eLearning Content Sharing Catalog Concept

This info paper was developed by the PfPC ADL Working Group with the support of the Latvian Defense Academy to inform next-generation Education, Training, Exercises, and Evaluation.

This Concept Proposal articulates the purpose, strategic rationale, scope, governance, operating concept, features, scenarios, risks, and implementation roadmap for an eLearning Content Catalog. It includes three Annexes with additional details: A – Initial Content Inventory Analysis; B – eLearning Catalog Requirements including initial analysis of alternative platform solutions; and C – Participation Growth Action Plan. It is a 15-minute read.

1. Purpose & Strategic Value

In support of the Multinational Concept Development Campaign on Sustainable Military Training in Wartime (MCDC-SMT), we propose creation of a secure, standards-based metadata eLearning Content Catalog (not a repository) designed to index and link to distributed education and individual training resources across NATO, Allied, and Partner nations. It will enable rapid discovery of mission-relevant content during peacetime, crisis, and wartime, supporting sustained readiness under kinetic, cyber, and spectrum threats.

2. Background & Operational Rationale

Recent conflicts demonstrate that training capacity is a contested target. Nations must maintain continuity of training under kinetic, cyber, and spectrum pressure. Many high-value resources already exist within national systems, but discovery and interoperability remain barriers. By federating metadata[1] and linking to authoritative hosts, the catalog bridges this gap, ensuring training (training delivery and training development) continuity even when primary training systems are disrupted.

3. Scope

The catalog indexes unclassified but potentially sensitive training and education resources relevant to sustaining force readiness. Examples include

- doctrine-aligned courses,
- training modules,
- job aids,

- simulations,
- reference materials,
- images,
- multimedia content,
- curriculum guides,
- info papers,
- handbooks,
- interactive modules,
- data models,
- and icons/3D models.

The catalog stores metadata and contact details to content owners only; learning content remain hosted by content owners.

4. Governance & Roles

Governance will be led by NATO Allied Command Transformation (ACT). ACT will be responsible for metadata stewardship, hosting responsibilities, sustainability, and metadata- and interoperability-standards.

Users include Education & Training Facilities, instructors, curriculum developers, and operational commanders.

Providers are national/institutional content owners, who retain content ownership.

5. Operating Concept

The catalog is metadata-first, federated, and resilient by design. It indexes distributed resources, links back to authoritative sources, and ensures continuity of training even under contested conditions with catalog redundancy and mirrored instances. Metadata will follow standardized fields and controlled vocabularies, supporting precise search and filtering.

Security-aware access dictates that metadata may be public or restricted and resource access follows source policy. The platform will be hosted by NATO HQ SACT and based on open-source solutions configured for catalog use.

6. Operational Scenarios

- Peacetime - supports prevention of duplication of efforts
- Multinational Exercise Spin-Up – Short notice events require pre-reads and modules; catalog enables rapid filtering by doctrine, language, and format pointing to the best-fit materials.
- Cyber Incident – National LMS offline; catalog directs trainers to federated alternatives.
- Contested EMS – Spectrum and cyber constraints degrade LMS access; catalog provides low-bandwidth discovery with links to mirrored or regionally hosted resources.
- Multinational Cooperation: Promoting multinational cooperation by sharing learning content laying groundwork for rapid mutual support in times of crisis and war.

- Article 5 Scenario – Training facilities are disrupted; catalog surfaces alternate courses from Allies.

7. Core Features & Requirements

Key features include:

- Submission Portal: Vetted contributors submit entries with mandatory fields (Title, Type, Language, URL, License, Access).
- Metadata Schema with HQ SACT guidance (v1):
    - Title, Abstract/Description,
    - Subject Tags,
    - Audience,
    - Language(s),
    - Format,
    - NATO STANAG - aligned metadata (Dublin Core, IEEE LOM) with SCORM, xAPI, and CMI5 fields,
    - Host/URL,
    - Access Restrictions: *Yes/No*,
    - License/Usage Rights,
    - Creation/Update dates,
    - Point of Contact,
    - Classification/Marking & Contains Personal Data: *Yes/No*.
- API & Harvesting: best-practice REST API and OAI-PMH support for ingesting/refreshing partner metadata.
- Governance & Audit: Role-based permissions, review workflow, and change history for metadata.
- Search and filter by keyword, tags, language, host, format, and access restriction.
- Security and resilience through mirrored instances, HTTPS/TLS, and role-based access.

