Multi-Agent Orchestration (RAD_TSHIRT v4.0 Edition)

Punchy guide to context lifecycle + role clarity.

Slide index

- Why → #why
- Roles → #roles-t-shirt-stays-on-roles-dont-change
- Visuals → #visuals
- Lifecycle → #lifecycle-capture--compress--hydrate--rehydrate
- Capsule → #minimal-capsule-template
- Enforcement → #enforcement-that-helps-sizes
- Patterns → #patterns-that-work
- Do these first → #do-these-first
- Metrics → #success-metrics

Why

- Models forget; teams shouldn't
- RAD_TSHIRT = guardrails; this guide = habits
- Outcomes: less rediscovery, more parallelism

Roles (wardrobe of t-shirts)

- PM shirt (Conductor): orchestrate/delegate only
- LEAD shirt (Lead engineer): code/test/architect
- DEV shirt (Implementation): git/CI/CD/scripts
- QA shirt (Quality): test/audit/validate
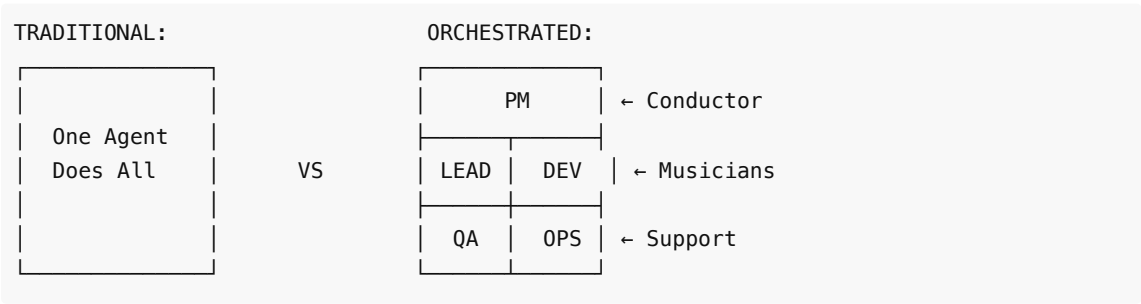- OPS shirt (Operations): monitor/evolve/enforce

Wardrobe

```
[ PM ]    [ LEAD ]    [ DEV ]    [ QA ]    [ OPS ]
  (👕)       (👕)        (👕)       (👕)        (👕)
```

Rule: switching shirts = switching permissions; never mix shirts.

Visuals

Orchestration vs One Agent

```
TRADITIONAL:                 ORCHESTRATED:

┌──────────────┐             ┌──────────────┐
│              │             │      PM      │ ← Conductor
│   One Agent  │             ├──────┬───────┤
│   Does All   │     VS      │ LEAD │  DEV  │ ← Musicians
│              │             ├──────┼───────┤
│              │             │  QA  │  OPS  │ ← Support
└──────────────┘             └──────┴───────┘
```

Why it works

- Division of labor: section players (LEAD/DEV/QA/Ops) specialize and move in parallel
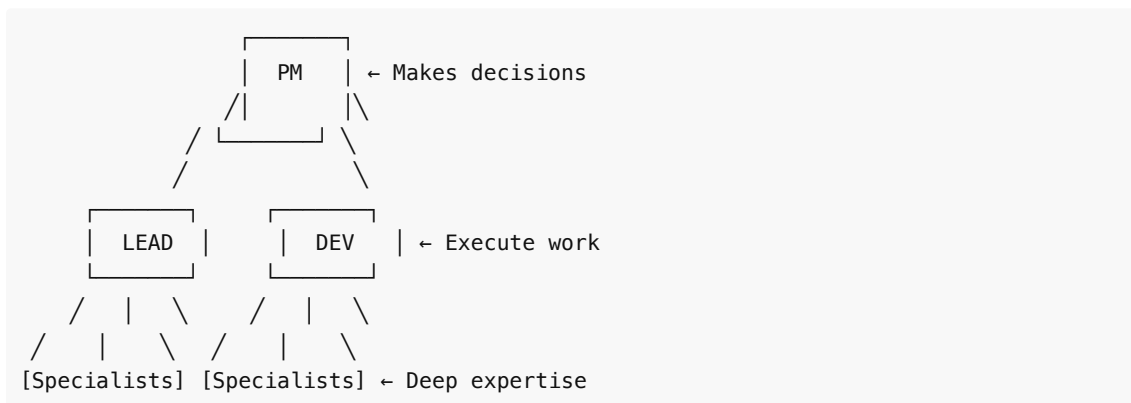
- Shared score: specs, tests, and gates keep everyone on the same page
- Timing & dynamics: PM conducts, sets tempo, and handles transitions
- Continuous tuning: QA/Ops listen for drift, enforce thresholds, and keep the ensemble tight

Context as a Finite Budget

```
💰 Context Budget Accounting

┌─────────────────────────────────┐
│ Total Budget: 100%              │
│ ├── Orchestration: 15–20%       │
│ ├── Implementation: 60–70%      │
│ ├── Quality/Testing: 10–15%     │
│ └── Reserve/Buffer: 5–10%       │
└─────────────────────────────────┘
```

Delegation Pyramid

```
            ┌─────┐
            │ PM  │ ← Makes decisions
           /│     │\
          / └─────┘ \
         /           \
        /             \
   ┌─────────┐   ┌─────────┐
   │  LEAD   │   │  DEV    │ ← Execute work
   └─────────┘   └─────────┘
    /  |  \      /   |   \
   /   |   \    /    |    \
 [Specialists] [Specialists] ← Deep expertise
```

Lifecycle (capture → compress → hydrate → rehydrate)

1. Capture

- Append-only logs; single attachments dir; broadcast duplicated into all logs

2. Compress

- Summarize per unit; keep decisions/constraints/gotchas; favor bullets

3. Hydrate

- Rebuild from capsule+logs; identity → tools → current state; verify permissions

4. Rehydrate (handoff)

- Trigger at 30% (or strike policy); use capsule; target 15 minutes

Minimal capsule template

```
# [ROLE] Dehydration Capsule
Date: <UTC timestamp>
Agent: <name or persona>
Context Remaining: <percent + emoji>
Session: <project/sprint>

IDENTITY
```

```
— Role: <role>
— Authority: <what you decide>
— Restrictions: <what you never do>

WORK COMPLETED
— <bullet list>

WORK IN PROGRESS
— <bullet list>

CRITICAL CONTEXT
— <decisions, constraints, gotchas>

PENDING TASKS
— <next steps with owners>

HANDOFF NOTES
— <exact instructions to resume>
```

Enforcement that helps (sizes)

- Start "M": tests block; lint advisory
- Grow "XL": tests+lint+coverage block
- Tune in `enforcement/pre_commit_gates.json`
- Hooks portable; installer has git-root fallback

Patterns that work

- Debug committees (5) + outside-reviewer synthesis
- Research sweep (3+) → CODEX synthesis → implement
- PM orchestrates; META watches thresholds/strikes

Do these first

- Context reporting each message
- Dehydrate at 30%
- Tool permissions by role
- Broadcast channel + shared format

Success metrics

- Handoff >95%
- Rehydrate <45 min
- Context per task <20%
- Dehydrate <15 min

See also → `RAD_TSHIRT_v4.0/protocols/HANDOFF.md` , `RAD_TSHIRT_v4.0/docs/COMMAND_MENU.md` , `RAD_TSHIRT_v4.0/enforcement/pre_commit_gates.json`