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TECHNICAL MANUAL

SL 5K



TM-50K — ADVANCED KNOWLEDGE MANAGEMENT

Specialist Course Manual

HEADQUARTERS
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TM-50K — ADVANCED KNOWLEDGE MANAGEMENT

Forward: SL 5K trains Army Knowledge Managers at the Corps and Theater echelon to design, federate, and sustain enterprise-scale knowledge management systems on MSS. This manual assumes mastery of all SL 4K competencies. SL 5K is not a continuation of SL 4K tasks — it is an architectural shift in responsibility, scope, and risk. **Prereqs:** SL 4K, Knowledge Manager (required); SL 1, Maven User; SL 2, Builder; SL 3, Advanced Builder; Data Literacy Technical Reference (all required); CONCEPTS_GUIDE_TM50K_KNOWLEDGE_MANAGER_ADVANCED (read before this manual). *HQ USAREUR-AF · v1.0 · 2026 · DISTRIB: USG only · AUTH: C2DAO/UDRA v1.1*

WARNING: An Advanced KM who builds enterprise systems without governance structures is not building capability — they are building uncontrolled risk. Every system at this level requires defined ownership, documented architecture, security review, and a decommission plan. A system without a decommission plan will outlive its usefulness and become a liability.

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CHAPTER 1 — INTRODUCTION AND SCOPE

1-1. Advanced Knowledge Manager Manual

BLUF: SL 5K trains Army Knowledge Managers at the Corps and Theater echelon to design, federate, and sustain enterprise-scale knowledge management systems on MSS. This manual assumes mastery of all SL 4K competencies. SL 5K is not a continuation of SL 4K tasks — it is an architectural shift in responsibility, scope, and risk.

A SL 4K KM designs and maintains knowledge systems for a unit. A SL 5K Advanced KM designs the architecture that SL 4K KMs operate within. The Advanced KM is the enterprise KM architect — defining standards, patterns, governance structures, and integration interfaces that make federated knowledge possible across a Theater.

At USAREUR-AF, the Advanced KM role supports:

- **C2DAO** enterprise knowledge governance
- **III Corps** and **V Corps** and subordinate Division KM architecture
- **EUCOM J3/J7** joint and coalition knowledge sharing
- **NATO ACO** lessons learned interoperability
- **Exercise program management:** Defender Europe, Saber Strike, Swift Response, Combined Resolve — each generating cross-unit knowledge products that must be federated and preserved at Theater level

NOTE

SL 5K is not a standalone track. Soldiers and Civilians attempting SL 5K without SL 4K mastery will lack the foundational vocabulary and Foundry platform competencies required to execute the tasks in Chapters 2 through 8. The prerequisite is enforced operationally, not administratively — incomplete foundations at this level produce systems that fail at scale.

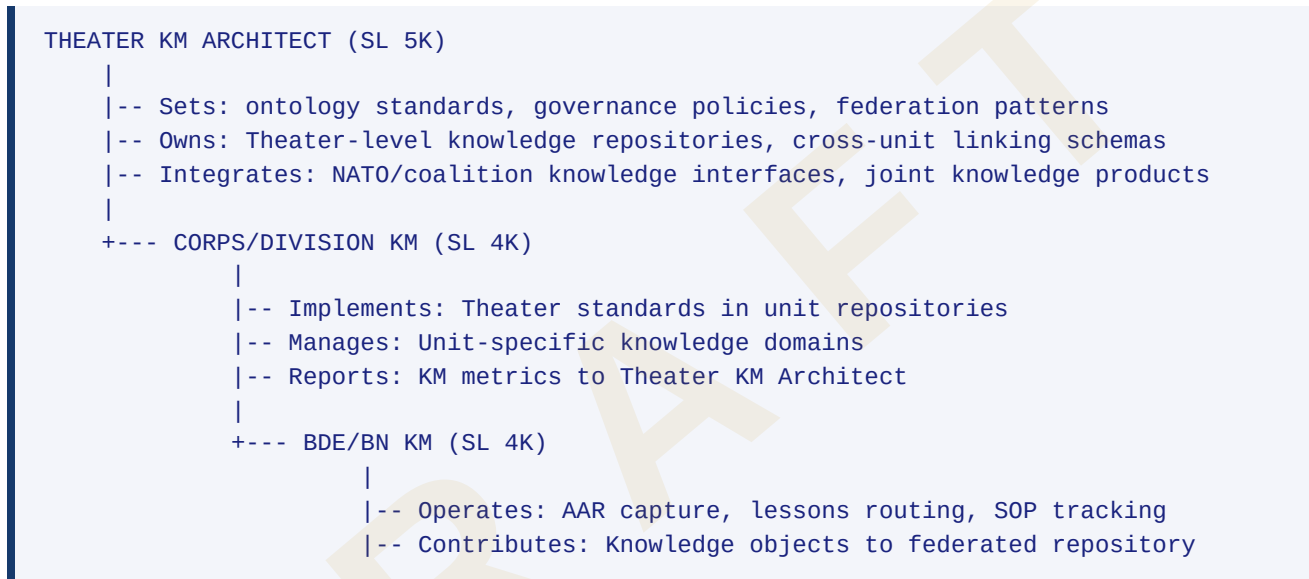
1-2. The Advanced KM Role: Architect, Not Operator

The distinction between SL 4K and SL 5K is architectural authority and scope of impact.

SL 4K KM (Unit level): - Designs and builds knowledge objects within an established ontology - Operates within governance structures set by the enterprise - Manages a single unit's knowledge domains - Builds AIP workflows that serve a defined user population - Maintains a knowledge repository with a single clear ownership chain

SL 5K Advanced KM (Corps/Theater level): - Designs the ontologies that SL 4K KMs operate within - Establishes the governance structures — access controls, naming conventions, ownership assignments, lifecycle policies — that all subordinate KMs follow - Federates knowledge across multiple units without creating brittle centralized dependencies - Integrates knowledge systems across classification levels (parallel networks, not bridges) - Designs AI-assisted workflows for large-scale synthesis across multi-unit, multi-exercise datasets - Manages coalition knowledge sharing with legal, classification, and releasability constraints - Measures KM effectiveness across a formation and identifies systemic gaps - Trains and accredits subordinate KMs

The Advanced KM chain of responsibility:



1-2A. Relationship to Other SL 5 Publications

Publication	Track	Key Overlap with SL 5K
SL 5G	ORSA Advanced	ORSA-derived lessons and analytical knowledge products
SL 5H	AI Engineer Advanced	Corpus design and ontology-RAG integration (AI-assisted KM)
SL 5M	ML Engineer Advanced	Feature data governance; training corpus quality architecture
SL 5J	Program Manager Advanced	KM program oversight and portfolio-level knowledge governance
SL 5K	Knowledge Manager Advanced	THIS DOCUMENT
SL 5L	Software Engineer Advanced	Platform SDK infrastructure supporting enterprise KM systems
SL 5N	UI/UX Designer Advanced	Information architecture; knowledge portal UX

Publication	Track	Key Overlap with SL 5K
SL 5O	Platform Engineer Advanced	Knowledge platform infrastructure; search and retrieval systems

WFF Operational Consumer Note. Knowledge management at the advanced level exists to ensure that the operational insights generated across exercises, operations, and analytical work are discoverable and usable 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). WFF practitioners are the primary end-users of validated lessons, TTPs, and doctrine products. Enterprise KM architecture must be designed with WFF operational workflows as the primary retrieval use case — if G3 (Movement and Maneuver) planners cannot find sustainment lessons relevant to their operation, the knowledge system has failed regardless of technical quality.

1-3. USAREUR-AF Knowledge Environment

USAREUR-AF operates a complex knowledge environment driven by the European and African AOR mission set:

Continuous exercise cycle. USAREUR-AF runs 20+ major exercises annually across the AOR. Each exercise produces AARs, lessons, TTPs, and personnel expertise data. Without enterprise KM architecture, this knowledge is captured locally and lost at the next PCS rotation.

High personnel turbulence. USAREUR-AF and EUCOM have above-average PCS tempo. Key positions turn over every 12-24 months. Institutional knowledge walks out the door with every departure unless systems are designed to capture it before it leaves.

Multi-echelon integration. Knowledge must flow from Battalion to Brigade to Division to Corps to Theater and back down — and sometimes laterally across formations. Siloed unit repositories that can't federate are a liability, not an asset.

Coalition integration. NATO exercise programs, Baltic flank operations, and EUCOM theater security cooperation activities produce knowledge that must be shared with partner nations — under specific releasability rules, in compatible formats, through approved channels.

Operational security constraints. European AOR operations include sensitivity considerations that require careful management of what knowledge is shared, with whom, and at what classification level. The Advanced KM must design systems that are useful without being vulnerable.

1-4. Governing References

Document	Relevance
FM 7-0 (Training)	AAR process, unit training management, lessons integration — foundational doctrine for knowledge capture
ADP 6-22 (Army Leadership and the Profession)	Organizational learning, leader development, institutional knowledge within the profession
ATP 6-01.1 (Techniques for Effective Knowledge Management)	Primary KM doctrine — operations, roles, processes, systems
AJP-5 (Allied Joint Doctrine for Operational-Level Planning)	Coalition knowledge integration requirements in joint and combined operations
NATO STANAG 4778 (Lessons Learned)	Standardized lessons learned format for NATO-compatible exchange
NATO Information Management Policy (IMP)	Governs information sharing with NATO partners on NATO networks
AR 25-1 (Army Enterprise Technology Management)	Information management policies, records management requirements
AR 25-400-2 (Army Records Management and Declassification Agency)	Records retention schedules applicable to knowledge repositories
USAREUR-AF C2DAO Guidance	Theater architecture standards — enterprise KM must conform
Joint Lessons Learned Information System (JLLIS)	DoD-level lessons platform — USAREUR-AF lessons feed into JLLIS
Center for Army Lessons Learned (CALL)	Army lessons learned repository — SL 5K systems must integrate or feed CALL appropriately
NATO Core Metadata Specification / STANAG 5636	Structured metadata standards — required for NATO-compatible knowledge products at theater level
NATO ADatP-34 / NISP	C3 interoperability standards for data cataloging and cross-domain knowledge exchange
STANAG 5643 (proposed) — MIM Governance Standard	NATO MIP Information Model governance — data model versioning, change proposals, national extensions

1-4a. Strategic Guidance

The following are strategic guidance documents — not doctrine — that inform MSS training design and operational context.

Document	Authority	Relevance
Army CIO Data Stewardship Policy (April 2, 2024)	Army CIO	Data product standards, domain ownership, stewardship hierarchy — applies to knowledge products
UDRA v1.1 (February 2025)	Army Enterprise	Unified Data Reference Architecture — federated governance and domain structure apply to enterprise KM
NATO Data Strategy for the Alliance (Feb 2025)	NATO	Alliance-wide data governance mandate — enterprise KM must align for coalition interoperability

1-5. TM-50K Chapter Guide

Chapter	Topic	Apply When
Chapter 2	Enterprise KM Architecture	Designing Corps/Theater knowledge systems from scratch or refactoring existing ones
Chapter 3	Cross-Domain Knowledge Federation	Managing parallel network knowledge environments, multi-unit federation
Chapter 4	AI-Assisted Doctrine/Lessons at Scale	Synthesizing lessons across multiple exercises, AI-assisted doctrine drafting
Chapter 5	Coalition Knowledge Sharing	NATO/partner nation knowledge integration, STANAG 4778 compliance
Chapter 6	Knowledge Graph Design	Building entity-relationship graphs for complex knowledge navigation
Chapter 7	KM Metrics	Measuring effectiveness, reporting to senior leaders, gap analysis
Chapter 8	Institutional Memory / Knowledge Risk	Identifying critical knowledge dependencies, designing for persistence

CHAPTER 2 — ENTERPRISE KM ARCHITECTURE (CORPS/THEATER LEVEL)

NOTE — Palantir Developers reference: *Product Launch: Ontology Foundations | DevCon 5* — Covers the foundational principles of Palantir Ontology design at enterprise scale, directly applicable to the Theater ontology design task in Section 2-3. Review before designing or reviewing a corps/theater-level schema. Available on the Palantir Developers YouTube channel (@PalantirDevelopers).

NOTE — Palantir Developers reference: *Deep Dive: Advanced Ontology | DevCon 5* — A technical deep dive into advanced Palantir Ontology design patterns, covering the design decisions that distinguish a scalable enterprise ontology from a unit-level one. Directly reinforces the Theater ontology and federated architecture content in Sections 2-3 through 2-5. Available on the Palantir Developers YouTube channel (@PalantirDevelopers).

2-1. Purpose

BLUF: Enterprise KM architecture at the Corps and Theater level requires a federated design — one that standardizes enough to enable cross-unit knowledge sharing, while remaining flexible enough for subordinate units to manage their own knowledge domains without central bottlenecks. This chapter covers the full methodology for designing, documenting, and governing a Theater-scale knowledge ontology on MSS.

