Poster Template System — Agent Kickoff Guide

This doc tells you exactly what to build for our Poster Template Design project, in what order, with what specs, and how we’ll test your work. Keep outputs deterministic, accessible, and print-ready.

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1) Objectives

• Ship a small, universal set of poster canvases that covers the most common conference boards.

• Provide a brand-color system that is accessible, projector/print safe, and easy to swap.

• Automate on-demand palette creation for any institution (“Palette Builder”).

• Export professional deliverables: PPTX templates, PDF print files, high-res PNGs, token files (JSON, CSS), and a style card.

Do not scrape or ship third-party palette data with share-alike constraints. If you reference external palettes during prototyping, re-derive final tokens from official brand guides or client input.

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2) Deliverables (MVP)

1. Poster canvases (8 sizes) as master templates (PPTX + PDF + SVG):

• 96×48 in, 90×42 in, 72×48 in, 95×47 in, 77.2×48 in, 72×42 in, 93×45 in, 48×48 in.

2. Themeable design system:

• 12-column layout grid, baseline grid, typography scale, spacing, and reusable components.

3. Palette Builder (CLI + library):

• Inputs: 1–6 brand hex codes.

• Outputs: accessible ramps, WCAG contrast pairings, projector/print-safe alternates, and tokens (JSON, CSS).

4. Exports for each theme+size:

• .pptx, .pdf (print-ready), .png (300 dpi), tokens.json, tokens.css, style-card.pdf.

5. QA reports:

• Contrast matrix, CVD (color-vision deficiency) previews, safe-margin checks, preflight.

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3) Directory Layout

poster-system/

  README.md

  data/

    institutions/         # curated Tier-1 palettes we author (JSON)

    tokens/               # compiled tokens for builds

  src/

    palettes/             # palette algorithms (ramps, CVD sims, contrast)

    builder/              # CLI for Palette Builder

    templates/            # parametric poster templates (SVG/PPTX skeletons)

    exports/              # export logic (PDF/PPTX/PNG)

    qa/                   # contrast, preflight, regression checks

  out/

    templates/{size}/     # generated by size/theme

  tools/

    scripts/              # small utilities (e.g., inches<->px)

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4) Poster Sizes (to support)

Units: W × H (in)

• 96 × 48  (4×8 ft, landscape)

• 90 × 42

• 72 × 48  (4×6 ft)

• 95 × 47

• 77.2 × 48 (usable inside some framed boards)

• 72 × 42

• 93 × 45

• 48 × 48  (square)

Lean release: 96×48, 90×42, 72×48, 95×47, 72×42.

Extended: add 77.2×48, 93×45, 48×48.

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5) Size → Conference Mapping (short)

Size (in) Examples (not exhaustive)

96×48 APS, AUA, AACR boards, AAOS, APHA, ATS, ASN, DDW, AANS, AAO info

90×42 ADA, ACR

72×48 ACS, AGU

95×47 ASCO

77.2×48 AHA, RSNA usable area

72×42 RSNA recommended

93×45 ENDO

48×48 SfN (some chapter/local guidance)

(Always verify current year specs with the organizer.)

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6) Design System

6.1 Grid & Margins

• Outer safe margin: ≥ 1 in on all sides (frames eat space).

• Grid: 12 columns, 24 pt gutters.

• Baseline: 24 pt (adjust for size scaling).

• Modules: hero finding, methods/result blocks, figure panel, QR strip, contact footer.

6.2 Typography

• Title: 180–240 pt

• Section heads: 72–96 pt

• Body: 28–36 pt (print readability at 1–1.5 m)

• Mono (optional): 28–32 pt for data labels

• Font families: variable (brand-driven). Provide a default stack (e.g., Inter, Source Sans, Noto).

6.3 Color & Contrast

• Primary/secondary/neutral tokens, plus ramps.

• WCAG 2.2 AA minimum for body text; prefer AAA for captions if feasible.

• Provide projector-safe variant (less saturated, higher value contrast).

6.4 Components (reusable)

• Header with title/affiliations (logo-free option; some meetings forbid logos).

• Findings “hero” block (one-sentence claim + figure thumbnail).

• Multi-panel figures with captions and scale bars.

• QR/doi strip (optional).

• Contact band.