Non-Functional Requirements:

- Availability: ≥90% uptime; automated backups; mirrored instance for continuity.
- Security: HTTPS/TLS, role-based access, audit logs; compliant handling of unclassified but sensitive data.
- Performance: Search results returned in ≤2 seconds for typical queries.
- Usability: Clear UI with tooltips/examples; low-bandwidth mode; accessibility best practices.

8. Risks & Mitigations

- Inconsistent Metadata – Mitigation: mandatory fields, contributor guidance, validation, and curation.
- Limited Participation – Mitigation: targeted outreach, recognition, and simplified submission.
- Access Restrictions – Mitigation: clearly indicate access rules; support federated identity.
- Platform Fragmentation – Mitigation: enforce standard APIs and governance to manage inputs.

9. Implementation Roadmap

The implementation will take place in a phased approach.

Phase 1 - Validate requirements, select platform, and finalize metadata schema v1. Establish national POCs, adopt metadata templates and using a minimum viable metadata set. NATO HQ SACT to host workshops and provide a metadata toolkit.

Phase 2 - Cyber accreditation/certification; pilot with initial providers (NATO HQ SACT, NETF, CoE, select nations); ingest first 250+ entries, run usability tests.

Phase 3 - Establish mirrored instance; enable API connections with national portals.

Phase 4 - Scale to ≥1,000 entries, proof of concept/implementation for AI-assisted metadata enrichment.

Phase 5 - Full National Participation

To achieve interoperability and sustained readiness, national actors must prepare both technically and administratively for catalog participation. While the catalog itself is a metadata index, not a repository, the quality of national metadata submissions determines the utility of the system.

Phase 5.1 Establish National Roles and Responsibilities

- National Lead Authority: Designate a single institutional point of contact for metadata policy and coordination with NATO ACT. This is typically the national ADL office.
- Content Providers: Identify national institutions that own learning resources (defense universities, service schools, centers of excellence, training centers).
- Metadata Stewards: Assign technically skilled personnel or partner institutions (often outside the content-owning organizations) to ensure metadata completeness, quality assurance, and conformance with NATO-aligned schema.

Phase 5.2 Metadata Compilation Process

- Short-Term (Initial):
  - Nations may begin with essential metadata fields only: Title, Description, Resource Type, Language, Host URL, Access Level, License.
  - These “minimal viable metadata” (MVM) entries are sufficient for initial inclusion and testing of catalog workflows.
- Mid-Term (Alignment):
  - Adopt the NATO Learning Technology Interoperability Group (NLTIG) metadata schema v1, expanding to include Audience, Subject Tags, Format, NATO Domain, Creation Date, and Point of Contact.
  - Implement national metadata templates that mirror the catalog’s submission form to reduce friction.

- Implement GDPR checklist to confirm compliance when personal data (e.g., images, voices, names) are present in linked content.

- Long-Term (Integration):
  - Embed metadata creation into content design workflows, ensuring each new national eLearning product automatically produces metadata aligned to NLTIG designated Dublin Core / IEEE LOM / xAPI / CMI5 structures.

Phase 5.3 - Managing Metadata Gaps and Restricted Fields

Some metadata such as classification markings, training audience composition, or deployment context may be restricted even if the learning content itself is unclassified. To manage this:

- Tag such entries as "metadata-restricted" with visibility limited to NATO-restricted catalog users.
- Use tiered access controls where metadata fields can be marked Public / Restricted / Secret without removing the entry entirely.
- Encourage nations to provide sanitized or generalized descriptors when exact terms are classified (e.g., "Advanced ISR Operations Course" instead of "SIGINT Targeting 201").