2-2. Federated Architecture Principles

A federated KM architecture is not a single centralized repository. It is a set of interconnected, semi-autonomous knowledge domains that share a common schema, common identifiers, and common linking conventions — but are owned and maintained by the units responsible for the knowledge.

The federated architecture solves three problems a centralized system cannot:

1. **Ownership:** Centralized repositories have ambiguous ownership. Federated domains have clear owners at every level who are accountable for content quality.
2. **Scalability:** A single Corps-level repository that every unit writes to becomes a bottleneck. Federated unit repositories that conform to Theater standards scale horizontally.
3. **Resilience:** A centralized system has a single point of failure. Federated systems degrade gracefully — a unit repository can operate independently if Theater connectivity is degraded.

Federated architecture does NOT mean: - Every unit can design its own schema (standardized schemas are required for federation) - Knowledge stays siloed in each unit (the point is cross-unit linking and search) - There is no central governance (federation requires stronger governance, not weaker)

The four layers of enterprise KM architecture:

LAYER 1: THEATER STANDARDS LAYER

- Core ontology definitions (Object Types, Link Types, property schemas)
- Naming conventions and identifier formats
- Access control policy templates
- Lifecycle and review cycle policies
- Governed by: Theater KM Architect (SL 5K)

LAYER 2: DOMAIN REPOSITORIES

- Corps/Division/Functional-area knowledge repositories

- Each repository conforms to Theater standards
- Each repository has a named domain owner
- Governed by: Corps/Division KM (SL 4K)

LAYER 3: UNIT CONTRIBUTION LAYER

- Brigade/Battalion-level knowledge capture and contribution
- Structured ingestion pipelines that validate against Theater schemas
- Unit KMs contribute objects; Theater KM reviews and federates
- Governed by: Unit KM (SL 4K)

LAYER 4: CONSUMER INTERFACE LAYER

- Search and discovery interfaces for cross-domain knowledge access
- AIP Q&A interfaces that query across federated domains
- Reporting and metrics dashboards
- Governed by: Theater KM Architect (SL 5K) in coordination with C2DA0

2-2a. Battle Rhythm Synchronization Across Echelons

Enterprise KM architecture must synchronize knowledge products with the battle rhythm at every echelon. FM 6-0 establishes the battle rhythm as the mechanism that sequences meetings, reports, and decision points across BDE, DIV, and Corps. The advanced KM architect designs knowledge flows that feed this rhythm — not operate in parallel to it.

Vertical flow (BN → BDE → DIV → Corps): Knowledge products move upward through aggregation. A battalion lessons-learned entry becomes a brigade trend analysis, which feeds a division knowledge brief, which informs the Corps CG's decision sync. Each aggregation step adds context and removes detail. The KM architect defines the aggregation rules and the handoff triggers at each echelon boundary.

Horizontal flow (staff sections, functional directorates): Knowledge products move laterally between G-staff sections within the same echelon. A G2 threat assessment informs G3 OPLAN development; G4 sustainment constraints inform G3 COA analysis. The KM architect ensures cross-directorate knowledge products are discoverable, tagged by battle rhythm event, and pushed to the right consumers at the right time — not buried in a repository waiting to be pulled.

Design rule: Every knowledge product in the enterprise KM system must be tagged with its target battle rhythm event(s) and its echelon scope. Knowledge products without battle rhythm linkage are orphaned — they exist but do not inform decisions.

NOTE — KM integration with the five Army integrating processes (FM 5-0): FM 5-0 identifies five integrating processes that unify staff effort: IPOE, information collection, targeting, risk management, and knowledge management. KM is one of the five — but the advanced KM architect must ensure knowledge products feed ALL five processes, not KM in isolation. IPOE consumes lessons and operational patterns. Information collection consumes knowledge gaps as collection requirements. Targeting consumes knowledge about threat patterns and engagement outcomes. Risk management consumes hazard

knowledge and mitigation effectiveness data. If knowledge products only circulate within the KM process itself, the enterprise KM architecture has failed its integrating function. Design knowledge flows that deliver products to the other four integrating processes as primary consumers.

2-3. Theater Ontology Design

The Theater ontology defines the Object Types, Link Types, and property schemas that ALL units in the Theater use. It is the contract that makes federation possible.

TASK 2-3-1: DESIGN THEATER CORE ONTOLOGY

CONDITIONS: You are the Theater KM Architect for USAREUR-AF. You have been directed to design or redesign the enterprise knowledge ontology. You have access to MSS Ontology Manager, prior unit KM documentation, and stakeholder availability for requirements gathering.

STANDARDS: Upon completion, the Theater ontology will include: all core Object Types with complete property schemas, all required Link Types with directionality documented, access control tiers for each Object Type, and a published schema documentation package reviewed by C2DAO.

EQUIPMENT: MSS Ontology Manager, MSS Foundry access, stakeholder interview documentation, USAREUR-AF C2DAO architecture standards.

PROCEDURE:

- 1. Conduct stakeholder analysis.** Identify all units and functional areas that will contribute to or consume from the Theater knowledge system. Minimum: G2, G3, C2DAO, G7 (Training), Civil Affairs, Corps KM, subordinate Division KMs, EUCOM J3/J7 liaison. Document their knowledge production and consumption requirements before opening Foundry.
- 2. Define core Object Type inventory.** At Theater level, the minimum required Object Types are:

Object Type	Definition	Primary Owner
Lesson	Extracted lesson from operational or exercise experience	Corps/Theater KM
AAR	Structured after-action review record	Contributing unit KM
Exercise	Exercise or operation event that generates knowledge products	G3/Theater KM
TTP	Tactic, technique, or procedure — operationally derived	G3/Theater KM
SOP	Standing operating procedure with version tracking	Functional area owner
DoctrinePub	External doctrine publication referenced by the command	Theater KM

Object Type	Definition	Primary Owner
ExpertiseProfile	Individual skills and qualifications record	HR/G1 in coordination with KM
UnitRecord	Unit identity and lineage for attribution and relationship linking	Theater KM
KnowledgeDomain	A defined knowledge area with owner, scope, and lifecycle	Theater KM
CoalitionKnowledgeProduct	Knowledge product approved for partner nation sharing	Theater KM / OPSEC
LessonsReview	Quality control record for lessons ingestion decisions	Theater KM

- 1. Define Theater-standard properties for each Object Type.** Every Object Type must have:
 2. A unique, non-repeating identifier field (Theater-assigned prefix, e.g., `USAREUR-LES-{YYYY}-{NNNN}` for Lessons)
 3. A `classification` property with controlled vocabulary (UNCLASSIFIED, CUI, SECRET — values restricted to network environment)
 4. A `sourceUnit` property linking to `UnitRecord`
 5. A `ownerID` property identifying the responsible individual/billet
 6. A `reviewDate` property with lifecycle enforcement
 7. A `status` property with controlled vocabulary (DRAFT, PENDING_REVIEW, APPROVED, ARCHIVED, SUPERSEDED)
- 8. Define Link Type inventory.** Links are as important as Object Types — they make knowledge navigable.

Link Type	Source	Target	Directionality
DERIVED_FROM	Lesson or TTP	AAR	One lesson derived from one or many AARs
OCCURRED_IN	AAR	Exercise	Many AARs from one exercise
REFERENCES	TTP or SOP	DoctrinePub	Procedural knowledge references doctrine
SUPERSEDES	SOP	SOP	Version chain tracking
PERFORMED_BY	AAR or Lesson	UnitRecord	Attribution chain
EXPERT_IN	ExpertiseProfile	KnowledgeDomain	Personnel expertise linkage

Link Type	Source	Target	Directionality
RELEVANT_TO	Lesson or TTP	KnowledgeDomain in	Routing and discoverability
VALIDATED_BY	TTP	ExpertiseProfile	SME validation attribution
APPROVED_FOR_COALITION	CoalitionKnowledgeProduct	Lesson or TTP	Releasability linkage

- Design access control tiers.** Define minimum three tiers:
- Tier 1 — Open:** All authenticated Theater users. Standard lessons, AARs from unclassified exercises, published doctrine.
- Tier 2 — Unit-restricted:** Contributing unit plus Theater KM only. Pre-approval lessons, internal AAR content, draft SOPs.
- Tier 3 — Controlled:** Theater KM and named approvers only. Classification-sensitive content, coalition-candidate knowledge products pending review, expertise profiles with PII fields.
- Document the schema in a Theater KM Schema Registry.** The registry is a living document maintained in MSS as a `KnowledgeDomain` object of type `GOVERNANCE`. It includes: Object Type definitions, property dictionaries, Link Type specifications, access control assignments, naming conventions, and version history. Publish the registry to all unit KMs before any unit begins building.
- Submit schema to C2DAO for architecture review.** C2DAO review is not optional. The review confirms the schema conforms to UDRA v1.1 and does not create unplanned cross-domain dependencies. Obtain written approval before production deployment.

CAUTION: Ontology changes after units have begun populating data require migration planning. A property rename or type change after 10,000 objects are ingested creates a multi-unit rework burden. Invest design time upfront. Get the schema right before units begin contributing.

2-4. Federated Repository Design Patterns

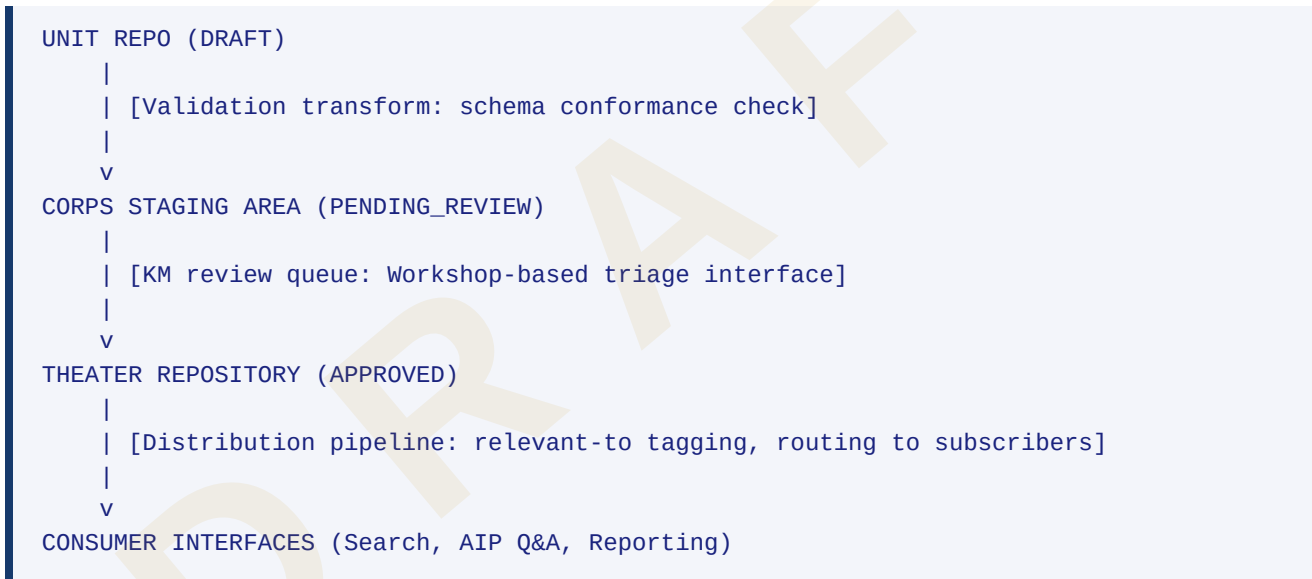
Three federation patterns are used in the USAREUR-AF enterprise. Select the correct pattern based on the knowledge domain requirements.

Table 2-2. Federation Pattern Selection Guide

Pattern	Description	Use When	Risk
Hub-and-Spoke	Unit repos contribute to a central Theater repo via ingestion pipelines	Lessons and AARs that must be normalized and	Central hub becomes bottleneck;

Pattern	Description	Use When	Risk
		reviewed before Theater-level access	requires strong Theater KM capacity
Peer-to-Peer with Shared Schema	Units maintain sovereign repos with common schema; cross-unit search via Quiver configured to query multiple repos	Knowledge that stays unit-owned but needs cross-unit findability	Schema drift if governance is weak; complex Quiver configuration
Tiered Publication	Knowledge flows through quality gates: Unit DRAFT → Corps REVIEW → Theater PUBLISHED	TTPs and doctrine-adjacent products requiring multi-level approval	Slow throughput; requires clear SLA for review queue processing

Hub-and-Spoke ingestion pipeline design:



Each arrow represents a Foundry pipeline with validation logic. The validation transform at the unit-to-corps boundary checks: required properties populated, controlled vocabulary compliance, classification field present, sourceUnit linked, reviewDate set. Objects that fail validation are returned to the contributing unit KM with a rejection reason — not silently dropped.

