

CRI_spec

Continuous Research Integration (CRI) — Specification (MVP)

Status: Draft (MVP)

Scope: Defines how this repository executes **Continuous Research Integration** (CRI) runs: *ingest → machine validation → human review → commit*.

Goal: Make research updates reproducible, auditable, and falsifiable by construction.

1. Goals & Non-Goals

Goals - Reproducibility: every run writes a timestamped, immutable folder under `runs/`.

- **Falsifiability:** claims must include predictions with tolerances or explicit falsification tests.

- **Human-in-the-loop:** two gates (Scope & Merge) with checklists and recorded approvals.

- **Minimal vendor lock:** local fallbacks work in CI; providers are pluggable later.

Non-Goals (MVP) - No external LLM providers required (local fallbacks only).

- No dataset downloads or networked replication (air-gapped default).

2. Lifecycle (Happy Path)

1. **Trigger:** GitHub Actions workflow `awo-run.yml` (manual or on push).

2. **Run:** `scripts/awo_run.py workflows/<name>.json`

3. **Machine checks:**

- `scope_validate` enforces testability.
- `assert_contains` applies content guardrails.

4. **Scope Gate:** Environment `awo-scope` renders preview summary for human approval.

5. **Merge Gate:** Environment `awo-audit` presents final run facts for approval.

6. **Publish:** Full run directory is committed to `runs/run_YYYY-MM-DDTHH-MM-SSZ/`.

3. Roles (Logical)

- **Proposer**: produces candidate outputs (e.g., simulated fan-out).
 - **Auditor-Static**: deterministic checks (`scope_validate`, `assert_contains`).
 - **Consensus**: reduces multiple outputs to a representative result.
 - **Human Gate**: scope + merge approvals recorded.
 - **Planned**: Refuter (adversarial rounds), Replicator (containerized re-run).
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4. Required Artifacts (Per Run)

Each run directory (`runs/run_<UTC_ISO>/`) includes:

Always - `index.json` — run metadata { `run_id`, `started_at`, `status`, `finished_at?` }.
- `workflow_frozen.json` — exact workflow used.
- `report.md` — human-readable step summary.
- `steps/*.json` — structured logs of each step.
- `scope/summary.json` — scope validation results.
- `scope/claims/*.json` — frozen claim inputs.

Conditional - `gate_decision.yml` — only written if `audit_gate` triggers.
- `approval.json` — only written after merge approval.

5. File / Folder Contract

```
workflows/  
    multimodel.json      # example workflow  
scripts/  
    awo_run.py          # CRI runner (stdlib only)  
.github/workflows/  
    awo-run.yml         # CI runner  
runs/  
    run_YYYY-MM-DDTHH-MM-SSZ/  
        index.json  
        workflow_frozen.json  
        report.md  
        steps/  
        scope/  
            summary.json  
            claims/*.json  
        gate_decision.yml   (conditional)  
        approval.json       (conditional)
```

6. Step Operations (MVP)

6.1 scope_validate

- **Purpose:** enforce testability.
- **Output:** scope/summary.json, scope/claims/*.json.

Schema (summary.json):

```
{  
    "claims_checked": 1,  
    "overall_ok": true,  
    "details": [  
        { "id": "claim-hello-001", "ok": true, "problems": [] }  
    ],  
    "notes": [],  
    "ts": "2025-09-12T01-31-09Z"  
}
```

Claim requirements:

```
{  
    "id": "string",  
    "statement": "string",  
    "predictions": [  
        { "name": "...", "function": "...", "tolerance": {"metric": "RMSE", "max": 0.05} }  
    ],  
    "falsification_tests": [  
        { "name": "...", "must_pass": true }  
    ]  
}
```

6.2 fanout_generate

- Simulates multiple models (echo, upper, reverse).
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6.3 consensus_vote

- Normalizes outputs, counts agreement, emits consensus_text.
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6.4 assert_contains

- Guards required content.
 - Fails the run if missing.
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6.5 audit_gate

- Creates `gate_decision.yml`, halts run with status `pending_review`.
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7. Gates & UX

- **Scope Gate (awo-scope)**: Preview + approve scope summary.
 - **Merge Gate (awo-audit)**: Preview + approve final run facts.
 - After approval, the run is auto-committed.
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8. Versioning & Invariants

- Runner always writes `workflow_frozen.json` and `index.json` at start.
 - All timestamps UTC, format YYYY-MM-DDTHH-MM-SSZ.
 - Adding ops = backward compatible.
 - Breaking changes → bump minor version + ADR.
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9. Security & Privacy

- No external network calls (MVP).
 - No secrets required.
 - Future adapters must handle secrets via GitHub encrypted secrets.
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10. Roadmap

- **Refuter**: adversarial rounds; halt if unaddressed failures remain.
 - **Replicator**: containerized re-run + tolerance diff.
 - **Provider adapters (future)**: pluggable connectors to external LLM APIs.
Status: not implemented in the MVP. When added, adapters will:
 - run behind a provider interface,
 - log {provider, model, api_version, params, seed, cost_estimate} to steps/*.json,
 - respect repo-wide reproducibility settings (seeds/temp), and
 - be optional—local fallbacks remain the default.
 - **Consensus with dissent ledger**: record unresolved objections.
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Appendix A — Example Workflow

```
{  
  "name": "Multi-model consensus demo (CRI)",  
  "steps": [  
    {  
      "id": "scope_1",  
      "op": "scope_validate",  
      "args": {  
        "claim": {  
          "id": "claim-hello-001",  
          "statement": "A demo claim asserting the summary mentions battery life and confusing  
          "predictions": [  
            {  
              "name": "mentions-battery",  
              "function": "text-contains('battery lasts all day')",  
              "tolerance": {"metric": "boolean", "max": 1}  
            }  
          ],  
          "falsification_tests": [  
            { "name": "mentions-ui-confusing", "must_pass": true }  
          ]  
        }  
      }  
    },  
    {  
      "id": "fanout_1",  
      "op": "fanout_generate",  
      "prompt": "Summarize: The battery lasts all day but the UI is confusing.",  
      "models": ["echo", "upper", "reverse"],  
      "params": { "seed": 123 }  
    },  
    {  
      "id": "consensus_1",  
      "op": "consensus_vote",  
      "inputs_from": "fanout_1"  
    },  
    {  
      "id": "assert_consensus_quality",  
      "op": "assert_contains",  
      "args": {  
        "from_step": "consensus_1",  
        "field": "consensus_text",  
        "must_include": [  
          "battery lasts all day",  
          "ui is confusing"  
        ]  
      }  
    }  
  ]  
}
```

```
},
{
  "id": "gate_review",
  "op": "audit_gate",
  "args": { "checklist": "templates/audit-checklist.md" }
},
{
  "id": "emit_consensus",
  "op": "write_text",
  "args": { "path": "notes/consensus.txt", "from_step": "consensus_1", "field": "consensus" }
}
]
```