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7) Token Model (JSON)

{

  "id": "umich",

  "name": "University of Michigan",

  "palette": {

    "primary": ["#00274C", "#FFCB05"],

    "secondary": ["#46535E", "#9EA2A2"],

    "neutrals": ["#0F0F10", "#1A1A1A", "#F5F7F9", "#FFFFFF"]

  },

  "ramps": {

    "primary\_0\_9": ["#001629", "#00274C", "#0A3C6A", "#145089", "#1E65A7", "#2B78BF", "#3C8CD1", "#54A0DC", "#74B6E6", "#A0CFEE"]

  },

  "contrast": {

    "pairs": [

      {"fg":"#00274C","bg":"#FFFFFF","AA":true,"AAA":true},

      {"fg":"#FFFFFF","bg":"#00274C","AA":true,"AAA":true}

    ]

  },

  "variants": {

    "projector": { "primary":["#24466C", "#FFD34D"] },

    "print": { "primary":["#062C54", "#F8C400"] }

  },

  "notes": "Verify against brand guide."

}

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8) Palette Builder (CLI)

8.1 Requirements

• Input: 1–6 hex codes, optional brand name, optional min contrast (AA/AAA), optional CVD sim target (protan/deutan/tritan).

• Output:

• JSON tokens (above schema)

• CSS variables (for web/Figma)

• PNG swatch sheet

• PDF style card (1 page)

• Contrast matrix (CSV/PNG)

8.2 Behavior

• Generate tints/shades (e.g., OKLCH or HCT space to maintain perceptual uniformity).

• Build accessible text/background pairs by solving for contrast ≥ target (WCAG formula).

• Provide two alternates:

• Projector-safe: reduce saturation, lift value, maintain brand hue.

• Print-safe: constrain to process-friendly gamut; note CMYK approximations.

8.3 CLI Sketch

# Generate tokens and style card from brand colors

palette build --brand "Example U" \

  --colors "#00274C,#FFCB05" \

  --contrast AA \

  --out ./data/institutions/example-u

8.4 Core Functions (pseudocode)

def build\_palette(hex\_list):

    base = normalize(hex\_list)

    ramps = [make\_ramp(h) for h in base]

    pairs = find\_wcag\_pairs(ramps, neutrals)

    projector = projector\_safe(base)

    print\_safe = print\_safe\_gamut(base)

    return tokens(base, ramps, pairs, projector, print\_safe)

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9) Template Generation

We maintain parametric masters (SVG and PPTX):

• SVG master for each size with named layers/IDs for: title, heads, body text frames, figure placeholders, QR, footer.

• PPTX master using slide layouts and placeholders.

9.1 Programmatic theming

• Replace color placeholders with tokens.

• Update text styles (title/body/heading) from tokens.

• Reflow modules using grid system and size constants.

9.2 Export Targets

• PDF: vector, embedded fonts, no crop/bleed unless requested.

• PNG: 300 dpi, sRGB IEC61966-2.1.

• PPTX: fonts embedded when allowed; provide fallback instructions.

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10) Production Specs (pixels @ 300 dpi)

Size (in) Pixels

96×48 28800×14400

90×42 27000×12600

72×48 21600×14400

95×47 28500×14100

77.2×48 23160×14400

72×42 21600×12600

93×45 27900×13500

48×48 14400×14400

Tip: Design in vector. Rasterize only for PNG previews.

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11) Accessibility & QA

• Contrast: compute WCAG 2.2 contrast for all text/label sizes. Produce a heat-map image and CSV.

• CVD Previews: render Deutan/Protan/Tritan simulations of the style card.

• Safe Areas: verify no critical content exceeds inner margins.

• Text sizes: check minimums (body ≥ 28 pt at these sizes).

• Preflight: sRGB profile, font embedding, vector objects intact, no overprint traps unless requested.

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12) “Tier-1” Institution Catalog (curated)

We will include 100–150 high-priority institutions (R1/AAU/top NIH/NSF). For each:

• Create tokens from official brand guides (not third-party lists).

• Store in data/institutions/{slug}.json.

• Include link to brand guide in the JSON notes (do not ship guide content).

• Run QA: contrast report and style card.

Add-on rule: Each client request via Palette Builder can be reviewed and added to Tier-1 if clean.

