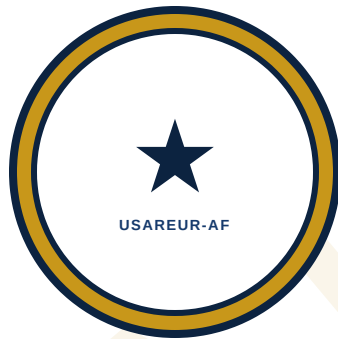


DRAFT — UNOFFICIAL — NOT FOR OPERATIONAL USE

TECHNICAL MANUAL

SL 5N



TM-50N — MAVEN SMART SYSTEM (MSS)

Specialist Course Manual

HEADQUARTERS
UNITED STATES ARMY EUROPE AND AFRICA
(USAREUR-AF)
Wiesbaden, Germany

DRAFT — NOT FOR OFFICIAL USE. FOR TRAINING PLANNING PURPOSES ONLY.

26 MARCH 2026

DRAFT — UNOFFICIAL — NOT FOR OPERATIONAL USE

TM-50N — MAVEN SMART SYSTEM (MSS)

Forward: SL 5N qualifies advanced UI/UX designers to build and govern design systems at scale, design for DDIL and cross-domain environments, lead coalition UI integration, and establish design operations that sustain quality across the MSS application portfolio. This manual extends SL 4N from individual application design to enterprise design leadership. **Prereqs:** SL 4N, UI/UX Designer (required, Go evaluation on file); demonstrated portfolio of 2+ MSS application designs from SL 4N practical exercise or operational assignment; *CONCEPTS_GUIDE_TM50N_UX_DESIGNER_ADVANCED* (read before this manual) *HQ USAREUR-AF · v1.0 · 2026 · DISTRIB: USG only · AUTH: C2DAO/UDRA v1.1*

WARNING: Design system decisions at SL 5N level propagate across every MSS application. A poorly designed component, an inconsistent pattern, or a broken accessibility standard scales from one application to the entire portfolio. Validate design system changes across representative applications before publishing. **CAUTION:** Cross-domain and coalition UI design involves classification boundary decisions. Designs that cross classification levels must be reviewed by the ISSM before implementation. Do not assume a design pattern valid at one classification level is valid at another.

TABLE OF CONTENTS

- [CHAPTER 1 — INTRODUCTION: THE ADVANCED UI/UX DESIGNER ROLE IN MSS](#)
 - [CHAPTER 2 — DESIGN SYSTEMS AT SCALE](#)
 - [CHAPTER 3 — DDIL-AWARE DESIGN](#)
 - [CHAPTER 4 — CROSS-DOMAIN AND COALITION UI](#)
 - [CHAPTER 5 — DESIGN OPERATIONS \(DESIGNOPS\)](#)
 - [CHAPTER 6 — ACCESSIBILITY AT ENTERPRISE SCALE](#)
 - [APPENDIX A — REFERENCES](#)
 - [APPENDIX B — PEER SL 5 CROSS-REFERENCES AND WFF INTEGRATION](#)
-

CHAPTER 1 — INTRODUCTION: THE ADVANCED UI/UX DESIGNER ROLE IN MSS

1-1. Advanced UX Designer Manual

BLUF: SL 5N extends SL 4N from designing individual applications to designing the design system itself — the patterns, components, governance, and operations that ensure consistency, accessibility, and quality across the MSS application portfolio.

This manual provides task-based instruction for advanced UI/UX designers operating on the Maven Smart System (MSS). SL 5N personnel define the design standards that all MSS application designers follow, lead design for complex multi-domain and coalition environments, and establish the operational processes that sustain design quality at scale.

SL 5N covers design systems at scale (building and maintaining reusable component libraries, pattern documentation, and design tokens across the MSS portfolio); DDIL-aware design (designing applications that function under denied, disrupted, intermittent, and limited bandwidth conditions); cross-domain and coalition UI (designing interfaces that operate across classification levels and serve multinational users in the USAREUR-AF AOR); design operations (DesignOps) including design review governance, quality metrics, design tooling, and onboarding new designers; accessibility at enterprise scale (automated accessibility testing, remediation prioritization, compliance reporting); and research operations (ResearchOps) including systematizing user research across the portfolio, maintaining a research repository, and preventing research duplication.

SL 5N does NOT cover individual application design fundamentals — see SL 4N; custom widget implementation — see SL 4L, SL 5L; platform infrastructure — see SL 4O, SL 5O; or Foundry platform administration (vendor-managed).