2-5. Governance Structures

Architecture without governance fails. Governance without architecture has nothing to govern. Both are required.

Theater KM Governance Board: A quarterly board, co-chaired by Theater KM Architect and C2DAO, that reviews: schema change requests, new domain requests, cross-unit access requests, metrics reports, and KM architecture deviations reported by subordinate KMs.

Schema Change Control Process:

1. Unit or Corps KM submits schema change request to Theater KM Architect
2. Theater KM Architect conducts impact analysis (which Object Types are affected, how many existing objects, what migration is required)
3. C2DAO reviews for architecture conformance
4. Governance Board approves or rejects at next quarterly meeting (emergency changes via Theater KM Architect + C2DAO bilateral)
5. Approved changes are implemented with a migration plan; unit KMs are notified with 30-day implementation window
6. Change is documented in Theater KM Schema Registry with effective date and rationale

Domain Ownership Registry: A table maintained by Theater KM Architect listing every knowledge domain, its owner (by billet, not individual), deputy owner, review cycle, last review date, and status. Published in MSS. Reviewed at each governance board meeting.

2-6. Enterprise KM Deployment Checklist

Before deploying any Theater-level KM system to production:

Checkpoint	Required	Verified By
Theater ontology schema documented and published	Yes	Theater KM Architect
C2DAO architecture review complete	Yes	C2DAO
Domain ownership registry populated	Yes	Theater KM Architect
Access control tiers configured and tested	Yes	Theater KM Architect + S6
Unit KM training on schema standards complete	Yes	Theater KM Architect
Ingestion validation pipelines tested with sample data	Yes	Theater KM Architect
Records retention schedule applied	Yes	Unit RMO
AIP workflow configuration reviewed by SME	Yes	Theater KM Architect + G3/G7
Privacy Act review for ExpertiseProfile data	Yes	Legal / S2
Decommission plan documented	Yes	Theater KM Architect

CHAPTER 3 — CROSS-DOMAIN KNOWLEDGE FEDERATION

3-1. Purpose

BLUF: Cross-domain knowledge federation in the USAREUR-AF environment means managing knowledge across organizational and functional boundaries — not across classification levels. Classification-level separation is a hard boundary managed by parallel network environments (NIPR, SIPR, JWICS). Cross-domain federation in this chapter refers to federating knowledge across Corps, Divisions, functional directorates, and coalition-parallel environments while maintaining access control integrity.

WARNING: "Cross-domain" in the MSS context NEVER means bridging or transferring data between NIPR and SIPR networks, or between U.S. and coalition networks, without an approved Cross Domain Solution (CDS) and ISSO/SSO authorization. If someone asks you to build a "cross-domain pipeline" that moves data between classification levels, stop. Consult your ISSO immediately. No knowledge product is worth a security violation.

3-2. Classification-Level Parallel Architecture

USAREUR-AF operates knowledge systems on multiple networks. Each network is a separate environment with its own MSS instance and no data connection to the others.

Network	Classification	MSS Instance	Use
NIPR (NIPRNet)	CUI	MSS-UNCLASS	Exercise lessons, unclassified TTPs, releasable doctrine, coalition-approved products
SIPR (SIPRNet)	SECRET	MSS-SECRET	Operational lessons with classified context, intelligence-informed TTPs, classified SOPs
JWICS	TOP SECRET/SCI	Not in scope for SL 5K	Addressed in separate C2DAO guidance

Parallel network KM design requirements:

- Maintain separate, independent knowledge repositories on each network.** Do not design one system and assume it will work on both — access controls, AIP capabilities, and partner nation access rules differ by network.
- Design knowledge products for the appropriate classification level from the start.** Retroactive downgrade or upgrade requires a formal classification review process. Build knowledge capture forms that prompt contributors to identify classification at ingestion time, not after.

3. **Do not create dependencies between network environments.** A knowledge pipeline that requires connectivity to SIPR to function on NIPR is a design flaw. Each environment must be independently operable.
 4. **Manage "SIPR-originated, downgraded-to-NIPR" products through formal release workflow.** If classified lessons will be declassified for broader distribution, design a structured release pipeline with classification review checkpoints — not an ad hoc copy-paste workflow.
-

3-3. Multi-Unit Knowledge Federation

Within a single network environment, federating knowledge across Corps, Division, Brigade, and Functional Directorate boundaries requires deliberate architecture.

TASK 3-3-1: DESIGN MULTI-UNIT FEDERATION ARCHITECTURE

CONDITIONS: You are designing the lessons learned federation architecture for USAREUR-AF Corps. Multiple Divisions and Functional Brigades will contribute lessons from Defender Europe exercises. All operate on NIPR. Lessons must be findable across unit boundaries from a single search interface.

STANDARDS: Upon completion, the federation architecture will include: a validated ingestion pipeline from each contributing unit, a Theater-level consolidated repository conforming to the Theater ontology, a cross-unit search interface in Workshop, and documented ownership at every layer.

EQUIPMENT: MSS Foundry (pipeline builder, Ontology Manager, Workshop), Theater KM Schema Registry, USAREUR-AF C2DAO coordination.

PROCEDURE:

1. **Map contributing units and their existing knowledge repositories.** For each contributing unit, identify: existing data location on MSS (dataset, object set, or manual upload), current schema in use (if any), contributing KM billet, estimated volume of knowledge objects per exercise cycle.
2. **Assess schema conformance for each contributing unit.** Compare each unit's existing schema to the Theater standard. Document deviations. Classify deviations as: minor (property rename, added optional field — addressable via pipeline transform), moderate (structural differences requiring unit-level work before ingestion), critical (incompatible architecture requiring unit KM intervention before federation is possible).
3. **Build unit-specific ingestion adapters for minor deviations.** A Foundry pipeline transform can handle minor schema normalization — mapping a unit's `lesson_title` property to the Theater standard `title`, for example. Document all transforms in the pipeline metadata.
4. **Establish ingestion staging areas for each contributing unit.** Each unit has a dedicated staging dataset on MSS where their knowledge objects land before validation. Unit KMs have write access to their staging area; Theater KM has read access. Staging data is not yet visible to Theater-level consumers.

5. **Build the validation pipeline.** The validation pipeline reads from all unit staging areas, applies Theater schema validation rules, routes conforming objects to the Theater consolidated repository, and routes non-conforming objects to a rejection queue with structured error records.

Minimum validation checks: - Required properties populated (not null, not empty string) - Controlled vocabulary compliance for `classification`, `status`, `operationalDomain` - `sourceUnit` links to a valid `UnitRecord` in the Theater ontology - `reviewDate` is set and is a future date (not past, which would indicate stale content already overdue for review) - No duplicate `lessonID` values within the Theater repository

1. **Build the Theater consolidated repository.** Configure as a Foundry Object Set drawing from the validated, normalized dataset. Apply access controls: all authenticated USAREUR-AF users on NIPR can read UNCLASSIFIED content; unit-restricted content visible only to contributing unit plus Theater KM.
2. **Configure cross-unit search interface.** Use Quiver (Foundry's Ontology browser for exploring, filtering, and traversing Object Types by property values) configured to index the Theater consolidated repository. Build a Workshop search interface that allows consumers to search by: free text, `operationalDomain` (filter), `exercise` (filter), `unit` (filter), `classification` (enforced by user access, not filter), date range. Surface the top-5 most-relevant `Lesson` objects with a link to the full record and to any associated `AAR` or `Exercise` objects.
3. **Test with representative data before production.** Seed the staging areas with 20-30 representative lessons from each contributing unit. Run the full pipeline. Verify: all valid objects reach the Theater repository, invalid objects appear in the rejection queue with correct error messages, the Workshop search interface returns expected results for known-good queries.
4. **Brief unit KMs on the federation process.** Distribute the Theater KM Schema Registry to all contributing unit KMs. Conduct a 2-hour virtual synchronization covering: schema requirements, staging area procedures, how to interpret rejection messages and fix them, who to contact for schema questions.

NOTE

Federation architecture is a living system. New units will join the Theater exercise program. Existing units will reorganize. The Theater KM Architect must plan for onboarding new contributors and managing unit deactivations without disrupting the consolidated repository.**

3-4. Functional Directorate Knowledge Integration

Within USAREUR-AF, functional directorates (G2, G3, G6, G7, Civil Affairs) each produce knowledge products relevant to other directorates. A G3 lessons learned from a Baltic flank exercise may be directly relevant to G7 training planning. A Civil Affairs civil-military engagement TTP may inform G2 information

collection planning.

Cross-functional linking is not automatic — it requires deliberate tagging architecture.

Cross-functional tagging design:

1. **Establish a shared `operationalDomain` controlled vocabulary** that cuts across functional lines.
Example values: `C2`, `FIRES`, `LOG`, `INTEL`, `ENGR`, `CHEM`, `AVIATION`, `CJOPS`, `CIVILMIL`, `COMMS`, `IO`. Multiple values allowed per knowledge object.
2. **Establish a `relevantFunctions` tag** that explicitly identifies which functional directorates should be notified when a new knowledge object is approved. Populated by the contributing KM; reviewed by Theater KM at ingestion.
3. **Build automated routing notifications.** When a new `Lesson` or `TTP` is approved with `relevantFunctions` tags, a Foundry notification or Slate report triggers an alert to the KM liaison for each tagged directorate.
4. **Do not duplicate objects across directorates.** Cross-functional relevance is handled by Link Types and tags, not by copying objects into multiple repositories. Duplication creates version management nightmares. One object, many links.

3-5. Theater-Level Exercise Knowledge Federation

Defender Europe, Saber Strike, and Combined Resolve generate the largest single-event knowledge volumes in USAREUR-AF's annual calendar. Theater KM Architects must design exercise-specific federation workflows for each major exercise.

Exercise knowledge federation timeline:

Phase	KM Actions	Target
T-90 days	Create <code>Exercise</code> object in Theater repository; distribute AAR capture templates to all participating units	All contributing units have staging areas configured
T-30 days	Validate unit staging areas are configured; test ingestion pipeline with sample data	Pipeline confirmed operational before exercise begins
During exercise	Monitor staging area contribution rates daily; provide real-time rejection queue feedback to unit KMs	>80% of submitted lessons pass validation on first submission
D+7 days	First lessons consolidation run; initial cross-unit search available	Top-priority lessons surfaced within 7 days of exercise end
D+30 days	Full exercise lessons set approved and published; AIP synthesis run to identify cross-unit themes	Theater lessons report available for command review

Phase	KM Actions	Target
D+90 days	Final validation and CALL/JLLIS submission for lessons meeting DoD sharing criteria	External submission complete

CHAPTER 4 — AI-ASSISTED DOCTRINE AND LESSONS LEARNED AT SCALE

4-1. Purpose

BLUF: Palantir AIP enables knowledge synthesis workflows that are not feasible manually at Corps and Theater scale. A Theater exercise program that generates 500+ individual lessons across 20 participating units cannot be manually reviewed for cross-unit themes, contradictions, and emerging TTP patterns in a reasonable timeframe. AIP can accelerate this synthesis — but only within a governance framework that keeps human judgment in the decision loop.

4-2. AIP Capabilities for Advanced KM

SL 4K introduced AIP Logic for unit-level tasks: single-document summarization, content tagging, knowledge Q&A over a single repository. SL 5K Advanced KM uses AIP at a different scale:

Capability	SL 4K Application	SL 5K Advanced Application
Document summarization	Summarize a single AAR	Batch summarize 200 AARs; extract cross-unit themes
Content tagging	Tag individual lessons	Bulk-tag incoming lessons; identify tagging inconsistencies across units
Knowledge Q&A	Q&A over a single unit repository	Q&A over the Theater consolidated repository; cross-unit answer synthesis
Contradiction detection	Not at SL 4K level	Identify conflicting recommendations across lessons from different units
TTP pattern extraction	Not at SL 4K level	Extract emerging TTP patterns from large lesson sets; draft TTP templates
Doctrine gap analysis	Not at SL 4K level	Compare lesson set recommendations to current doctrine; flag gaps

Capability	SL 4K Application	SL 5K Advanced Application
Readability and format review	Not at SL 4K level	Apply Army Writing Style checks across bulk lesson submissions

WARNING: AIP outputs at this scale require staged human review. Do not design a pipeline that feeds AI-generated content directly to a Theater-wide distribution channel without a KM review gate. Scale amplifies errors. A misclassified lesson in a single-unit system is a minor problem. A systematically misclassified lesson batch in a Theater-wide system misleads everyone.