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13) Legal & Policy

• Colors are not copyrightable, but logo usage is restricted. We ship logo-free templates.

• Include a small footer note in readme and style cards:

“Institution names/colors are for compatibility; verify against current brand standards. No affiliation or endorsement implied.”

• Do not import CC BY-SA palette data into our shipped registry. If prototyped from such sources, rebuild from original brand guides or client-provided hex codes.

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14) Milestones & Acceptance Criteria

M1 — System skeleton (✔ when:)

• Repo structure present; build scripts run.

• A single size (96×48) renders to PPTX/PDF from default tokens.

• Palette Builder CLI builds tokens from 2 hex inputs and outputs JSON+CSS.

M2 — Full size set & theming (✔ when:)

• All 8 sizes render from the same theme.

• Typography, grid, and components consistent across sizes.

• Exports: PDF, PPTX, PNG (sample theme).

M3 — Accessibility & QA (✔ when:)

• Contrast matrix + CVD previews generated per theme.

• Preflight checks pass (fonts, sRGB, margins).

M4 — Tier-1 catalog (✔ when:)

• 50 institutions compiled and validated (phase 1).

• Style cards generated and stored.

M5 — Launch pack (✔ when:)

• 3 themes (e.g., dark-on-light, light-on-dark, projector) across all sizes.

• Documentation for end-users (how to swap colors/text safely).

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15) Implementation Notes

• Language: Python is fine for CLI & exports (reportlab, cairosvg, python-pptx). Node is also okay; pick one and be consistent.

• Color math: prefer OKLCH for ramps; convert to sRGB with gamut-clipping guards.

• Contrast: implement WCAG formula once and unit-test with known pairs.

• SVG → PDF: cairosvg or Inkscape CLI.

• PPTX: python-pptx slide masters; embed fonts if license allows; otherwise bundle install notes.

• Testing: snapshot tests for token JSON, pixel-diff for PNG previews (tolerance small).

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16) Commands (examples)

# Build tokens from brand colors

poster-cli palette build --brand "Contoso U" --colors "#0033A0,#FFD100" --contrast AA --out data/institutions/contoso-u

# Generate all template sizes for a theme

poster-cli templates render --theme data/institutions/contoso-u.json --sizes all --out out/templates/contoso-u

# QA reports

poster-cli qa contrast --theme data/institutions/contoso-u.json --out out/qa/contoso-u

poster-cli qa preflight --dir out/templates/contoso-u

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17) Style Card (one-pager contents)

• Brand name + date + version hash

• Swatches (primary/secondary/neutral) with hex

• Recommended text/background pairs (AA/AAA)

• Projector and print alternates

• Example header, body, caption styles

• QR to our documentation

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18) Agent Working Rules

• Be conservative on accessibility; when in doubt, increase contrast.

• Favor vector outputs; raster only for previews.

• Keep tables and file names short and consistent (e.g., Poster\_96x48\_ContosoU.pdf).

• Every generated theme must include: tokens, templates (all sizes), previews, and QA reports.

• Record decisions in a CHANGELOG.md.

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19) Future Enhancements (post-MVP)

• Web UI for Palette Builder.

• Figma plugin to ingest tokens.json and restyle frames.

• Illustrator template export (SVG ↔ AI round-trip).

• Automatic figure paneling (smart grids for images).

• Live spell/typo scan on PDFs.

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20) Quick Start for the Agent

1. Scaffold the repo and commit the size constants, grid, and type scale.

2. Implement Palette Builder (minimal: input 2 colors → tokens.json + tokens.css).

3. Produce first template (96×48) in SVG and PPTX; inject tokens; export.

4. Add contrast & CVD checks; output QA.

5. Expand to all 8 sizes; run QA; fix overflow/margins.

6. Create three demo themes; export full pack; write end-user README.

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If anything is ambiguous, propose a default, implement it behind a flag, and document it in README.md and CHANGELOG.md.Automating Stylistic Design with an LLM — Playbook

This is a practical blueprint for letting an LLM decide style while your code enforces constraints and renders. It’s opinionated, accessible-first, and tuned for poster templates.

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Core principle

Use the LLM as a Style Director that outputs structured tokens, never the final art. A deterministic Renderer (your code) applies tokens to SVG/PPTX/PDF. A Judge layer auto-checks accessibility, contrast, spacing, and brand constraints. Iterate until all checks pass.