1-2. Curriculum Position

Prerequisite: SL 4N (UI/UX Designer) is REQUIRED with Go evaluation on file. Demonstrated experience designing at least 2 MSS applications (from SL 4N practical exercise or operational assignment).

Peer advanced tracks: Coordinate with SL 5J (Advanced PM) on portfolio-level product strategy. Coordinate with SL 5L (Advanced SWE) on design system implementation architecture and shared component libraries. Coordinate with SL 5O (Advanced Platform Engineer) on performance budgets and deployment constraints that affect design patterns.

CHAPTER 2 — DESIGN SYSTEMS AT SCALE

2-1. MSS Design System Architecture

BLUF: A design system is not a style guide — it is a product that serves other products. It has users (designers and developers), releases, versioning, and governance.

Design system layers:

Layer	Contents	Audience
Design tokens	Colors, typography, spacing, shadows — the atomic values	Designers + Developers
Components	Buttons, tables, forms, status indicators, classification banners	Designers + Developers
Patterns	Page layouts, navigation, data entry workflows, drill-down patterns	Designers
Templates	Pre-built page templates for common MSS application types	Designers + Builders (SL 3)
Guidelines	Usage rules, accessibility requirements, when-to-use/when-not-to-use	Designers

2-2. Component Library Management

BLUF: Every component in the library must be documented, accessible, tested, and versioned. Undocumented components are tech debt in the design layer.

Component documentation standard:

Each component entry must include: 1. **Name and description:** What it is and when to use it 2.

Variants: All supported configurations (sizes, states, themes) 3. **Accessibility notes:** Keyboard

behavior, ARIA roles, screen reader behavior 4. **Do/Don't examples:** Correct and incorrect usage with

explanation 5. **Data binding:** Which Ontology property types it supports 6. **Responsive behavior:** How it

adapts across target screen sizes 7. **Classification awareness:** How it handles classification-marked

data

2-3. Design Token Architecture

BLUF: Design tokens are the single source of truth for visual values. Change a token, change every component that uses it — consistently, everywhere.

Token categories for MSS:

Category	Examples	Governance
Color — classification	Banner colors per IC/DoD standard	Locked — cannot be overridden by application designers
Color — status	Ready/Degraded/Not Ready/Unknown	Locked — MSS-wide standard
Color — neutral	Backgrounds, borders, text	Configurable within palette constraints
Color — accent	Interactive elements, highlights	Configurable within contrast ratio requirements
Typography	Font family, size scale, weight scale, line height	Locked — MSS-wide standard
Spacing	Padding, margin scale (4px base unit)	Locked — MSS-wide standard
Elevation	Shadows, z-index layers	Locked

2-4. Design System Versioning

BLUF: A design system is a dependency for every MSS application. Unversioned changes to tokens or components break downstream applications the same way unversioned API changes break consumers. Version the design system like a product release.

Versioning scheme:

Follow semantic versioning (MAJOR.MINOR.PATCH) applied to the design system as a whole:

Change Type	Version Bump	Example
Breaking — component API change, removed variant, token rename	MAJOR	Button removes <code>compact</code> variant; applications using it must update
Additive — new component, new variant, new token	MINOR	New <code>StatusChip</code> component added; no existing application affected
Fix — bug fix, accessibility fix, visual correction	PATCH	Tooltip z-index corrected; no API change

Breaking vs. non-breaking changes:

Breaking (requires consumer action)	Non-Breaking (safe to adopt immediately)
Remove or rename a component	Add a new component
Remove or rename a component prop/variant	Add a new prop/variant with a default value
Change a token name or remove a token	Add a new token
Change default behavior of an existing pattern	Add a new pattern

Breaking (requires consumer action)	Non-Breaking (safe to adopt immediately)
Alter component DOM structure that affects automated tests	Fix an accessibility defect

Deprecation strategy:

1. **Announce:** Mark component/token as deprecated in the design system documentation. Add a `@deprecated` tag with the replacement path and target removal version.
2. **Warn:** Tooling flags deprecated component usage during design reviews and CI builds. Set a deprecation window — minimum 2 release cycles or 90 days, whichever is longer.
3. **Migrate:** Provide a migration guide for each deprecation: what to replace, how to replace it, edge cases. For token renames, provide a find-and-replace mapping file.
4. **Remove:** Remove the deprecated element in the announced MAJOR version. Removal without completing the deprecation window requires Lead Designer approval and documented justification.