4-3. Large-Scale Lessons Synthesis Workflow

TASK 4-3-1: SYNTHESIZE CROSS-UNIT LESSONS FROM A MAJOR EXERCISE

CONDITIONS: Defender Europe has concluded. 450 individual lessons have been submitted by 22 participating units. The Theater KM Architect must produce a Theater-level lessons report identifying the top themes, critical recommendations, and emerging TTPs within 30 days of exercise end.

STANDARDS: Upon completion, the Theater lessons report will include: top-10 cross-unit themes with supporting evidence, a list of critical recommendations requiring command action, 3-5 candidate TTPs for further development, a list of lessons submitted for CALL/JLLIS, and an AIP audit trail documenting which outputs were AI-assisted versus human-reviewed.

EQUIPMENT: MSS AIP Logic, Theater consolidated lessons repository (450 validated lessons), Workshop reporting interface, AIP audit log capability.

PROCEDURE:

1. **Confirm all 450 lessons are validated and in the Theater repository.** Run validation pipeline one final time. Check rejection queue — any pending lessons from the final submission window must be resolved before synthesis begins. Document the final count and unit breakdown.
2. **Run initial AIP theme extraction.** Configure an AIP Logic workflow that:
3. Reads all 450 `Lesson` objects from the Theater repository
4. Applies a theme clustering prompt instructing AIP to group lessons by operational domain, type of observation (tactical, technical, administrative, leadership), and apparent root cause pattern
5. Returns a structured output: list of candidate themes, each with a label, a 2-3 sentence description, and a list of lesson IDs supporting the theme
6. Logs the prompt, model version, and run timestamp to the AIP audit log

NOTE

Run AIP theme extraction against lessons with `status = APPROVED` only. Do not run against DRAFT or PENDING_REVIEW objects — AI synthesis of unreviewed content can amplify errors in the source material.

1. **Human review of theme clusters.** The Theater KM Architect reviews each candidate theme. For each theme:
 2. Confirm the supporting lessons actually support the theme (AIP hallucination check — read representative samples from each cluster)
 3. Merge or split clusters that are redundant or too broad
 4. Assign each confirmed theme an `operationalDomain` tag and a priority level (HIGH, MEDIUM, LOW based on mission impact)
 5. Identify lessons that AIP miscategorized and correct their tags manually
6. **Run AIP contradiction detection.** For the top-10 confirmed themes, run a second AIP pass:
 7. Within each theme cluster, identify lessons from different units that make contradictory recommendations (e.g., two units recommend opposite tactics for the same condition)
 8. Flag contradictions for subject matter expert adjudication
 9. Do not suppress contradictions — contradictions between units are operationally significant and should be surfaced to command for deliberate resolution
10. **Run AIP TTP candidate extraction.** For themes rated HIGH priority that include 10+ supporting lessons:
 11. Prompt AIP to draft a TTP template for the pattern: Conditions, Standards, Equipment, Procedure (numbered), Notes
 12. AIP output is a DRAFT TTP — flagged prominently as AI-ASSISTED DRAFT, NOT FOR DISTRIBUTION
 13. Route each TTP draft to the appropriate G3/functional SME for review and validation before it enters the TTP object set
14. **Run AIP CALL submission pre-screening.** CALL accepts lessons meeting specific criteria (actionable, broadly applicable, not unit-specific). Prompt AIP to evaluate each lesson against CALL submission criteria and recommend: SUBMIT, DO NOT SUBMIT (too unit-specific), or REVIEW (borderline). Human KM reviews recommendations before submission decisions are finalized.
15. **Produce Theater lessons report.** Build a Workshop Slate report that:
 16. Summarizes exercise participation statistics (units, lessons submitted, lessons approved, themes identified)
 17. Presents top-10 themes with supporting lesson counts and representative excerpts

- 18. Lists critical recommendations (from HIGH-priority themes) formatted for command briefing
- 19. Lists TTP candidates with routing status
- 20. Lists CALL/JLLIS submission queue
- 21. Includes AIP audit trail table documenting which sections were AI-assisted
- 22. **Brief the report to the Theater KM governance board.** Get approval before distributing to all units. The governance board review ensures AI-assisted content has received leadership review before Theater-wide distribution.

4-4. AI-Assisted Doctrine Development

USAREUR-AF produces theater-level doctrine supplements, SOPs, and TTPs that adapt Army doctrine to the European AOR. AIP can accelerate the drafting phase — but the Army Writing Style, accuracy, and publication authority requirements remain human responsibilities.

Doctrine development lifecycle with AIP assistance:

Phase	Human Task	AIP Assist	Output
Requirements	Identify doctrine gap; define scope	Literature review: query existing doctrine for related content	Requirements document
Research	Synthesize existing lessons and doctrine	Extract relevant lessons from Theater repository; identify related TTPs	Research summary
Drafting	Apply Army Writing Style; ensure operational accuracy	Generate initial structure and draft text from research inputs	AI-ASSISTED DRAFT (clearly labeled)
Review	SME review; command review; legal/classification review	Readability checks; Army Writing Style conformance check	Reviewed draft
Publication	Formal publication authority approval; distribution	Formatting assistance	Published doctrine product

CAUTION: AIP-generated doctrine drafts will sound authoritative. They are not. Army doctrine has a publication authority structure for a reason: content accuracy, legal compliance, and classification review cannot be automated. An AI-generated SOP that sounds correct but contains a procedural error can cause real harm when Soldiers follow it. Every AIP-assisted doctrine product requires full SME review before any distribution, even for internal use.

Army Writing Style conformance check — AIP prompt template:

Review the following document for Army Writing Style compliance.
 Check for: active voice usage, sentence length (target <20 words average), acronym definition on first use, BLUF structure in introductory paragraphs,

WARNING/CAUTION/NOTE callout usage, and numbered procedure format.
Return: a list of flagged sentences or sections with the specific style issue identified and a suggested revision. Do not rewrite sections wholesale — identify issues for human revision.

4-5. Bulk Tagging and Quality Control

At Theater scale, inconsistent tagging across 20+ contributing units is guaranteed. AIP can audit and normalize tags without human review of each individual lesson.

AIP bulk tagging workflow:

1. **Identify the controlled vocabulary.** Before running AIP tagging, confirm the current Theater controlled vocabulary for all tag fields (`operationalDomain` , `relevantMOS` , `exercisePhase` , `lessonType`). Load this vocabulary into the AIP prompt context.
2. **Run AIP tag audit on the incoming lesson batch.** Prompt AIP to: review each lesson's current tags against the controlled vocabulary, flag lessons with non-standard tags, suggest correct controlled-vocabulary values, and flag lessons where the tag appears inconsistent with the lesson content (e.g., a lesson about COMMS procedures tagged as FIRES).
3. **Human spot-check.** The Theater KM Architect reviews a random 10% sample of AIP tag recommendations and a 100% review of all "inconsistent content-tag" flags. Confirm AIP accuracy before applying bulk updates.
4. **Apply bulk tag corrections.** After spot-check approval, apply AIP-recommended tag corrections as a bulk update pipeline. Log all changes with the run timestamp and AIP audit record — maintain full history of tag changes.

CHAPTER 5 — COALITION KNOWLEDGE SHARING (NATO/PARTNERS)

5-1. Purpose

BLUF: USAREUR-AF operates as the Army component to EUCOM within a NATO alliance framework. Exercises like Defender Europe and Saber Strike involve partner nations who generate knowledge products, contribute lessons, and need access to shared knowledge for combined operations planning. Managing coalition knowledge sharing requires legal authority, technical architecture, and operational security discipline — in that order.

5-2. Legal and Policy Framework

Coalition knowledge sharing is not a technical problem. It is a legal and policy problem that has technical implications. Do not design coalition knowledge interfaces before confirming the legal framework is in place.

Required legal foundations before any coalition knowledge sharing:

Requirement	Description	Who Validates
Information Sharing Agreement (ISA)	Bilateral or multilateral agreement authorizing specific categories of information exchange with named partner nations	USAREUR-AF J5/Legal
Originator's Consent	Information shared with coalition partners must have originator approval. U.S.-originated products require approval from the originating organization before sharing	Originating unit KM / Legal
Releasability Review	Each knowledge product must be reviewed for releasability to the specific partner nation(s) — no blanket approvals	OPSEC Officer / Classification Manager
NATO Caveat Compliance	NATO documents carry caveats (REL TO USA, GBR, DEU, etc.) that govern who may access them	Information management officer
OPSEC Review	Knowledge products may reveal sensitive capabilities, schedules, or personnel even if individually unclassified	OPSEC Officer

WARNING: Do not share U.S. government knowledge products with coalition partners without confirming all five requirements above are met. Unauthorized sharing is a security violation regardless of the classification level of the content. "It's unclassified" does not mean "it can be shared with anyone."

5-3. NATO Knowledge Management Integration

NATO operates its own knowledge management and lessons learned frameworks. USAREUR-AF participates in these frameworks through EUCOM representation at NATO ACO and through direct exercise participation.

NATO KM frameworks relevant to USAREUR-AF:

Framework	Description	USAREUR-AF Interface
NATO Lessons Learned (LL) System	Bi-SC database for Allied lessons; managed by the NATO Joint Analysis and Lessons Learned Centre (JALLC)	EUCOM J7 submits USAREUR-AF-originated lessons meeting NATO sharing criteria

Framework	Description	USAREUR-AF Interface
Allied Joint Publication-5 (AJP-5)	Doctrine for operational-level planning in allied operations — knowledge products supporting combined planning must align	G3/G5 knowledge products reference AJP-5 where applicable
STANAG 4778	Standardized Lessons Learned format for NATO exchange	All lessons destined for NATO systems must conform; see Appendix B
NATO Federated Mission Networking (FMN)	Technical standards for federated network sharing in coalition operations	C2DAO integration point for MSS-to-NATO knowledge sharing architecture
Mission Partner Environment (MPE)	The technical environment for sharing information with mission partners in combined operations	Coalition knowledge sharing interface for non-NATO partners operating in MPE

5-4. STANAG 4778 Conformance

STANAG 4778 defines the standardized format for lessons learned exchange within NATO. Any USAREUR-AF lesson intended for NATO submission must conform to this standard.

STANAG 4778 required fields for a NATO Lesson:

Field	Description	U.S. MSS Property Mapping
Observation	What was observed — factual, not evaluative	<code>observation</code>
Discussion	Analysis of the observation — why it matters	<code>discussion</code>
Recommendation	What should change — actionable	<code>recommendation</code>
OPR (Office of Primary Responsibility)	Who is responsible for implementing the recommendation	<code>ownerID</code> (mapped to billet)
Status	Where the lesson is in the approval/implementation cycle	<code>status</code> (controlled vocabulary mapping required)
Classification	NATO classification marking (NATO UNCLASSIFIED, etc.)	<code>classification</code> (NATO marking applied after releasability review)
Event	The exercise or operation that generated the observation	<code>sourceEvent</code> linked to <code>Exercise</code> object

Field	Description	U.S. MSS Property Mapping
Issuing Authority	Who approved the lesson for NATO submission	New property: <code>coalitionIssuer</code>

STANAG 4778 conformance pipeline:

```

Theater Repository (APPROVED Lessons)
  |
  v
Releasability Filter (only lessons marked APPROVED_FOR_COALITION)
  |
  v
NATO Format Transform (property mapping per STANAG 4778)
  |
  v
NATO Caveat Application (attach appropriate REL TO caveat)
  |
  v
Classification Review Checkpoint (human: OPSEC + Classification Manager)
  |
  v
NATO LL Submission Package

```

CAUTION: The NATO format transform is a technical step, but the classification review checkpoint before submission is a human step that cannot be automated. Ensure the pipeline design makes the checkpoint mandatory and auditable — an output that bypasses the human review checkpoint is a design defect.

5-5. Coalition Knowledge Sharing Architecture

TASK 5-5-1: DESIGN A COALITION KNOWLEDGE SHARING INTERFACE

CONDITIONS: USAREUR-AF is planning Saber Strike. Baltic partner nations (Estonia, Latvia, Lithuania) will participate. A signed ISA authorizes sharing of UNCLASSIFIED // RELEASABLE TO EST, LVA, LTU exercise lessons. You are designing the coalition knowledge sharing interface on the NIPR MSS instance.

STANDARDS: Upon completion, the architecture will include: a releasability-filtered partner nation knowledge view, a contribution pathway for partner nation lessons (optional, per ISA), an audit trail for all coalition knowledge sharing events, and documentation reviewed by OPSEC and Legal.

EQUIPMENT: MSS Workshop, Foundry access controls, USAREUR-AF OPSEC Officer coordination, Legal review confirmation, ISA documentation.