10. Measures of Success (KPIs)

- Catalog size: ≥1,000 quality entries within 12 months of launch.
- Coverage: representation from ≥12 nations.
- Metadata quality: ≥90% completeness of mandatory fields; ≥80% adoption of controlled vocabularies.
- Operational impact: documented cases where catalog reduced downtime or accelerated exercise readiness.

11. Classification of Metadata and Content

While the catalog itself indexes only unclassified resources, aggregation of national metadata could, over time, reveal patterns of training priorities, doctrinal emphasis, or capability gaps. For this reason:

- ACT will conduct periodic classification reviews of metadata aggregates to determine whether subsets of the catalog require restricted handling.
- Automated sensitivity analysis tools may be applied to detect clustering that could reveal sensitive operational focus areas.
- If needed, such clusters will be migrated to a NATO SECRET mirrored instance hosted within ACT infrastructure, separate from the public catalog.

Recognizing that the most operationally relevant training content (e.g., for reservists, cyber operators, or special operations forces) may be classified.

The eLearning Content Catalog is not designed to host classified content. However, the catalog framework including its metadata schema, APIs, and governance model can be reused to create a parallel classified catalog on NATO Secret or national networks.

This "dual-domain model" ensures architectural and procedural continuity between unclassified and classified environments.

Nations may pilot secure synchronization between catalog instances using metadata stubs that reference classified entries, visible only to authorized users.

12. Legal and Data Protection Considerations

- Copyright: Nations retain ownership of content; catalog links respect source licensing and intellectual property rights.
- Security Policy Compliance: Handling and distribution of restricted metadata will align with C-M(2002)49 (NATO Security Policy).
- Data Protection: The catalog itself stores only metadata describing learning resources and does not hold learner analytics. Personal data will only be used for catalogue access means and needs to be handled according to the Hosts national regulations. However, some linked materials may contain identifiable individuals (e.g., voices, images, or names). To comply with respective national Data Protection Regulations:
    - Content providers must ensure lawful processing and consent for any personal data within shared materials.
    - Metadata submissions shall indicate via the "Contains Personal Data" field whether such content exists and confirm GDPR clearance.
    - Materials lacking proper clearance should not be shared or linked until compliance is confirmed.

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MCDC-SMT eLearning Content Catalog: Annex A, B, C, & D

Annex A: Initial Content Inventory Report

Executive Summary

The initial catalog pull organized at the PfPC ADL Working Group meeting in Riga (May 2025) includes 14 submitted resources, representing a diverse but uneven starting point for the eLearning Content Catalog. Resource types are varied, with the largest share falling into 'Other' or generic course formats, followed by videos and documents. While this diversity offers flexibility, the current mix suggests the need for more structured, standards-aligned submissions to support rapid integration into NATO and partner learning environments. The current pool demonstrates willingness to contribute but requires targeted outreach and improved submission guidance to meet multinational operational needs (European, as well as MENA and Indo-Pacific theaters) and training demands.

Methodology

Data sources include Google Form submissions captured via the "Online Resource Submission for Training Education Repository" spreadsheet and inputs from the Riga PfPC ADL Working Group meeting. Counts reflect direct tallies of form fields; language selections were treated as checked when a value was present. Limitations: several records have missing descriptions, tags, and URLs, which reduces discoverability and reliability of the baseline.

Findings

Language availability is heavily skewed toward English, with no representation in French, German, or Spanish. This imbalance limits the catalog's immediate utility across multinational contexts and underscores the need for targeted outreach to contributors able to provide multilingual materials, particularly in key operational languages.

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Metadata completeness is a significant challenge. Of the submissions, half lack a description, are missing subject matter tags, or have no resource URL provided. These gaps reduce discoverability, delay operational use, and may limit the ability to quickly deploy materials under contested or time-sensitive conditions.

Additionally, there is little evidence of resources aligned with xAPI, CMI5, or other interoperability standards, which will be essential for enabling LTI launches and integration into distributed learning systems.

In its current form, the catalog provides a useful proof-of-concept and a clear picture of early participation trends. However, strategic outreach, tighter submission standards, and a push for multilingual, standards-aligned content will be essential to achieving its goal as a NATO- and partner-ready training discovery platform.