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Architecture at a glance

1. Intent → Tokens (LLM)

Input: brand colors, adjectives, audience, venue constraints.

Output: JSON style tokens (colors, type scale, grid, spacing, borders, shadows).

2. Guardrails (schema + rules)

Validate tokens against JSON Schema + hard rules (ranges, enums, disallowed combos).

3. Render (code)

Apply tokens to parametric SVG/PPTX masters for each size (96×48, 90×42, …).

4. Judge (code + optional LLM critique)

• Programmatic checks: WCAG, CVD sims, margins, line-length/leading, object density.

• Optional LLM self-critique using a rubric, but only on numbers/text, not images.

5. Repair loop

If checks fail, send diff + failure reasons back to the LLM to minimally adjust tokens. Repeat.

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The token model (what the LLM should emit)

Keep it small, numeric, and enforceable.

{

  "meta": {

    "style\_name": "Academic Minimal",

    "use\_case": "poster",

    "version": "1.0.0"

  },

  "color": {

    "primary": ["#00274C", "#FFCB05"],

    "secondary": ["#46535E"],

    "neutrals": ["#0F0F10", "#1A1A1A", "#F5F7F9", "#FFFFFF"],

    "accents": ["#2B78BF"],

    "bg": "#FFFFFF",

    "text": "#0F0F10",

    "projector\_variant": true,

    "print\_variant": true

  },

  "type": {

    "family\_heading": "Inter",

    "family\_body": "Inter",

    "scale": "majorThird",

    "body\_pt": 32,

    "heading\_levels": {

      "h1\_pt": 200,

      "h2\_pt": 120,

      "h3\_pt": 72

    },

    "line\_height": {

      "body": 1.25,

      "heading": 1.05,

      "caption": 1.15

    }

  },

  "grid": {

    "columns": 12,

    "gutter\_pt": 24,

    "baseline\_pt": 24,

    "outer\_margin\_in": 1.0

  },

  "components": {

    "header\_height\_ratio": 0.16,

    "hero\_callout": true,

    "qr\_strip": true,

    "figure\_border\_px": 2,

    "figure\_corner\_radius\_px": 8,

    "shadow": "none"

  },

  "rules": {

    "min\_contrast": "AA",

    "max\_chars\_per\_line": 85,

    "min\_caption\_pt": 28

  }

}

Why this works: every field is machine-verifiable and maps 1:1 to rendering operations. The LLM’s “style” is just choosing numbers and named options within guardrails.

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Best prompting patterns

A. Style Director (Intent → Tokens)

• System: “You output only JSON that passes a schema. Do not use prose.”

• User input: brand hex codes (1–6), poster context, audience, adjectives, venue constraints (e.g., projector lighting).

• Few-shot: 3–5 good token examples + 1 bad example with reasons it fails (e.g., insufficient contrast).

Prompt skeleton

Goal: Propose style tokens for a scientific poster.

Constraints:

- Output JSON matching the provided schema.

- WCAG AA for body text.

- Baseline grid = multiple of 24 pt.

- Max chars/line ≤ 85.

- Provide projector and print variants.

Inputs:

- Brand hex: #00274C, #FFCB05

- Tone: rigorous, readable, minimal

- Venue: bright hall, long viewing distance

- Poster size: 96×48 in, scalable to 72×48 in

Schema: <paste JSON Schema>

Examples: <3 good, 1 bad with critique>

Return: ONLY valid JSON.

B. Repair Agent (Token Diff → Token Fix)

• Feed validator errors (e.g., “contrast body on bg fails at AA by 0.3”) and request minimal changes.

• Include the previous tokens and instruct: “Edit no more than 3 fields; prioritize text color, then secondary background.”

C. Critic Agent (Optional)

• Provide a rubric (short bullet checks). Ask for ranked suggestions with rationales, then let Renderer decide which are safe to apply.

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Guardrail techniques that work

• JSON Schema with enums and numeric ranges (e.g., 0.9 ≤ line\_height ≤ 1.4).

• Unit sets: forbid px/pt mix in the same category.

• Hard rules: “no light text on yellow backgrounds for body,” “outer margin ≥ 1 in,” “caption ≥ 28 pt.”