PROCEDURE:

1. **Confirm ISA scope.** Read the ISA for specific authorized categories. ISAs are not blanket authorizations — they specify content categories, partner nation list, duration, and handling requirements. If the ISA does not specifically authorize a category of content you plan to share, stop and coordinate with Legal before proceeding.
2. **Create a `CoalitionKnowledgeProduct` Object Type instance for each shareable lesson.** Do not give partner nations direct access to the main Theater repository. Create a separate, explicitly marked collection of lessons that have been through the releasability workflow and carry the `APPROVED_FOR_COALITION` link to the target partner nation list.
3. **Build the releasability workflow.** The workflow is a Workshop-based triage queue:
 4. Theater KM identifies candidate lessons (those with `operationalDomain` and content relevant to Saber Strike combined training)
 5. OPSEC Officer reviews each candidate — approves or rejects with written rationale
 6. Classification Manager confirms classification marking and applies appropriate NATO caveat (REL TO EST, LVA, LTU)
 7. Theater KM Architect marks approved lessons with `APPROVED_FOR_COALITION` link
 8. Approved lessons enter the Coalition Knowledge Collection
9. **Design the partner nation access interface.** Partner nations access the Coalition Knowledge Collection through a Workshop application with:
 10. Authentication via approved mechanism (coordinate with C2DAO and FMN standards)
 11. Read-only access to Coalition Knowledge Collection only — no access to main Theater repository
 12. Download/export logging — every access event is recorded with timestamp, user identity, and document accessed
 13. Prominent classification and caveat markings on every page
 14. A feedback mechanism for partner nations to submit observations (routes to Theater KM queue for review before entering the U.S. system)
15. **Build the coalition contribution pathway (if ISA authorizes).** If the ISA authorizes receiving partner nation lessons:
 16. Partner nation KM submits lessons through a Workshop form in the coalition interface
 17. Submissions route to a dedicated partner contribution staging area (separate from U.S. staging areas)
 18. OPSEC and Theater KM review each submission before it enters the Theater repository
 19. Partner-contributed lessons are tagged `sourceNation = [nation code]` and `contributionType = COALITION` for attribution and separate analytics
20. **Build the audit trail.** All coalition sharing events are logged: lesson ID, partner nation, access timestamp, user identity (hashed if PII concerns apply), action (view, download). Audit log is retained per AR 25-400-2 retention schedule. Review monthly for anomalies.

21. **Coordinate annual review.** ISAs have renewal dates. Coalition knowledge interfaces must be reviewed and potentially deactivated when an ISA expires. Calendar the ISA expiration date as a mandatory review trigger in the Theater KM governance board schedule.

5-6. Partner Nation Knowledge Integration Patterns

Different partner nations have different technical environments, doctrine alignment, and security frameworks. The Theater KM Architect must maintain a partner integration profile for each active coalition partner.

Partner integration profile elements:

Element	Description
Partner nation	Country and contributing command
Authorized categories	Specific knowledge categories authorized under ISA
Technical environment	Does partner use NATO systems, national systems, or ad hoc exchange?
STANAG conformance	Is partner STANAG 4778 compliant for lessons exchange?
Doctrine alignment	AJP-aligned? National doctrine only? Hybrid?
Preferred format	NATO XML, PDF, Excel? (Design output accordingly)
Point of contact	Partner nation KM billet contact
ISA expiration	Renewal date
Last review	Date of last Theater KM architecture review for this partner

CHAPTER 6 — KNOWLEDGE GRAPH DESIGN AND MAINTENANCE

NOTE — Palantir Developers reference: *Deep Dive: Interoperability at Scale with the Multimodal Data Plane* | *DevCon 5* — Covers Palantir's Multimodal Data Plane, which enables knowledge federation and interoperability across heterogeneous data sources at theater scale. Directly relevant to the advanced knowledge graph architecture in Sections 6-3 and 6-4, particularly where federated repositories must interoperate. Available on the Palantir Developers YouTube channel (@PalantirDevelopers).

6-1. Purpose

BLUF: A knowledge graph is a representation of knowledge as entities (nodes) and relationships (edges). In Foundry, the knowledge graph is implemented through the Object Type / Link Type ontology. At Theater scale, the knowledge graph becomes the navigational backbone of the entire enterprise knowledge system. This chapter covers the design principles, construction methodology, and long-term maintenance requirements for Theater-scale knowledge graphs on MSS.

6-2. Knowledge Graph Concepts for Military KM

The knowledge graph enables a type of knowledge navigation that keyword search alone cannot: finding knowledge through relationships.

Example: Traversal vs. keyword search

A planner planning a complex terrain air assault for Defender Europe wants to find: all lessons from previous complex terrain air assaults, the TTPs currently used for that mission type, the SMEs in the formation who have executed it, and the doctrine publications that govern it.

Keyword search result: A flat list of documents containing the words "complex terrain" and "air assault" — unranked by relevance to mission planning, with no relationship context.

Knowledge graph traversal result:

```
Exercise: Defender Europe 24 (complex terrain phase)
  |-- HAS_LESSON --> Lesson: "FARP positioning in complex terrain limits air assault
radius"
  |-- HAS_LESSON --> Lesson: "Ground assault force synchronization with aviation
requires 72-hr lead"
  |-- PRODUCED_TTP --> TTP: Complex Terrain Air Assault Planning Checklist

TTP: Complex Terrain Air Assault Planning Checklist
  |-- VALIDATED_BY --> ExpertiseProfile: CPT Rodriguez (CW3, Aviation, 160th SOAR
experience)
  |-- VALIDATED_BY --> ExpertiseProfile: MAJ Chen (FA49, complex terrain planning)
  |-- REFERENCES --> DoctrinePub: TC 3-04.11 (Air Assault Operations)

DoctrinePub: TC 3-04.11
  |-- HAS_GAP (from lesson set) --> "Current doctrine does not address FARP in
complex terrain"
```

This navigational capability — following relationship paths to find relevant knowledge — is what distinguishes a knowledge graph from a document repository.

6-3. Knowledge Graph Architecture Design

TASK 6-3-1: DESIGN THE THEATER KNOWLEDGE GRAPH SCHEMA

CONDITIONS: You are designing the Theater knowledge graph for USAREUR-AF. The graph will support operational planning knowledge navigation, post-exercise lessons analysis, and SME identification across the Corps.

STANDARDS: Upon completion, the knowledge graph schema will include: all node types (Object Types) with defined property schemas, all edge types (Link Types) with defined directionality and cardinality rules, documented traversal patterns for the three primary use cases (planning support, lessons navigation, SME identification), and a maintenance plan.

EQUIPMENT: MSS Ontology Manager, Theater KM Schema Registry, stakeholder documentation.

PROCEDURE:

1. **Define the primary traversal use cases.** A knowledge graph designed without defined traversal patterns will be over-engineered in areas no one uses and under-engineered in areas everyone needs. Define minimum three primary use cases — the questions the knowledge graph must answer — before designing any nodes or edges.

USAREUR-AF primary traversal use cases: - **Planning support:** Given a mission type and AOR, find relevant lessons, applicable TTPs, current SOPs, and available SMEs - **Lessons navigation:** Given a lesson, find related lessons, the exercises that produced them, the units that experienced them, and the TTPs they informed - **SME identification:** Given a knowledge domain or mission requirement, find personnel with relevant expertise, their assignment history, and the knowledge products they have validated

1. **Identify the minimum node set.** Each use case requires specific node types. Map use cases to required nodes:

Use Case	Required Nodes
Planning support	Exercise , Lesson , TTP , SOP , DoctrinePub , ExpertiseProfile , KnowledgeDomain
Lessons navigation	Lesson , AAR , Exercise , TTP , UnitRecord , KnowledgeDomain
SME identification	ExpertiseProfile , KnowledgeDomain , UnitRecord , TTP , Qualification

1. **Design edge types to support each use case traversal path.** For each use case, trace the relationship path the user will follow and ensure an edge type exists at each step:

Planning support path: KnowledgeDomain --[RELEVANT_TO]--> Lesson Lesson --[DERIVED_FROM]--> AAR AAR --[OCCURRED_IN]--> Exercise Lesson --[INFORMED]--> TTP TTP --[VALIDATED_BY]--> ExpertiseProfile TTP --[REFERENCES]--> DoctrinePub TTP --[SUPERSEDES]--> TTP (prior version)

1. **Define cardinality rules for each edge type.** Cardinality prevents graph integrity errors:

Edge Type	Cardinality	Example
DERIVED_FROM	Many-to-many	One lesson can derive from many AARs; one AAR can produce many lessons
OCCURRED_IN	Many-to-one	Many AARs from one exercise
VALIDATED_BY	Many-to-many	One TTP validated by multiple SMEs; one SME validates multiple TTPs
SUPERSEDES	One-to-one	Each SOP version supersedes exactly one prior version
EXPERT_IN	Many-to-many	One person expert in multiple domains; one domain has multiple experts

1. **Design graph integrity constraints.** These are rules enforced at ingestion time to prevent orphaned nodes and broken traversal paths:
2. Every Lesson must have at least one DERIVED_FROM edge to an AAR
3. Every AAR must have at least one OCCURRED_IN edge to an Exercise
4. Every TTP must have at least one VALIDATED_BY edge to an ExpertiseProfile before status can be set to APPROVED
5. Every SOP with status SUPERSEDED must have a SUPERSEDES edge to the succeeding version
6. **Document traversal queries.** Write and document the Ontology AQL (Foundry's query language) or OSDK traversal patterns for each primary use case. Store these as executable query templates in the Theater KM Schema Registry. Unit KMs can use them directly; the templates are also the specification for the Workshop search interfaces.

6-4. Knowledge Graph Maintenance at Scale

A Theater knowledge graph with thousands of nodes and tens of thousands of edges degrades without active maintenance. At SL 4K level, maintenance is manageable manually. At SL 5K scale, maintenance requires automated monitoring and systematic processes.

Knowledge graph health indicators:

Indicator	Unhealthy Signal	Maintenance Action
Orphaned nodes	Nodes with no edges	Run integrity check pipeline weekly; route orphaned nodes to review queue
Stale review dates	<code>reviewDate</code> in the past	Generate overdue review report monthly; route to domain owner
Broken SUPERSEDES chains	SOP marked SUPERSEDED with no successor	Flag in governance dashboard; assign to unit KM for repair
Duplicate nodes	Two <code>Lesson</code> objects with identical content	Run AIP-assisted deduplication check quarterly; route to Theater KM for merge decision
Unvalidated TTPs	TTPs with status APPROVED but no <code>VALIDATED_BY</code> edge	Block status transition in pipeline; require validation before approval
Expertise profiles without assignments	<code>ExpertiseProfile</code> objects not linked to <code>UnitRecord</code>	Route to G1 liaison for update; privacy-aware — do not expose to broad audience

Automated health monitoring pipeline:

Build a scheduled Foundry pipeline (weekly cadence) that runs each health indicator check against the Theater knowledge graph and writes results to a `GraphHealthReport` dataset. A Workshop dashboard displays current health status, trends over time, and outstanding issues by domain owner. Theater KM Architect reviews the dashboard at each governance board meeting.

6-5. Long-Term Graph Evolution

Knowledge graphs must evolve as the operational environment, doctrine, and technology change. At Theater scale, graph evolution requires planned change management.

Graph evolution triggers: - New doctrine publication (requires new `DoctrinePub` node and review of `REFERENCES` edges) - ADP revision (may require updating `relevantAreas` properties across linked TTPs and SOPs) - Unit reorganization (requires updating `UnitRecord` nodes and reviewing all attribution edges) - New exercise type or operational requirement (may require new `KnowledgeDomain` nodes and vocabulary updates) - Technology change in MSS (Ontology Manager updates may affect how edges are stored or traversed) - PCS of major SME (requires updating `ExpertiseProfile` assignment links and flagging dependent knowledge products for re-validation)

Graph evolution governance: - All node type or edge type additions require Theater KM Schema Registry update and C2DAO notification - Property changes to existing node types require migration plan review - Controlled vocabulary changes require unit KM notification and a transition window

CHAPTER 7 — KM METRICS AND EFFECTIVENESS MEASUREMENT

7-1. Purpose

BLUF: Knowledge management is notoriously difficult to measure. The outcome KM enables — a formation that learns faster, makes better-informed decisions, and doesn't repeat costly mistakes — is real but not directly countable. The Advanced KM must develop a metrics framework that measures what can be measured, makes reasoned inferences about what can't, and communicates both honestly to senior leaders.

7-2. The KM Metrics Problem

The instinct is to count outputs: number of lessons captured, number of SOP updates published, number of searches performed. These measures are necessary but not sufficient. They measure activity, not effectiveness. A system that captures 500 lessons no one reads has failed. A system that distributes 50 SOPs no one knows are current has failed.

