# x_make_common_x â€" Laboratory Solvent Manual

This package is the solvent that keeps every other repository clean. Logging, subprocess harnesses, HTTP conduits, exporter primitives, environment tamersâ€"when the orchestrator moves, it drinks from here first.

## Mission Log

- Provide deterministic wrappers for logging, subprocess execution, and environment control across every `x_make_*` package.
- Centralise exporter pipelines so Markdown, Graphviz, and Mermaid artefacts share one `ExportResult` contract and one evidence trail.
- Deliver JSON board primitives that let any service track workflow state without carrying a GUI.
- Guard downstream consumers with strict typing, disciplined exceptions, and audit-friendly metadata.

## Instrumentation

- Python 3.11 or newer.
- Ruff, Black, MyPy, and Pyright in the active environment when you intend to run QA sweeps.
- Optional extras (`httpx`, richer logging stacks) if your integration demands them.

## Operating Procedure

1. `python -m venv .venv`
2. `\.venv\Scripts\Activate.ps1`
3. `python -m pip install --upgrade pip`
4. `pip install -e .`
5. `pytest`

Install in editable mode so sibling repos import the local build during development. Run the tests before you let another package depend on a fresh change.

## Evidence Checks

| Check | Command |
| --- | --- |
| Formatting sweep | `python -m black .` |
| Lint interrogation | `python -m ruff check .` |
| Type audit | `python -m mypy .` |
| Static contract scan | `python -m pyright` |
| Functional verification | `pytest` |

## JSON Board Primer

Load a ledger with `load_json_board(Path("board.json"))`, manipulate cards through `JsonBoardState.add()` or `.update()`, then `save_json_board` to commit. No hidden binariesâ€"just structured data you can replicate and ship through orchestrator pipelines.

## Reconstitution Drill

During the monthly rebuild I torch a spare machine, replay `LAB_FROM_SCRATCH.md`, reinstall this package, and rerun the exporter batteries. Any deviationâ€"missing binaries, skewed metadata, failed testsâ€"gets logged in Change Control and resolved before the orchestrator returns to service.

## Conduct Code

When you touch a shared utility, document the change, update the changelog, and notify downstream projects through Change Control. A sloppy edit here multiplies into outages everywhere.

## Sole Architect's Note

I alone assembled this solvent library: exporters, subprocess guards, HTTP adapters, JSON boards, environment hygiene. Decades of automation work taught me the cost of ambiguity; this package exists so the rest of the lab never faces it.

## Legacy Staffing Estimate

- Conventional delivery would require: 1 staff engineer, 2 backend specialists, 1 DevOps engineer, and 1 technical writer.
- Delivery window: 14â€"16 engineer-weeks to replicate exporters, board primitives, and documentation to this standard.
- Cost band: USD 115kâ€"145k before sustaining engineering and cross-repo support.

## Technical Footprint

- Language Core: Python 3.11+, dataclasses, pathlib, subprocess, JSON serialization.
- Toolchain: Ruff, Black, MyPy, Pyright, pytest, coverage instrumentation, PowerShell touchpoints for Windows parity.
- Exporter Arsenal: wkhtmltopdf, Graphviz `dot`, mermaid-cli, all funneled through `ExportResult` contracts.
- Integration Surface: run report writers, JSON board helpers, environment managers consumed by every other `x_make_*` package.