• Constraint solver: when a rule fails (e.g., contrast), solve it numerically and propose the nearest valid color, then ask the LLM to approve or suggest a semantically close hue.

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Judging aesthetics without hand-waving

Programmatic heuristics beat vibes:

• Contrast: WCAG 2.2 for all text roles and states (default, hover, emphasis).

• CVD simulation: deuteranopia/protanopia/tritanopia previews; flag indistinguishable pairs.

• Whitespace balance: text area ≤ 55–65% of canvas; image area ≥ 25–35% for scientific posters.

• Line length: body 55–85 chars/line equivalent at print size.

• Baseline adherence: text boxes snap to 24 pt multiples.

• Figure density: max 3 columns for A0-scale; warn on clutter.

• Margins: all content inside 1 in safe area.

If you want an LLM critique, pass structured measurements, not images, e.g.:

{

  "contrast\_pairs": [{"fg":"#0F0F10","bg":"#FFFFFF","ratio":16.8}],

  "text\_density\_pct": 58,

  "avg\_line\_length\_chars": 76,

  "violations": []

}

Prompt: “Review numbers vs rubric and suggest ≤3 token edits.”

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Reusable style intents

Define a small catalog where each intent maps to token defaults the LLM can tweak:

• Academic Minimal: high contrast, low chroma, fine rules, no shadows.

• Conference Bold: larger heads, stronger accent ramps, bigger hero callout.

• Clinical Clean: blue/neutral palette, strong legibility, subdued accents.

• Data-dense: smaller leading, more figure columns, clearer caption hierarchy.

(Each intent = a partial JSON patch you apply before LLM fills the rest.)

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Palette automation playbook

1. Normalize brand hexes to OKLCH.

2. Generate ramps (tints/shades) with perceptual spacing.

3. Pick text/bg by maximizing contrast subject to brand hue preservation.

4. Projector variant: lower chroma, raise L to ~80 for light backgrounds.

5. Print variant: clip to sRGB/CMYK gamut; provide CMYK approximations.

6. Lock tokens and pass to Renderer.

(The LLM can pick parameters for steps 2–5; your code executes them.)

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Typography automation

• Choose a base body size from viewing distance + board size (e.g., 32 pt body for 96×48).

• Select a modular scale (minorThird, majorThird, perfectFourth) based on style intent.

• Compute headings from scale, cap with min/max bounds.

• Compute leading via typographic formula (e.g., body\_line\_height = clamp(1.2, 1.25, 1.35) depending on intended density).

• Enforce min caption 28 pt for legibility.

Let the LLM pick scale + ratio; let code calculate exact sizes.

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Layout & spacing automation

• Column count from size and density target (e.g., 12 columns for 96×48; 8 for 72×42).

• Gutter from body size (e.g., gutter = body\_pt \* 0.75).

• Outer margins fixed (1 in).

• Module kit: header, abstract, findings hero, results grid, methods grid, QR/footer.

• The LLM chooses which modules and order; the Renderer places them deterministically.

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Data you should log for learning

• Inputs: brand colors, intent, size, constraints.

• Tokens: final JSON, plus diffs across repair cycles.

• Metrics: contrast pass %, density, violations.

• Human ratings: 1–5 on clarity/appeal/brand fit.

• Use a bandit to bias future defaults toward higher-scoring settings.

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Where LLMs shine vs where they don’t

Great at: mapping adjectives → token choices, picking complementary accents, proposing hierarchy (what’s prominent vs subdued), writing microcopy labels.

Not great at: pixel-perfect layout, color math, accessibility proofs, file export quirks. Keep these in code.

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Example workflows

Workflow 1: One-shot theme

1. User: brand hex + “academic minimal” + size.

2. LLM → tokens.

3. Guardrail validate → pass.

4. Render → PDF/PPTX/PNG + QA report.

Workflow 2: Repair loop

1. LLM tokens → contrast fail on captions.

2. Validator returns: “caption on accent fails AA (2.9:1); raise L or switch to neutral bg.”

3. Repair Agent edits only color.accents[0] and type.caption\_pt by +2 pt.

4. Re-render + QA → pass.

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Concrete prompts to reuse

Style Director

You are a Style Director. Output ONLY JSON tokens that match the schema.

Goals: scientific poster, clear hierarchy, accessible, projector-safe.