The three-level measurement framework:

Level	What It Measures	Limitation
Activity	What the KM system did (inputs/outputs: lessons captured, SOPs published, searches run)	Does not measure whether the activity had value
Utilization	How the knowledge system is used (search query volume, unique users, time-to-first-result, return-visit rates)	Does not measure whether utilization led to better decisions
Effectiveness	Whether knowledge use improved outcomes (decisions made faster, mistakes avoided, training quality improved)	Difficult to isolate — many factors affect outcomes

A mature Theater KM metrics program measures at all three levels and is honest about the limits of inference at Level 3.

7-3. Activity Metrics

Activity metrics are measured directly from system logs and pipeline outputs. They are the easiest metrics to collect and the least sufficient on their own.

Required Theater-level activity metrics:

Metric	Definition	Target	Collection
Lessons capture rate	Lessons submitted per exercise per participating unit	>10 lessons per unit per major exercise	Ingestion pipeline
Lessons approval rate	% of submitted lessons that reach APPROVED status	>70% on first submission	Validation pipeline
Lessons rejection rate	% rejected with specific error types	Track error type trends — systematic errors indicate unit KM training gap	Rejection queue
SOP currency rate	% of SOPs with <code>reviewDate</code> in the future	>95%	Scheduled integrity check
Knowledge object growth	Net new APPROVED objects per quarter	Positive trend	Repository count
Coalition submission rate	Lessons submitted to CALL/JLLIS/NATO LL per exercise cycle	Per command guidance	Submission log

7-4. Utilization Metrics

Utilization metrics require instrumented interfaces. Build logging into every Workshop search interface and AIP Q&A endpoint.

Required Theater-level utilization metrics:

Metric	Definition	What It Tells You
Monthly active users (MAU)	Unique users who accessed any knowledge interface in the past 30 days	Adoption level
Search query volume	Searches per day/week across all interfaces	Demand for knowledge access
Null result rate	% of searches returning zero results	Either knowledge gap (content not captured) or query design issue
Top search queries	Most frequent search terms	What knowledge users most need — potential capture gap indicator
AIP Q&A query volume	Queries to knowledge Q&A interfaces per week	AIP adoption and demand
Repeat user rate	Users who return within 30 days	Value signal — users come back if the system is useful

Metric	Definition	What It Tells You
Coalition interface access	Partner nation accesses per month	Coalition sharing utilization
Expert profile query volume	How often SME identification searches are run	Expertise network utilization

Null result analysis is a critical diagnostic. A high null result rate on specific query types indicates a gap between what knowledge users seek and what the system contains. Review null result logs monthly. Categorize null results: - **Content gap:** The knowledge exists in the formation but has not been captured. Flag for targeted capture effort. - **Terminology gap:** The content exists but is tagged with different terminology than users search for. Fix tagging and vocabulary. - **Query design issue:** Users are constructing queries that don't match the system's indexing. Fix the search interface or user guidance.

7-5. Effectiveness Metrics

Measuring whether KM made the formation more effective requires intentional data collection at decision points — not just system logs.

Effectiveness measurement methods:

Method 1: Pre/Post exercise planner survey. Before each major exercise, survey planners: "What knowledge sources did you consult for this plan? Did you use the Theater knowledge system? What did you find/not find?" After the exercise: "Were there operational decisions made during this exercise that were influenced by prior lessons or TTPs? Were there issues that prior lessons would have prevented, had they been accessible?"

This is qualitative data. It does not prove causation. But systematic survey results over multiple exercise cycles build a body of evidence that informs both the value case and the improvement areas.

Method 2: After-Action attribute tracking. When capturing post-exercise lessons, include a field: "Did this issue occur in a prior exercise? Was a prior lesson available?" If a known lesson was available but the unit still encountered the same issue, the KM system failed to disseminate or was not consulted. Track this rate — it is the most direct measure of knowledge application failure.

Method 3: Decision latency tracking. For operations centers with structured decision logs, compare time-to-decision for decisions where KM support was explicitly requested versus not requested. This requires relationship with G3/J3 to access decision logs and is an advanced capability, not a baseline requirement.

Method 4: SOP currency improvement rate. Track the percentage of SOPs with current review dates over time. A positive trend indicates the KM system is enabling better procedural knowledge management. This is an indirect effectiveness measure — it measures maintenance quality as a proxy for knowledge usability.

7-6. KM Effectiveness Reporting

Theater KM Architects report metrics to: C2DAO (quarterly), Theater KM governance board (quarterly), and subordinate Corps/Division KMs (monthly). Each audience receives a different product.

Quarterly C2DAO report — required elements:

Section	Content
Executive summary	3-5 sentences: system health, top achievement, top concern
Activity summary	Table of key activity metrics vs. targets
Utilization summary	MAU trend, top-10 queries, null result rate and categories
Effectiveness indicators	Survey results summary, attribute tracking results, notable decisions supported
Gap analysis	Knowledge domains with low capture, high null results, or low utilization — and proposed action
Coalition metrics	Partner nation access, NATO LL submissions
Action items	Outstanding issues requiring C2DAO decision or resource

Monthly subordinate KM report — required elements:

Section	Content
Contribution metrics	Each unit's lessons submission count, approval rate, rejection errors
Outstanding items	Lessons in rejection queue by unit; overdue review dates
Upcoming events	Exercise cycles, scheduled pipeline maintenance, schema changes
Action required	Specific items each unit KM must action before next reporting period

7-7. Communicating KM Value to Senior Leaders

Senior leaders — Commanding Generals, Chiefs of Staff, DCGs — are not KM practitioners. They care about mission outcomes, readiness, and force management. KM metrics reports written for technical audiences will be ignored.

Translation framework for KM value communication:

KM Metric	Senior Leader Translation
450 lessons captured from Defender Europe	"We preserved Defender Europe's operational experience in a searchable system before personnel rotations diluted it"
Null result rate decreased from 18% to 7%	"Soldiers looking for knowledge in the system now find useful content 93% of the time, versus 82% last cycle"
12 duplicate lessons identified from prior exercise	"Planning teams for Saber Strike were at risk of repeating 12 known mistakes from Defender Europe until the KM system flagged the patterns"
3 TTP candidates extracted from exercise lessons	"Three new procedural improvements are in SME review based on what multiple units independently discovered in Defender Europe — the KM system surfaced the pattern, which no single unit could have seen from its own lessons alone"
SOP currency rate: 97%	"97% of our procedures are confirmed current — the 3% overdue are tracked and are being worked by named owners"

The last metric — naming the exception, not just the aggregate — is critical for senior leader trust. Reporting only good numbers looks like covering. Reporting the exception with an action demonstrates mature management.

CHAPTER 8 — INSTITUTIONAL MEMORY AND KNOWLEDGE RISK MANAGEMENT

8-1. Purpose

BLUF: USAREUR-AF's most persistent knowledge management challenge is not technology — it is personnel turbulence. The Army's PCS system systematically displaces institutional knowledge. A Theater KM Architect who does not address this systemically is not managing knowledge — they are watching it leave. This chapter covers the methodology for identifying critical knowledge dependencies, designing systems that survive personnel transitions, and managing knowledge risk before it becomes operational failure.

8-2. The Institutional Memory Problem in USAREUR-AF

The quantifiable scope of the problem:

A typical Division headquarters at USAREUR-AF turns over approximately 30-40% of its staff in any 12-month period. A Brigade headquarters may turn over 50-70% over a two-year period. V Corps rotates its key staff positions on staggered cycles, but the aggregate effect is that within any 24-month window, a majority of institutional knowledge has walked out the door.

The harm this causes is not abstract. Documented patterns from USAREUR-AF exercise analysis include:

- Planning teams have reconstructed logistics synchronization procedures that existed in prior-cycle SOPs they didn't know were available
- Exercise control teams have repeated known friction points from prior rotations that were captured in CALL but not searched before the exercise began
- Incoming key personnel have spent 30-90 days in orientation before becoming fully effective — often learning from peers what was available in documented form had they known to look

The KM system is the mitigation. But only if it is designed for this threat specifically.

8-3. Knowledge Risk Assessment

TASK 8-3-1: CONDUCT A THEATER KNOWLEDGE RISK ASSESSMENT

CONDITIONS: You are the Theater KM Architect for USAREUR-AF. A new G6 directive requires all Functional Areas to complete a knowledge risk assessment before the annual PCS season (June-August). You are conducting the assessment for the Theater KM system.

STANDARDS: Upon completion, the knowledge risk assessment will identify: all critical knowledge dependencies (knowledge that lives in one person's head), the risk level for each, a prioritized list of capture actions to be completed before PCS season, and a residual risk acceptance statement for items that cannot be captured in time.

EQUIPMENT: Theater KM system access, personnel roster and projected rotation dates, domain owner registry, interview access to key billets.

PROCEDURE:

1. **Map critical knowledge domains to key personnel.** For each knowledge domain in the Theater KM system, identify: the domain owner, the deputy domain owner, and any Subject Matter Experts whose departure would create a critical knowledge gap. Use the ExpertiseProfile Object Type data supplemented by G1 personnel data.
2. **Score each critical dependency by risk level.** A critical knowledge dependency is critical when:
 3. It is held by one person with no documented backup
 4. The person is projected to PCS within 90 days
 5. The knowledge is not captured in the KM system in actionable form

Use the following risk matrix:

Impact	Probability (PCS within 90 days)	Risk Level
HIGH (mission-critical knowledge, no backup)	HIGH (confirmed orders)	CRITICAL — immediate action required
HIGH (mission-critical knowledge, no backup)	MEDIUM (projected rotation)	HIGH — initiate capture now
HIGH (mission-critical knowledge, has deputy)	Any	MEDIUM — accelerate deputy development
LOW (important but not mission-critical)	Any	LOW — schedule standard capture

- 1. Prioritize capture actions.** For all CRITICAL and HIGH risk items:
- Schedule knowledge elicitation interviews with the departing SME (see Task 8-4-1)
- Identify replacement personnel and initiate overlap period knowledge transfer
- Identify which elements can be captured as formal knowledge objects (Lessons, TTPs, SOPs) versus what requires narrative documentation in the KM system
- 5. Assign capture ownership.** Every capture action must have a named owner and a completion date before the projected PCS date. Unowned actions will not be completed. Track completion in the Theater KM governance dashboard.
- 6. Document residual risk.** Some knowledge cannot be fully captured. Highly tacit knowledge — the judgment built over years of operational experience, the network of relationships, the ability to navigate an organization — cannot be fully encoded in a knowledge system. Document residual risk honestly: "Departure of [billet] leaves [specific knowledge gap] that cannot be fully mitigated by capture. Recommend overlap period of [N weeks] and accelerated development of [replacement billet]." Route residual risk documentation to the Theater KM governance board for acceptance.

8-4. Knowledge Elicitation Methodology

Knowledge elicitation is the structured process of extracting tacit knowledge from experienced personnel before they depart. It is not a casual conversation or a form-fill exercise. At the Theater level, a structured methodology is required.

TASK 8-4-1: CONDUCT KNOWLEDGE ELICITATION INTERVIEW

CONDITIONS: A key SME — the USAREUR-AF Theater Exercise Planner with 4 years of Defender Europe planning experience — is PCSing in 60 days. No successor has equivalent experience. The Theater KM Architect must extract maximum transferable knowledge before departure.

STANDARDS: Upon completion, the elicitation will produce: a set of Lesson objects for the top-10 insights, a set of TTP draft objects for the top-3 procedural patterns, an annotated contact/relationship list, and a narrative "knowledge landscape" document describing the exercise planning domain from this SME's perspective.

EQUIPMENT: Workshop knowledge object creation interfaces, structured interview guide, AIP transcription and extraction assistance (with SME consent), 3-5 hours of interview time across 2-3 sessions.

PROCEDURE:

1. **Prepare the interview guide.** The guide must be tailored to the domain, not generic. For exercise planning, the guide covers:
 2. Critical decisions in the annual exercise planning cycle and what informs them
 3. Known failure patterns and how the experienced planner recognizes and avoids them
 4. Relationship networks: who in which commands must be engaged at which phase, and what works versus what creates friction
 5. Undocumented processes: things the SME does that work, that aren't in the SOP
 6. Known gaps in current documentation: what should be documented that isn't
 7. Hard-won knowledge: what took the most time to learn and would have most benefited from advance knowledge
8. **Conduct elicitation sessions in three passes:**
 9. **Pass 1 — Landscape:** Have the SME describe the domain from their perspective. Do not interrupt with specifics. Take notes on the structure of their knowledge, not just the content. What do they consider important? What do they mention first? What do they seem most concerned that their replacement won't know?
10. **Pass 2 — Structured extraction:** Work through the interview guide. For each area, probe for specific examples: "Can you give me an example of a time when [this failure pattern] occurred, and what you did?" Examples are actionable — they can become Lessons. Abstract principles are harder to transfer.
11. **Pass 3 — Validation:** Present back your synthesis: "Based on our conversations, here are the top-10 things I think you've told me are most critical. What's missing? What have I mischaracterized?" This pass is essential — the KM captures what they think they heard, not necessarily what the SME meant.
12. **Convert elicitation outputs to knowledge objects.** For each distinct insight:
 13. If it is a discrete, actionable learning from experience: create a Lesson object with Observation / Discussion / Recommendation structure

- L4. If it is a repeatable procedural pattern: create a `TTP` draft object with Conditions / Standards / Procedure structure
- L5. If it is relationship or network knowledge: document in a narrative `KnowledgeDomain` note object — this knowledge does not fit formal object structure but is valuable to the successor
- L6. If it is organizational history and context: add to the `UnitRecord` for the relevant headquarters
- L7. **Get SME review of all created objects.** Before the SME departs, have them review every knowledge object created from elicitation. Corrections at this stage cost an hour. Corrections after departure may not be possible.
- L8. **Conduct replacement introduction.** Before the SME departs, conduct a three-way session: SME, replacement, and KM Architect. Walk the replacement through the knowledge objects, the relationship networks, and the undocumented patterns. The knowledge system is a reference; the three-way session is the living transfer.

