM (PRACTICALLY)

Instead of a big "Describe the condition" box, your form would have:

1. **Dropdowns:**
2. Category, Domain, Subject Type, State Type, Time Horizon
3. **Lookup fields:**
4. Subject Reference (AOI, route, unit from existing tables)
5. **Indicator selector:**
6. Multi-select from "Indicator catalog"
7. **Threshold builder for each Indicator:**
8. Operator (dropdown)
9. Numeric value (number field)
10. Unit (dropdown, auto-filled from Indicator)
11. Time window (dropdown)
12. Sustainment requirement (dropdown)
13. **Optional text:**
14. Short narrative description (with banned words & regex validation)

Free text is **only**:

- Short description (tight length + regex filters)
- Maybe a comments/notes field that doesn't drive logic