Brand hex: #0B3D91, #FFC72C

Adjectives: modern, crisp, restrained; audience: clinicians; size: 90×42 in.

Hard constraints:

- WCAG AA for body and captions.

- outer\_margin\_in >= 1

- baseline\_pt = 24

- max\_chars\_per\_line <= 85

- avoid light text on yellow backgrounds for body/captions

Schema: <JSON Schema here>

Return only JSON.

Repair Agent

You are a Style Repair agent. Edit at most 3 fields.

Failures:

- body on bg contrast = 4.2:1 (AA ok), caption on accent = 2.9:1 (AA fail).

- avg\_line\_length = 96 chars (too long).

Return new tokens JSON changing minimal fields to pass:

1) improve caption contrast (prefer change accent L or use neutral bg for captions),

2) reduce avg line length (increase gutter\_pt or reduce body\_pt slightly).

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Tooling checklist for the Engineer

• Validator: JSON Schema + custom rules (contrast, margins, line length).

• Color engine: OKLCH conversion, ramp generator, contrast solver, projector/print transforms.

• Renderer: SVG → PDF; PPTX templater with slide masters and placeholders.

• QA: WCAG calculator, CVD sims, typographic audits, preflight (sRGB, embedded fonts).

• CLI: style build, style render, style qa, style repair.

• Regression tests: token snapshots; pixel-diff for PNG previews.

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Risk management

• Brand compliance: prefer client-provided hex; include disclaimer in outputs.

• Accessibility: fail closed; if a token set can’t reach AA with brand colors, suggest an alt neutral for text.

• Determinism: set temperature=0, fixed few-shot exemplars, strict JSON parsing.

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Bottom line

Automate style by constraining the LLM’s role to structured decisions (tokens) and let code guarantee accessibility and rendering. This division gives you speed, consistency, and legal/brand safety—while still delivering genuinely “designed” outcomes.Heuristic Design Elements We Can Encode

Below is a practical, encode-able checklist of stylistic rules the agent can apply deterministically. Each item is framed as a heuristic → measurable rule(s) → fallback/repair so the system can auto-fix violations without human review.

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1) Global priorities & guardrails

• Priority order: Legibility > Accessibility > Information hierarchy > Brand fidelity > Aesthetics > Density.

• Determinism: Prefer numeric ranges, enums, and ratios over free text; express all sizes in pt/in and colors in HEX/OKLCH.

• Repair policy: When conflicts arise, fix the smallest change that restores compliance (e.g., adjust text color before changing brand hue; reduce body size last).

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2) Canvas & margins

• Outer safe margin: ≥ 1.0 in on every edge (prevents frame overlap).

• Inner module padding: 0.25–0.5 in around text blocks/figures.

• Content bounding: No text or figures outside the safe area; auto-shrink or reflow when overflow detected.

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3) Grid, rhythm & spacing

• Columns: Default 12 for 96×48; scale to 8–10 for smaller canvases; keep column width ≥ 3.5 in for body-text columns.

• Gutter: body\_pt × 0.6–1.0 (e.g., 32 pt body → 20–32 pt gutter).

• Baseline grid: 24 pt base; line-height and spacings snap to multiples.

• Module spacing: Vertical spacing between sections = 1–2 × body leading.

• Alignment: Snap left edges of text, captions, and figure panels to the same column edge; avoid micro-misalignments.

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4) Typography

• Body size (print posters): 28–36 pt; choose by canvas size and intended viewing distance.

• Headings scale: Use a modular scale (e.g., major third or perfect fourth); cap H1 180–240 pt, H2 96–140 pt, H3 60–96 pt.

• Line length: 55–85 characters per line; shrink column width or raise body size to keep within range.

• Line height: Body 1.2–1.4; headings 1.0–1.15; captions 1.15–1.3.

• Case & emphasis: Avoid ALL-CAPS for body; prefer bold for emphasis; never rely on color alone.

• Hyphenation: Off for headings; optional for body with limits (max 2 consecutive hyphenated lines; no hyphenation on the last line).

• Rag: Ragged-right body text (avoid full justification to prevent rivers).

• Lists: Bullets with hanging indent = body\_pt; list spacing = 0.5 × body leading.