Gap Analysis
- Languages: No French, German, or Spanish entries; this limits immediate multinational usage and undermines readiness in non-English dominant contexts.

- Metadata quality: High rates of missing description, tags, and URLs reduce search precision and the ability to route users to authoritative hosts under time pressure.

- Operational domains: Lacking standards and doctrine requirements aligned submissions to support rapid integration into NATO and partner learning environments.

- Format readiness: Limited evidence of xAPI/CMI5-friendly resources; future submissions should indicate standards alignment to enable LTI/xAPI launches.

Proposals for Further Action:
To encourage a greater number of contributions and enrich the Online Resource Submission for the eLearning Content Catalogue, we propose the following action items:

1. **Implement a Targeted Outreach and Recognition Program:**
   - **Action:** Proactively identify key experts and organizations within our community and directly invite them to contribute relevant online resources.
   - **Action:** Establish a system to acknowledge and recognize contributions, such as featuring contributors in a newsletter, on a dedicated section of the Catalogue platform (if applicable), or through certificates of appreciation during future scheduled meetings.
   - **Action:** Organize webinars or virtual workshops showcasing the value of the Catalogue and providing guidance on how to effectively submit resources. Highlight successful examples and the impact of shared materials.

2. **Streamline the Submission Process and Provide Clear Guidelines:**
   - **Action:** Review and simplify the current submission form to reduce the time and effort required for contribution. Consider making certain fields optional or providing clear examples and tooltips for each field.
   - **Action:** Develop comprehensive guidelines and best practices for resource submission, including preferred formats, levels of detail for descriptions, and effective tagging strategies for subject matter and target audience. Make these guidelines easily accessible.
   - **Action:** Offer support and assistance to potential contributors, such as a dedicated contact person or a frequently asked questions (FAQ) section to address any queries or concerns about the submission process.

3. **Foster a Collaborative and Engaging Community Around the Catalogue:**
    - **Action:** Utilize existing fora and venues (NLTIG, NTTC, PFP C ADL WG, MCDC-SMT, NORDEFCO, etc.) where experts can discuss educational resources, share ideas, and collaborate on the development or curation of content. This can foster a sense of ownership and encourage reciprocal sharing.
    - **Action:** Organize additional virtual events focused on the Catalogue, such as resource sharing sessions or discussions on emerging trends in online education. This can help build relationships and encourage contributions.
    - **Action:** Actively solicit feedback from the community on the Catalogue and the submission process and demonstrate responsiveness to their suggestions for improvement. This will show that their contributions and opinions are valued.

Annex B: MCDC-SMT eLearning Content Catalog Requirements including initial analysis of alternative platform solutions

1. Purpose & Scope

The Multinational Capability Development Campaign – Sustainable Military Training in Wartime (MCDC-SMT) eLearning Content Catalog will provide a multinational, discoverable index of training and education resources to support NATO and partner readiness. It is designed as a catalog (metadata index) rather than a repository, enabling distributed hosting while providing centralized discovery.

This document defines the requirements for the MCDC-SMT eLearning Content Catalog in support of NATO and Partner nations' ability to sustain training continuity under contested conditions. Requirements are derived from the MCDC Sustaining Military Training project's operational objectives, including:

- CONUS[2]-based failover capacity for multinational training continuity.
- Resilience in degraded or denied training environments.
- Support for theaters with low-bandwidth operating conditions.
- Alignment with NATO interoperability standards for rapid, multinational content sharing.

2. Governance & Standards Alignment

Governance including metadata stewardship, hosting responsibilities, and sustainability will be led by NATO Allied Command Transformation (ACT), with input from participating nations and technical standards bodies. The catalog will align recognized metadata and interoperability standards, including xAPI, SCORM, CMI5, and Learning Tools Interoperability (LTI) for launching content from host systems. The NATO Learning Technology Interoperability Group (NLTIG) will serve as a standards reference point, ensuring metadata consistency and cross-platform compatibility.