Migration paths:

- **Token changes:** Publish a token migration map (old name → new name) as a consumable file. Application teams apply it via automated find-and-replace or design tooling plugin.
- **Component changes:** Provide a side-by-side comparison (old vs. new component), document prop mapping, and supply code snippets showing the before/after. Where feasible, ship a compatibility wrapper that translates old props to new ones during the transition window.
- **Pattern changes:** Update the pattern documentation with the new pattern, mark the old pattern as deprecated, and schedule application-by-application migration during normal maintenance cycles — not as emergency work.

Governance tie-in: All MAJOR version releases require design review per Section 5-1. The review must confirm that the migration guide is complete, the deprecation window was honored, and at least one representative application has been migrated successfully before fleet-wide rollout.

CHAPTER 3 — DDIL-AWARE DESIGN

3-1. Designing for Degraded Connectivity

BLUF: In the USAREUR-AF AOR, "always connected" is a fiction. Design every application to function — not just survive — when the network is slow, intermittent, or absent.

DDIL design tiers:

Tier	Network Condition	Design Response
Full connectivity	Normal bandwidth, low latency	Full application functionality; real-time data
Degraded	Reduced bandwidth, higher latency	Reduce data payload; defer non-critical updates; show loading indicators with time estimates
Intermittent	Connection drops and reconnects	Queue actions locally; sync on reconnect; show connection status; indicate data freshness
Disconnected	No connectivity	Read-only cached data; indicate staleness prominently; queue writes for later sync

3-2. Data Freshness Indicators

BLUF: Stale data without a staleness indicator is worse than no data — it creates false confidence.

Every data element displayed under DDIL conditions must indicate: - **Last updated timestamp:** When was this data last confirmed current? - **Staleness threshold:** Visual indicator when data exceeds its freshness window (e.g., readiness data >4 hours old gets amber border) - **Source status:** Is the upstream data source currently reachable? Show connection indicator.

3-3. Offline-First Interaction Patterns

BLUF: If the user performs an action offline, the system must acknowledge the action, queue it, and sync it — or clearly explain why it cannot.

Pattern	Behavior	User Feedback
Optimistic action	Accept action immediately; sync to server when connected	"Action saved locally. Will sync when connected."
Queued action	Accept action; hold in queue until connectivity confirmed	"Action queued. [3 actions pending sync]"
Blocked action	Action requires server confirmation; cannot be performed offline	"This action requires network connectivity. Currently offline."

CHAPTER 4 — CROSS-DOMAIN AND COALITION UI

4-1. Multi-Classification Display

BLUF: When users work across classification levels, the UI must make the current classification level unmistakable at all times. Ambiguity is a security violation.

Cross-domain design requirements: - Classification banners visible at ALL times — never hidden by scroll, modal, or overlay - Color-coded banners per IC/DoD standard with redundant text labels - Data from different classification levels NEVER displayed on the same screen without explicit domain separation and ISSM-approved design - Session transition between classification levels requires deliberate user action (not automatic) - Print output includes classification markings on every page

4-2. Coalition and Multinational UI

BLUF: USAREUR-AF operates with NATO and partner nation forces. Interfaces shared with coalition partners must account for language, cultural conventions, and releasability markings.

Coalition UI considerations:

Consideration	Design Response
Language	English as primary; critical labels and status indicators designed for non-native English readers (simple vocabulary, no idioms, no abbreviations without expansion)
Date/time format	DTG standard for military use; ISO 8601 as fallback; never MM/DD/YYYY (ambiguous internationally)
Units of measure	Metric primary for coalition contexts; dual display where required
Releasability markings	REL TO markings displayed alongside classification; filter controls enforce releasability
Cultural conventions	Left-to-right layout assumption documented; color associations verified across partner nation conventions

CHAPTER 5 — DESIGN OPERATIONS (DESIGNOPS)

5-1. Design Review Governance

BLUF: Without governance, a design system erodes. New applications introduce inconsistencies, accessibility regressions, and pattern drift. DesignOps prevents this.

Design review process (enterprise scale):

Review Type	Trigger	Reviewers	Output
New application design	Before development begins	Lead Designer + PM + SWE	Approved design spec or revision requests
Component addition	New component proposed for design system	Design system team (2+ designers)	Accept to library, reject, or merge with existing
Pattern deviation	Application needs to deviate from standard pattern	Lead Designer + requesting Designer	Approved exception (documented) or redesign using standard pattern
Accessibility audit	Quarterly, or before major release	Designer + automated tools	Compliance report with remediation priorities
Portfolio consistency check	Semi-annual	Lead Designer reviews 5 representative applications	Consistency scorecard; remediation backlog

5-2. Design Quality Metrics

BLUF: What gets measured gets improved. Define metrics that drive design quality, not just design output.