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5) Color system & accessibility

• Contrast (WCAG 2.2): Body/captions ≥ 4.5:1; large text (≥ 48 pt) ≥ 3:1; aim AAA (≥ 7:1) for small captions when feasible.

• Backgrounds: Prefer light neutrals (off-white) for dense text; avoid saturated yellows as text backgrounds.

• Accent use: Reserve accents for headings, dividers, highlights, and data; body text must be neutral/dark on light background or vice versa.

• Projector variant: Reduce chroma 10–30%, raise L (lightness) +5–10 (OKLCH) for legibility in bright halls.

• Print variant: Clip to sRGB/CMYK-safe gamut; substitute nearest in-gamut color if required.

• CVD robustness: Ensure categorical colors differ by a perceptual distance (target ΔE\_oklch ≥ 0.08–0.12); if not, auto-adjust hue/chroma.

• States: Links/interactive QR cues must pass contrast independently (link vs bg, link vs surrounding text).

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6) Visual hierarchy

• Title prominence: Title block height 12–18% of canvas; subtitle ≤ 60% of title size.

• Hero finding: Exactly 1 prominent “key finding” callout near top-left or top-center; limit to 140 chars.

• Section order: Introduction → Methods → Results → Conclusions → References/Contact/QR; allow swapping Methods/Results only if data-first layout is chosen.

• Density caps: Text area ≤ 65% of canvas; figures ≥ 25–35% total area. Flag clutter above thresholds and suggest demotion of least important blocks.

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7) Figures, images & panels

• Minimum effective size: Images ≥ 4 in shortest side or 150 dpi at print scale; warn or prevent scaling beyond 125% source resolution.

• Panel grids: Use 2–3 columns for figure mosaics on large canvases; maintain consistent panel gaps = gutter.

• Scale bars & labels: Mandatory for microscopy or maps; scale-bar label ≥ body size; units SI with space (e.g., “10 μm”).

• Captions: 28–32 pt; 1–3 sentences; align to panel grid; avoid paragraph-long captions.

• Borders & corners: Figure border 1–3 px; corner radius 0–8 px (consistent across all panels).

• Color in figures: Enforce same accessibility rules; never encode meaning by color alone—use line styles/markers/annotations.

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8) Charts & data visualization

• Fonts: Chart labels ≥ body size – 2 pt; axis titles ≥ body size.

• Gridlines: Light neutral at 5–10% opacity; minimal; no heavy frames.

• Series limit: Max 6 categorical hues; if more, introduce pattern/line style instead of color alone.

• Order & sorting: Default to meaningful order (descending, chronological, or domain logic).

• Legends: Prefer direct labeling over legends; if legends are required, place top-left or top-right inside plot area.

• Axes & ticks: Avoid duplicate zeros; limit major ticks to 4–7; use sensible precision (max 3 decimals; align to units).

• Error bars: Visible, but faint; width proportional to stroke; explain in caption if non-standard.

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9) Tables

• Column count: ≤ 7; otherwise split or rotate to landscape inside figure region.

• Alignment: Numbers right-aligned with decimal alignment; text left-aligned; headers centered or left-aligned consistently.

• Zebra shading: Neutral tint 6–12% for alternate rows; header row 12–18%.

• Typography: Table body ≥ 28 pt; header +2–4 pt.

• Notes: Footnotes below table; small but ≥ 26 pt; avoid long paragraphs in cells.

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10) Microcopy & labeling

• Title length: ≤ 120 characters; no abbreviations that are not defined on first use.

• Abbreviations: Define on first occurrence in each major section.

• Bullets: Short phrases, not sentences; avoid trailing punctuation unless full sentences are used.

• Units & notation: SI units, space between number and unit (e.g., “5 mg”), use en-dash for ranges (“5–10”).

• References: Use numeric or short author-year; keep to 3–6 key citations with DOI/QR where possible.

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11) Dividers, rules, boxes & backgrounds

• Dividers: 1–2 pt neutral lines; full-width across column grid; spacing = 0.75–1.25 × body leading before/after.

• Boxes: Only for emphasis or grouping; corner radius 4–8 px; background tint ≤ 6–10%; never reduce contrast below thresholds.

• Drop shadows: Default off; if used, small soft shadow only on floating callouts; no decorative heavy shadows.

