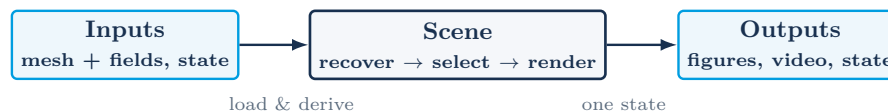


IST Vector



Scope

This note is the contract at the two ends of the IST Vector pipeline: *what the application reads* and *what it writes*. The middle — recovery, representation, camera — is the subject of the Reference Manual; here we only fix the file boundaries. Everything follows one rule: **one scene, four outputs**. Screen, PDF, MP4, and the saved-view / project JSON all consume the same in-memory scene object, so what is read in and shown is exactly what is written out.



1. Inputs

1.1 Solver and mesh files

Opened by drag-and-drop, **Ctrl+0**, or the **Recent** flyout; the reader is dispatched by file extension. Fields may be nodal or per-element, scalar / vector / tensor, and steady or transient (multi-step).

Extension	Family	Carries
.case	EnSight Gold	Topology, parts, transient steps; scalar / vector / tensor fields, via .geo / .scl / .vec / .ens sidecars. ASCII & binary, multi-part, wildcard step files.
.vtu	VTK XML UnstructuredGrid	Topology + per-point / per-cell fields. Inline ASCII, base64, zlib-compressed payloads.
.vtp	VTK XML PolyData	Verts, lines, polys, strips → point / bar2 / tria3 / quad4.
.vtk	VTK legacy	ASCII or binary; UnstructuredGrid, PolyData, StructuredGrid, RectilinearGrid, StructuredPoints.
.pvd	ParaView collection	Time-series index of .vtu / .vtp files (honours timestep).
.obj	Wavefront mesh	Reference geometry only — no fields.
.stl	Stereolithography mesh	Reference geometry only — no fields.
.spp	IST Vector project	Self-contained scene + camera + mesh reference (§2.3); both an input and an output.

Derived at load. For every vector field IST Vector auto-builds its three components, the Euclidean norm, and the ℓ^∞ norm; for every tensor, the Frobenius and von Mises invariants, the hydrostatic pressure, the three column vectors, and — where a matching nodal/element pair exists — an **Absolute_E** error estimator. These join the solver’s literal fields in the field drop-down. (At the *Large* mesh tier and above, derivation is deferred to an explicit **Force-derive** action to bound memory.)

1.2 Application state read at start-up

Read silently on launch from the per-user profile; written back as the user works (see §2.3). Missing or unreadable files are recreated with safe defaults, never fatal.

File (%AppData%\IST-VectorPostprocessor\)	Holds
saved_views.json	The saved-views library (reproducible scene snapshots).
part_sessions.json	Per-part session state: last field, time step, display mode, camera and view toggles.
recent_files.json	LRU of the 20 most recent files for the Recent flyout.
export_folders.json	Last folder used per export type (PDF, MP4, geometry).
view_preferences.json	Per-part view preferences.

2. Outputs

2.1 Figures — vector PDF

The headline output. Surfaces emit as PDF Type-4 Gouraud-shaded triangles and contour / feature lines as stroked polylines, so the figure is **resolution-independent** — not a rasterised screenshot. The colour bar, axis triad, contour labels, and dimensions print at their on-screen relative positions; the scientific-notation labels are set in base-14 Helvetica-Bold (referenced, not embedded).

Export	Produces
Scene PDF	The live scene as one vector page. Squeeze gives a narrow right-anchored page; Ultra fine pdf routes through the high-fidelity glossy path (boosted specular + per-sub-vertex re-shaded subdivision).
Geometry PDF	A two-up reference page of the loaded mesh.
Saved-views PDF	A collage of the saved-views library on one sheet.
Contour PDFs	One contour figure per scalar field that varies across the part at the current step (uniform fields skipped), batch-written in a single pass.

2.2 Animation — MP4

H.264 video (FFmpeg / libx264 preferred, Windows Media Foundation fallback). Frames are captured at the live viewport's physical pixel size (HiDPI-aware) and the stream is tagged BT.709 so players read the colour space deterministically. The same camera closure that drives the live View / Rotation Tour drives the recorder, so the clip reproduces the on-screen motion frame-identically. An optional five-stage cinematic pass (FXAA, bloom, tone-mapping, vignette, grain) can be applied per frame.

2.3 Reproducible state

- **Project file (.spp).** A single shareable document: the full scene state (display mode, active fields, ranges, deformation, filter, iso / threshold / sections, symmetry, hidden parts, probes, time, camera) plus a reference to the mesh, resolved relative to the project on re-open. Round-trips losslessly; this is the file to send a colleague.
- **Saved views.** The same scene snapshot stored as a named entry in `saved_views.json`, for building a library of viewpoints within one mesh.
- **Per-user state.** The `.json` stores of §1.2 are rewritten as the user loads files, saves views, and exports — the inputs of the next session.

2.4 Live render and diagnostics

- **On-screen viewport.** The interactive OpenGL render is the primary, continuous output; the PDF and MP4 exporters reproduce exactly what it shows.
- **Diagnostic log.** Rolling log files under `%LocalAppData%\IST-VectorPostprocessor\logs\` (per-machine, may be large).

IST Vector Postprocessor — Inputs & Outputs — P. Areias — pedro.areias@tecnico.ulisboa.pt — Instituto Superior Técnico, Universidade de Lisboa.