Recommended metrics:

Metric	What It Measures	Target
Accessibility compliance rate	% of applications meeting WCAG 2.1 AA	100%
Design system adoption	% of components using design system tokens/components	>90%
Usability test cadence	% of applications tested with representative users in past 6 months	100%

Metric	What It Measures	Target
Design-to-deploy fidelity	% of implemented features matching design specification	>95%
Time to first design	Days from requirement to first design review	<5 business days
Pattern reuse rate	% of new designs using existing patterns vs. creating new ones	>70%

5-3. Research Repository

BLUF: User research is expensive to conduct. A research repository prevents teams from re-asking questions that have already been answered.

Research repository structure: - **Study records:** Who was studied, when, where, methodology, key findings - **Insight library:** Validated insights tagged by user role, WFF track, application domain -

Persona library: Maintained set of user personas updated with each research cycle - **Recommendation tracker:** Design recommendations with implementation status

CHAPTER 6 — ACCESSIBILITY AT ENTERPRISE SCALE

6-1. Automated Accessibility Testing

BLUF: Manual accessibility testing does not scale across a portfolio. Automate what can be automated; reserve manual testing for what cannot.

Automation vs. manual testing:

Can Automate	Must Test Manually
Color contrast ratios	Logical reading order for screen readers
Missing alt text	Meaningfulness of alt text content
Missing form labels	Clarity of error messages
Keyboard focus indicators present	Keyboard navigation flow is logical
ARIA roles present	ARIA roles are correct for the interaction
Touch target size	Touch target placement makes sense in context

6-2. Accessibility Remediation Prioritization

BLUF: Not all accessibility issues are equal. Prioritize by operational impact.

Priority	Criteria	Response
P0 — Blocker	User cannot complete the primary task at all	Fix before next deployment
P1 — Critical	User can complete the task but with significant difficulty	Fix within current sprint
P2 — Major	User experience is degraded but task is completable	Schedule in next sprint
P3 — Minor	Cosmetic or minor friction; does not affect task completion	Backlog; address during next design system update

APPENDIX A — REFERENCES

Reference	Relevance
SL 4N — UI/UX Designer	Prerequisite; individual application design
SL 5J — Advanced Program Manager	Portfolio-level product strategy coordination
SL 5L — Advanced Software Engineer	Design system implementation, shared component architecture
SL 5O — Advanced Platform Engineer	Performance budgets, deployment constraints
WCAG 2.1 (W3C)	Accessibility technical standard
IC/DoD Classification Marking Guide	Classification banner requirements
NATO STANAG 4774/4778	Coalition information exchange metadata

APPENDIX B — PEER SL 5 CROSS-REFERENCES AND WFF INTEGRATION

Peer SL 5 Publications. Advanced UI/UX Designers should coordinate with practitioners in these companion advanced-track publications rather than operating in isolation.

Publication	Track	Coordination Point
SL 5G	Advanced ORSA	Data visualization design for analytical products; dashboard UX for ORSA outputs
SL 5H	Advanced AI Engineer	UI/UX for AI-driven applications; model output presentation; automation bias mitigation through interface design
SL 5M	Advanced ML Engineer	Visualization of ML model performance; feature importance displays; experiment tracking dashboards
SL 5J	Advanced Program Manager	Portfolio-level product strategy; design system roadmap prioritization; resource allocation for UX research
SL 5K	Advanced Knowledge Manager	Knowledge portal UX; search interface design; taxonomy visualization; glossary integration
SL 5L	Advanced Software Engineer	Design system implementation architecture; shared component libraries; design token-to-code pipeline
SL 5O	Advanced Platform Engineer	Platform portal design; performance budgets; deployment constraints affecting design patterns; CDN hosting for design assets

WFF Operational Consumer Note. Design systems, DDIL patterns, and accessibility standards built by SL 5N designers are consumed by the six Warfighting Function (WFF) tracks: Intelligence (SL 4A), Fires (SL 4B), Movement and Maneuver (SL 4C), Sustainment (SL 4D), Protection (SL 4E), and Mission Command (SL 4F). These practitioners are the operational users of every dashboard, COP layer, and decision support product in the MSS portfolio. A G2 intelligence dashboard has different layout priorities than a G4 sustainment status board; both must be accessible, DDIL-resilient, classification-explicit, and unambiguous about data freshness. Design system decisions at the SL 5N level propagate to every application these WFF operators depend on — design with their operational conditions, not garrison connectivity, as the baseline.