NOTE

Not all knowledge can be transferred through a knowledge system. The human relationship network — who trusts whom, who to call for a fast informal read, which organizations have informal friction with which — lives in the SME's head. The best KM can do is surface it, document what can be documented, and ensure the replacement knows it exists and needs to be rebuilt through direct relationship investment.**

8-5. Designing for Personnel Continuity

Beyond reacting to specific departures, the Theater KM Architect must design the knowledge system so that continuity is built in — not a response to crisis.

Continuity design principles:

Principle 1: Design for the person who hasn't arrived yet. Every knowledge object, every SOP, every TTP should be usable by someone who joined the organization yesterday. Test this: give the knowledge object to a qualified outsider with no context and ask them to use it. If they need to phone a colleague to make sense of it, it is not ready.

Principle 2: Two-person rule for every critical knowledge domain. Every domain must have both an owner and a deputy who are genuinely capable of operating the domain independently. Not a backup who can be briefed in an emergency — a trained deputy who regularly interacts with the domain. This requires deliberate development, not just an org chart assignment.

Principle 3: Knowledge object quality over quantity. A knowledge system with 100 high-quality, current, well-structured objects with proper links and attribution is more valuable than one with 5,000 objects of mixed quality, inconsistent structure, and unknown currency. Quality enables trust. Users who

get burned by stale or inaccurate content stop using the system.

Principle 4: Embed knowledge capture in operational processes. Knowledge capture that requires additional work after an operation will not happen consistently. Knowledge capture embedded in existing processes — AAR forms that are the Army-standard format, SOP review linked to existing publication cycles, expertise profiles updated during annual training briefs — will. Work with G7 and S3 to embed capture touchpoints into the processes that already happen.

Principle 5: Use transition periods constructively. The 30-90 day overlap between an outgoing and incoming officer is the highest-density knowledge transfer window available. Design a structured transition program that uses this window deliberately, not as casual orientation. A Theater KM-designed transition checklist, a guided knowledge system walkthrough, and a formal elicitation session are achievable in the overlap period.

8-6. Leading the KM Community of Practice

BLUF: The Theater KM Architect's scope extends beyond the technical systems — it includes developing, accrediting, and leading the subordinate KM community. A Theater with excellent architecture and undertrained subordinate KMs will still fail at the execution layer.

TASK 8-6-1: ESTABLISH A THEATER KM COMMUNITY OF PRACTICE (CoP)

CONDITIONS: You are the Theater KM Architect. Subordinate Corps, Division, and Brigade KMs operate in relative isolation. Knowledge management approaches vary across units, creating federation challenges and quality inconsistencies. You are directed to establish a Theater-level KM Community of Practice.

STANDARDS: Upon completion, the CoP will have: a defined membership, a regular meeting cadence, a standards library accessible to all members, a peer consultation mechanism, and a new-KM onboarding pathway.

EQUIPMENT: MSS Foundry access (Workshop, Ontology Manager), approved collaboration platform for virtual synchronization, Theater KM Schema Registry, SL 4K and SL 5K publications, G1 personnel roster.

PROCEDURE:

- 1. Define CoP membership.** All billets performing knowledge management functions within Theater — 37F KMOs, staff officers in KM roles, S6 data NCOs with KM responsibilities — are members. Membership is by billet, not individual. New occupants inherit membership. Document the billet list and update with each G1 personnel update.
- 2. Establish meeting cadence.** Monthly 60-minute virtual synchronization via approved collaboration platform. Quarterly in-person workshop timed with unit training cycles (avoid major exercise execution windows). Meeting agenda template: metrics review (10 min), schema/governance updates (10 min),

member case study or problem (20 min), upcoming events coordination (10 min), open issues (10 min).

3. **Build the CoP standards library in MSS.** Create a `KnowledgeDomain` object of type `COMMUNITY_OF_PRACTICE` that contains:
 4. Theater KM Schema Registry (current version)
 5. Standard operating procedures for common KM tasks (based on SL 4K and SL 5K)
 6. Lessons from KM system failures and improvements (yes, KM produces lessons about KM)
 7. Template Workshop applications, AIP prompt libraries, pipeline templates
 8. Training resources and self-development references
9. **Create the new-KM onboarding pathway.** A new KM arriving at a Theater unit should be able to become productive within 30 days. The onboarding pathway includes:
 10. Day 1-5: SL 1 through SL 3 review (if not current), account provisioning on MSS
 11. Day 6-14: SL 4K review, unit knowledge system walkthrough with Theater KM Architect
 12. Day 15-21: First supervised task in their unit knowledge domain (capture, review, or maintenance)
 13. Day 22-30: Independent operation with Theater KM Architect as available resource
 14. Day 31+: Full performance, integrated into CoP monthly synchronization
15. **Establish peer consultation mechanism.** KMs at Brigade and Battalion level encounter novel problems that SL 4K does not fully address. They need access to more experienced KMs without escalating through command channels. A CoP Slack channel (or approved equivalent) with Theater KM Architect and senior unit KMs available for queries provides this — and the question/answer record becomes a self-populating knowledge resource for the CoP standards library.
16. **Conduct annual KM capability assessment.** Each year, the Theater KM Architect assesses each unit KM's performance against Theater standards: knowledge object quality in their domain, metrics reporting timeliness, CoP participation, onboarding of new personnel. Assessment results inform: training priorities, architecture support priorities, and recommendation for billet-level KM capability ratings to be included in Theater readiness reporting.

8-7. KM Architecture Assessment and Audit

The Theater KM Architect conducts formal assessments of subordinate unit KM architectures on a defined schedule. Assessments are not punitive — they are diagnostic. The goal is to identify gaps before they become operational failures, and to direct Theater KM resources where they are most needed.

Assessment schedule: - Corps-level KM systems: assessed annually by Theater KM Architect -
Division-level KM systems: assessed annually by Corps KM in coordination with Theater KM Architect -
Brigade/Battalion KM systems: assessed on a rolling 18-month cycle by Division KM

Assessment areas and standards:

Area	Standard	Assessment Method
Schema conformance	All Object Types conform to current Theater schema	Ontology comparison check in MSS
Domain ownership	All domains have named owner and deputy with future <code>reviewDate</code>	Domain ownership registry review
Content quality	Random sample of 20 knowledge objects meets completeness and accuracy standards	Spot check against Theater standards
Ingestion pipeline health	Validation pipeline operational; rejection queue reviewed within 7 days	Pipeline monitoring log review
Metrics reporting	Monthly metrics submitted on time with required elements	Reporting record review
Coalition products	All coalition-candidate products have completed releasability workflow	Coalition approval record review
Access control	Tier assignments conform to Theater access control policy	Access control configuration review
Knowledge transfer	Outgoing personnel have completed elicitation within 60 days of PCS	Elicitation record review

Assessment results are documented using the checklist in Appendix A and briefed to the unit KM's chain of command with a remediation timeline for any deficiencies rated UNSATISFACTORY.

APPENDIX A — KM ARCHITECTURE ASSESSMENT CHECKLIST

A-1. Purpose

This checklist is the standard instrument for all Theater KM architecture assessments conducted under paragraph 8-7. Assessors use this checklist to evaluate unit KM systems against Theater standards.

Assessment Rating Scale: - **SATISFACTORY:** All required elements present and current; no significant deviations - **MARGINAL:** Required elements present but with deficiencies that do not currently impair function; corrective action required within 30 days - **UNSATISFACTORY:** Required elements missing or deficiencies that impair system function or create security/governance risk; corrective action required within 14 days; escalation to unit chain of command required

A-2. Architecture Conformance

#	Checkpoint	Standard	Rating	Notes
A-1	Schema registry access	Unit KM has current Theater KM Schema Registry and can demonstrate awareness of current version		
A-2	Object Type conformance	All Object Types in unit Ontology conform to Theater standard types — no unauthorized custom types		
A-3	Property schema compliance	Required properties present on all Object Types; no unauthorized property additions that conflict with Theater schema		
A-4	Link Type usage	All Link Types conform to Theater standard; directionality and cardinality rules observed		
A-5	Identifier format	All knowledge objects use Theater-standard identifier format (e.g., USAREUR-LES-YYYY-NNNN)		
A-6	C2DAO notification	Any local schema customizations have been coordinated with C2DAO		

A-3. Domain Governance

#	Checkpoint	Standard	Rating	Notes
B-1	Domain ownership registry	All knowledge domains have named owner (by billet) documented in domain registry		
B-2	Deputy ownership	All Tier 1 and Tier 2 domains have named deputy owner capable of independent operation		
B-3	Review cycle documentation	All domains have documented review cycle; all objects have <code>reviewDate</code> set		
B-4	Overdue reviews	Less than 5% of knowledge objects have <code>reviewDate</code> in the past		
B-5	Status discipline	No objects in DRAFT status more than 30 days without documented review action		
B-6	Governance board participation	Unit KM attends or provides representative to quarterly Theater KM governance board		

A-4. Content Quality

#	Checkpoint	Standard	Rating	Notes
C-1	Lesson completeness	Random sample of 20 Lesson objects: all have Observation, Discussion, Recommendation populated; no null required fields		
C-2	TTP validation	All TTP objects with status APPROVED have at least one <code>VALIDATED_BY</code> link to an ExpertiseProfile		
C-3	AAR linkage	All Lesson objects have at least one <code>DERIVED_FROM</code> link to an AAR object		
C-4	SOP currency	All SOP objects with status ACTIVE have <code>reviewDate</code> in the future		
C-5	Controlled vocabulary compliance	Random sample: all <code>operationalDomain</code> , <code>classification</code> , <code>status</code> values conform to Theater controlled vocabulary		
C-6	Duplicate detection	No duplicate knowledge objects identifiable by lessonID, title, or content hash		

A-5. Security and Access Control

#	Checkpoint	Standard	Rating	Notes
D-1	Access tier assignment	All knowledge objects assigned to correct access tier per Theater access control policy		
D-2	Coalition product approval	All objects marked <code>APPROVED_FOR_COALITION</code> have completed releasability workflow with documented OPSEC review		
D-3	Expertise profile access	ExpertiseProfile objects with PII fields restricted to Tier 3 access; no broad audience exposure		
D-4	Classification marking	All objects have <code>classification</code> property populated; no null classification fields		
D-5	ISSO coordination	Any classified knowledge objects on SIPR have been coordinated with unit ISSO		

A-6. Operational Continuity

#	Checkpoint	Standard	Rating	Notes
E-1	Knowledge elicitation records	Departing personnel (PCS within 90 days) have initiated elicitation process with documented completion plan		
E-2	Two-person rule	All Tier 1 knowledge domains have both owner and deputy actively engaged		
E-3	Onboarding pathway	New KM personnel (< 60 days in position) have completed or are enrolled in Theater KM onboarding pathway		
E-4	Transfer documentation	Personnel departed in last 180 days have completed transition checklists on file		
E-5	Residual risk documentation	Any knowledge gaps that could not be fully captured before departure are documented and accepted by chain of command		

A-7. Metrics and Reporting

#	Checkpoint	Standard	Rating	Notes
F-1	Monthly reporting	Last 3 monthly metrics reports submitted on time with required elements		
F-2	Activity metrics	Lessons capture rate, approval rate, SOP currency rate tracked and visible		
F-3	Utilization metrics	Search query volume, MAU, null result rate tracked		
F-4	Null result analysis	Null result categories reviewed within 30 days; action taken for content gaps		
F-5	AIP audit log	All AIP-assisted knowledge outputs have documented audit log entries		

APPENDIX B — NATO/COALITION KM STANDARDS REFERENCE

B-1. STANAG 4778 — Lessons Learned (Summary)

STANAG 4778 is the NATO standardization agreement governing lessons learned format and exchange. It is the technical standard for all USAREUR-AF lessons submitted to NATO channels.