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12) Iconography, QR & wayfinding

• Icon use: Minimal; 1-color line icons; size ≥ 1.5 × body height; ensure contrast.

• QR codes: Side length ≥ 1.0 in with quiet zone; test scan at 3–4 ft; place in footer or contact band; avoid proximity to busy textures.

• Arrows/annotations: Stroke 2–4 pt; color = accent with sufficient contrast on underlying figure.

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13) Brand compliance (without logos)

• Primary vs accent: Primary color used for headings and key rules; accent for highlights only.

• No logos by default: Many conferences restrict logos; provide a switch to disable.

• Neutral fallback: If brand colors fail contrast, auto-substitute neutral text and keep brand colors for accents only.

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14) Projector vs print heuristics

• Projector: Boost contrast (raise L difference), reduce mid-tone saturation, prefer dark text on light bg.

• Print: Ensure 300 dpi raster assets; embed fonts; sRGB to CMYK conversion when requested; verify rich black vs 100K guidelines if CMYK.

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15) Accessibility checks

• Contrast matrix: Compute for headings, body, captions, annotations, table text, and over-image labels.

• CVD simulations: Deutan, protan, tritan previews on major color pairs; auto-repair if indistinguishable.

• Non-color cues: Underlines or patterns where color encodes meaning.

• Touch targets (if interactive PDF): Links and QR labels ≥ 44×44 px equivalence.

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16) Content-aware layout heuristics

• Auto-condense: If abstract > 120 words, collapse to bullets or move to side panel.

• Figure priority: Largest figure near upper third; if multiple, prioritize those referenced earliest in the text.

• Overflow strategy: Reduce body size down to 28 pt (minimum), then increase columns, then truncate less-critical sections (e.g., extended methods) with QR to full version.

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17) Error prevention & preflight

• Orphans/widows: No single-word lines in headings; avoid 1-line paragraphs at column ends.

• Cross-reference integrity: Every figure/table cited once; warn if uncited.

• Image formats: Prefer SVG/PDF for vector; PNG/TIFF for raster; forbid JPEG for text-heavy figures.

• Profiles & fonts: Embed fonts; sRGB profile; no missing font fallbacks.

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18) Numeric/ratio summaries for the agent

• Text density target: 45–60% of canvas area.

• Figure density target: 25–35% of canvas area.

• Header block height: 12–18% of canvas.

• Hero callout height: 6–10% of canvas.

• Max columns per figure mosaic: 3.

• Min caption size: 28 pt.

• Min line length: 55 chars; max 85 chars.

• Min contrast ratios: Body 4.5:1, Large text 3:1, Aim AAA for small captions.

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19) Tokenizable knobs (what the LLM can safely set)

• Colors: primary/secondary/neutral/accents + projector/print variants.

• Type: families, base body size, scale type, heading multipliers, line heights.

• Grid: columns, gutter, baseline, outer margin.

• Components: hero enabled, QR enabled, divider thickness, border radius.

• Rules: min\_contrast level (AA/AAA), max\_chars\_per\_line, min\_caption\_pt.

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20) Auto-repair strategies

• Contrast fail: First adjust text color toward neutral; if still failing, increase font size (if large text AA applies) or add tint box behind text.

• Overlong lines: Increase gutter or reduce column width; last resort reduce body size within allowed range.

• Over-dense: Collapse abstract to bullets, demote least-important panel, or split Results across two rows.

• CVD clash: Shift accent hue by ±10–20° or reduce overlap by applying patterns/line styles.

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21) Conference-aware toggles (optional)

• Logo suppression: On by default for meetings with restrictions.

• Title capitalization: Title Case vs Sentence case by venue preference.

• QR policy: Enable/disable and add required disclaimer text per venue.

• Board size mapping: Auto-select template and margins for: 96×48, 90×42, 72×48, 95×47, 77.2×48, 72×42, 93×45, 48×48.

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How to integrate

• Express each heuristic as a validator (pass/fail + numeric delta) and a fixer (minimal token change).

• Keep a rubric score (0–100) aggregating contrast, density, alignment, hierarchy, and errors; decline export if score < threshold (e.g., ≥ 85).

This list is deliberately exhaustive so you can encode it once and let the agent compose styles as tokens, while the renderer and validators guarantee a clean, accessible, conference-ready poster every time.