STANAG 4778 lesson record — required elements:

Field	Content	Notes
LL Number	Unique identifier	NATO format: [Nation]-[Year]-[Sequence]
Title	Short descriptive title	Maximum 100 characters
Observation	Factual description of what occurred	No evaluative language
Discussion	Analysis — why the observation matters	Include context
Recommendation	Specific recommended action	Actionable, assigned to an OPR
OPR	Office of Primary Responsibility for action	Billet designation
Status	OBSERVATION / PROPOSED LESSON / VALIDATED LESSON / LESSON LEARNED	NATO-standard controlled vocabulary
Classification	NATO classification marking	NATO UNCLASSIFIED; NATO RESTRICTED; NATO CONFIDENTIAL; NATO SECRET
Releasability	REL TO caveat	Must be explicit
Event Reference	Exercise or operation identifier	NATO exercise identifier if applicable
Issuing Authority	Organization and authority issuing the lesson	
Date	Date lesson was validated	ISO 8601 format

STANAG 4778 status progression:

OBSERVATION (captured event data, not yet analyzed)

|

↓

PROPOSED LESSON (analyzed, OPR assigned, recommendation drafted)

|

v
 VALIDATED LESSON (OPR confirmed recommendation is actionable and accurate)
 |
 v
 LESSON LEARNED (OPR has confirmed corrective action is implemented)

The distinction between VALIDATED LESSON and LESSON LEARNED is critical. Many organizations stop at VALIDATED LESSON. LESSON LEARNED means the corrective action was actually taken. NATO tracks both counts — USAREUR-AF should as well.

B-2. NATO Information Management Policy (IMP) Reference

The NATO IMP governs how information is created, named, stored, distributed, and disposed of on NATO systems. Key provisions relevant to USAREUR-AF KM:

Classification levels (NATO):

NATO Classification	Approximate U.S. Equivalent	Access
NATO UNCLASSIFIED (NU)	UNCLASSIFIED	All NATO personnel and authorized partner nations
NATO RESTRICTED (NR)	CUI	NATO nations and authorized recipients
NATO CONFIDENTIAL (NC)	SECRET	NATO nations with need-to-know
NATO SECRET (NS)	SECRET/SAR	NATO nations with clearance and need-to-know
COSMIC TOP SECRET (CTS)	TOP SECRET	Highly restricted

NOTE

U.S. classification levels and NATO classification levels do not map exactly. Do not assume equivalence for access control design. Consult your classification manager for specific products requiring NATO marking.**

Information object naming conventions (NATO):

NATO uses standardized naming for information objects on NATO networks. USAREUR-AF knowledge products intended for NATO distribution must conform to NATO naming conventions — including date format (ISO 8601), classification prefix in subject/title lines, and originator identification.

B-3. Allied Joint Publication-5 (AJP-5) — Knowledge for Operational Planning

AJP-5 (Allied Joint Doctrine for Operational-Level Planning) defines the planning process for combined allied operations. USAREUR-AF knowledge products supporting combined planning must align with AJP-5 concepts and terminology.

AJP-5 concepts with KM implications:

AJP-5 Concept	KM Application
Commander's Critical Information Requirements (CCIR)	Knowledge architecture must support rapid access to information satisfying CCIRs
Mission Analysis	Knowledge system must surface relevant lessons and doctrine during mission analysis phase
Operational Design	Knowledge graph traversal enables identification of analogous operations and their lessons
Transition Planning	Knowledge products must address transition requirements — continuity of knowledge during mission handoffs

B-4. Federated Mission Networking (FMN) — Technical Reference

FMN is the NATO framework for federated network operations in coalition environments. For MSS coalition knowledge sharing, FMN defines:

- **Spiral standards:** The specific technical standards applicable at each FMN spiral level. USAREUR-AF MSS integration with coalition environments must conform to the current operational spiral.
- **Information exchange requirements (IERs):** Defined exchange patterns for specific information types. Knowledge products may have defined IERs in the exercise-specific FMN implementation.
- **Mission network configuration:** How partner nation systems connect to the mission network and what content is accessible at each connection point.

Coordinate with USAREUR-AF C2DAO for current FMN spiral applicability and coalition interface technical specifications before designing any FMN-connected knowledge sharing capability.

GLOSSARY

Terms are defined as used in this manual. Cross-references to SL 4K terms are noted where applicable.

AAR (After-Action Review): A structured review of a task, event, or operation to identify what was planned, what occurred, why it occurred, and what will be sustained or improved. The primary source document for lessons learned generation. (FM 7-0)

AIP (Artificial Intelligence Platform): Palantir's AI orchestration layer within Foundry, enabling large language model integration, AI Logic workflow development, and AIP-assisted data and knowledge tasks on MSS. (See SL 4K for unit-level AIP usage; this manual covers Theater-scale applications.)

AJP-5 (Allied Joint Publication-5): NATO doctrine governing operational-level planning in combined allied operations. USAREUR-AF knowledge products supporting combined planning must align with AJP-5 structure and terminology.

C2DAO (Command and Control Data Architecture Office): USAREUR-AF enterprise data architecture authority. Approves Theater-level knowledge architecture designs, schema changes, and cross-unit data sharing configurations.

CALL (Center for Army Lessons Learned): The Army's institutional repository for lessons learned, located at Fort Leavenworth, KS. Theater KM Architects coordinate USAREUR-AF lesson submissions to CALL.

CoP (Community of Practice): A group of practitioners who share a professional domain and engage in collective learning and knowledge exchange. The Theater KM CoP is the network of all KM billets within USAREUR-AF, organized and led by the Theater KM Architect.

Coalition Knowledge Product: A knowledge object that has been through the releasability workflow and is authorized for sharing with specified partner nations under an applicable Information Sharing Agreement. Marked with appropriate NATO caveat.

Controlled Vocabulary: A defined, closed set of permitted values for a property field. Controlled vocabulary ensures consistency across contributors and enables reliable filter and search operations. Required for all classification, status, and domain-type fields in the Theater ontology.

Cross-Domain Federation: In the MSS context, the management of knowledge across organizational, functional, and echelon boundaries within a single classification-level network environment. Explicitly does NOT mean data transfer across classification levels.

Domain Owner: The individual (identified by billet) responsible for content quality, currency, and lifecycle management within a defined knowledge domain. Every knowledge domain must have a named owner before production deployment.

EUCOM (United States European Command): The Unified Combatant Command to which USAREUR-AF serves as Army Service Component Command (ASCC), along with USAFRICOM. Theater KM architecture supports EUCOM J3/J7 integration.

Federated Repository: A knowledge architecture pattern in which multiple semi-autonomous unit repositories share a common schema and cross-unit search capability, without requiring all data to reside in a single centralized store.

FMN (Federated Mission Networking): The NATO framework defining technical standards for network connectivity and information exchange in coalition operations. Governs the technical interface for coalition knowledge sharing on exercise networks.

Graph Health Indicator: A measurable signal of knowledge graph integrity: orphaned nodes, stale review dates, broken link chains, duplicate objects, or unvalidated TTPs. Monitored by automated weekly pipeline.

Hub-and-Spoke Federation: A knowledge federation pattern in which unit repositories contribute to a central Theater repository via ingestion pipelines. Enables quality-controlled aggregation at the cost of a central bottleneck.

ISA (Information Sharing Agreement): A bilateral or multilateral legal agreement authorizing the exchange of specified categories of information with named partner nations. Required before any coalition knowledge sharing. Maintained by USAREUR-AF J5/Legal.

Institutional Memory: The accumulated knowledge, experience, and context held by an organization — distinct from any individual's personal knowledge. The primary output that effective KM systems are designed to capture and sustain.

JALLC (Joint Analysis and Lessons Learned Centre): NATO's primary lessons learned organization, responsible for the NATO Lessons Learned system. Receives lessons from USAREUR-AF via EUCOM J7 channels.

JLLIS (Joint Lessons Learned Information System): The DoD-level lessons learned platform. USAREUR-AF lessons meeting DoD sharing criteria are submitted to JLLIS in addition to CALL.

Knowledge Domain: A bounded area of institutional knowledge with a defined owner, a defined consumer population, a defined lifecycle, and a defined scope. The organizational unit for knowledge governance.

Knowledge Elicitation: The structured process of extracting tacit knowledge from experienced personnel before their departure or transition. Includes structured interviews, procedure documentation, and relationship mapping.

Knowledge Graph: A representation of knowledge as a network of entities (nodes) and relationships (edges). In Foundry, implemented through Object Types and Link Types. Enables navigational knowledge access beyond keyword search.

Knowledge Risk: The probability and impact of critical institutional knowledge being lost due to personnel transitions, system failures, or organizational changes. Managed through risk assessment, knowledge capture prioritization, and continuity design.

Lessons Learned vs. Validated Lesson: Per NATO STANAG 4778: a VALIDATED LESSON is one confirmed as actionable with an assigned OPR. A LESSON LEARNED is one where corrective action has been implemented. Most Army systems conflate these — USAREUR-AF Advanced KMs track both states.

MPE (Mission Partner Environment): The technical environment used to share information with mission partners (non-NATO partners) in combined operations. The technical interface for coalition knowledge sharing with non-NATO partners.

MSS (Maven Smart System): Palantir Foundry deployed for USAREUR-AF and EUCOM. The platform on which all knowledge management systems described in this manual are built.

NATO IMP (Information Management Policy): NATO's governing policy for information lifecycle management on NATO networks. Governs naming conventions, classification marking, retention, and disposal of NATO information objects.

Null Result Rate: The percentage of knowledge system searches that return zero results. A key diagnostic metric — high null result rates indicate content gaps, vocabulary mismatches, or query design issues.

Ontology: In MSS/Foundry: the set of Object Types, Link Types, and property schemas that define the structure of the knowledge graph. At Theater level, the ontology is the governance contract that enables federation.

OPSEC (Operations Security): The process of denying adversaries information about capabilities and intentions. Relevant to knowledge management — aggregated knowledge products can reveal sensitive operational information even when individual elements appear innocuous.

Originator's Consent: The requirement that information may not be shared with third parties without approval from the organization that originated it. A prerequisite for all coalition knowledge sharing.

PCS (Permanent Change of Station): The reassignment of military personnel from one duty station to another. The primary driver of institutional knowledge loss in Army organizations. The central challenge that Theater KM architecture must address.

Releasability Review: The process of evaluating a knowledge product for authorization to share with specified partner nations, confirming classification, OPSEC, and originator approval requirements are met.

Schema Registry: The authoritative documentation of the Theater knowledge ontology — Object Types, property schemas, Link Types, controlled vocabularies, and governance rules. Maintained by the Theater KM Architect in MSS.

STANAG 4778: NATO Standardization Agreement governing lessons learned format and exchange. All USAREUR-AF lessons submitted to NATO systems must conform to STANAG 4778 format.

Theater KM Architect: The Advanced KM (SL 5K qualified) responsible for designing and governing the enterprise knowledge architecture across USAREUR-AF. Sets standards, manages federation, leads the KM CoP, and measures system effectiveness.

Two-Person Rule (KM context): The design principle that every critical knowledge domain must have both an owner and a trained, actively engaged deputy who can operate the domain independently. Not a compliance checkbox — a genuine operational continuity requirement.

UDRA (Unified Data Reference Architecture) v1.1 (February 2025): Army enterprise data architecture standard. Federated governance and domain structure requirements apply to Theater KM architecture.

Utilization Metrics: Measurements of how knowledge systems are actually used: active users, search volume, null result rates, return visit rates. The second level of the KM metrics framework — measures activity but not necessarily impact.

SL 5K — Advanced Knowledge Management, Maven Smart System HEADQUARTERS, UNITED STATES ARMY EUROPE AND AFRICA Wiesbaden, Germany — 2026 Distribution: Distribution authorized to U.S. Government agencies and their contractors only. Other requests must be referred to Headquarters, USAREUR-AF, C2DAO, Wiesbaden, Germany.

PIN: 1050E-000 This manual supersedes no prior publication. Prerequisite: SL 4K, Knowledge Manager.

KM-specific governing references:

Publication	Title	Relevance
ATP 6-01.1	Techniques for Effective Knowledge Management	The Army's dedicated KM publication; covers KM solution design, content management, and KM SOPs
AR 25-400-2	Army Records Management Program (Oct 2022)	Records lifecycle management, ARIMS compliance, electronic records
DA PAM 25-403	Army Guide to Recordkeeping (Nov 2022)	Implementing guidance for AR 25-400-2; electronic records, scheduling, transfer
UDRA v1.1	Unified Data Reference Architecture (February 2025)	Domain ownership and federated governance for knowledge products
Army CIO Data Stewardship Memo	Data Stewardship Policy (April 2024)	Chain of responsibility for data governance and stewardship