3. Functional Requirements

- Catalog-first design: index and describe resources without duplicating hosting.
- Advanced search/filter by metadata (language, topic, format, operational relevance).
- Multilingual metadata fields and UI.
- LTI launch capability for immediate access to hosted content.
- Contributor submission workflow with approval and metadata validation.
- Analytics on search queries, views, and launches.
- Role-based access control for administration and curation.

4. Non-Functional Requirements

- High availability and uptime, suitable for operational environments.
- Scalable to accommodate thousands of entries.
- Secure authentication and access control.
- Low-bandwidth operational mode for degraded connectivity.

[2] Continental US

- Open-source preference to avoid licensing constraints.
- Minimal training requirement for administrators.

5. Platform Comparison

Platform	Strengths	Limitations	LTI Support	Metadata Standards	Fit for SMT Context
CKAN	Proven open-source data catalog; flexible metadata; strong search/filter.	Not tailored to learning content; requires customization for LTI.	Possible via plugin/custom dev.	Custom schema, Dublin Core possible.	Good for pure catalog use; needs LTI dev for training integration.
Omeka S	User-friendly; strong metadata and theming; museum/archive heritage.	Less mature in eLearning integrations; smaller community than CKAN.	Possible via plugin/custom dev.	Dublin Core, MODS.	Suitable for smaller-scale catalog; less optimal for large-scale NATO use without mod.
DSpace	Robust repository platform; rich metadata handling; mature open-source community.	Repository-first design may require mods to act as catalog-only.	Possible via customization.	Dublin Core, custom fields.	Strong for metadata and archival; adaptable for catalog role.
Moodle	Widely adopted LMS; built-in LTI support; NATO ACT migration underway.	LMS-heavy; must disable course delivery features to focus on catalog.	Yes – native.	LOM, Dublin Core, custom metadata.	Strategic fit with ACT infrastructure; easy LTI integration.
Open EQUELLA	Purpose-built for learning content management; strong LTI and standards support.	Complex setup; poor interface; requires dedicated admin expertise.	Yes – native.	LOM, Dublin Core, custom schemas.	Excellent training catalog; high standards compliance.

6. Use Case Examples

Moodle Tenant: NATO ACT leverages its planned Moodle Workplace migration, configuring a dedicated tenant as a catalog. LMS delivery features are disabled, LTI launch is used for distributed content access, and metadata fields are standardized to NATO operational requirements.

Pluses: Strategic alignment with NATO ACT infrastructure; built-in LTI support; widely familiar interface for military training administrators; strong community support.

Minuses: Full LMS architecture may add unnecessary complexity; disabling course delivery features requires configuration effort; potential for 'feature bloat' if not tightly managed. Access may only be granted to NATO and NATO's Partner Nations.

DSpace: Used as a metadata-rich, open-source catalog. Custom workflows prevent file storage, focusing solely on metadata indexing and linking to distributed hosts. Tailored search and multilingual fields support multinational users.

Pluses: Excellent metadata management and archival capability; mature open-source community; adaptable for catalog use; proven stability in large-scale deployments.

Minuses: Repository-first orientation may require significant customization for pure catalog function; less native LTI support compared to LMS solutions; UI less tailored for learning contexts.

openEQUELLA: Operates as a hybrid catalog/repository, but configured in catalog-only mode. Offers robust support for LTI launches, metadata standards, and federation with other EQUELLA instances, making it suitable for rapid multinational content discovery.

Pluses: Purpose-built for learning content; robust metadata schema support; native LTI capability; strong standards compliance and interoperability.

Minuses: Complex setup and administration; smaller implementation community than Moodle; requires dedicated technical expertise for long-term sustainment.

Annex C: Participation Growth Action Plan

Objective

To increase the volume, diversity, and quality of contributions to the eLearning Content Catalog.

Strategies

1. Targeted Outreach & Engagement

- Identify priority organizations and invite contributions directly.
- Recognize contributors through official communications and NATO/MCDC events.

2. Streamlined Submission Process

- Submission Form Update:
  - Reorganize fields into logical sections: Resource Identification, Metadata, Access Information.
  - Implement dropdown menus for common fields (e.g., Resource Type, Language, License) to standardize entries.
  - Add conditional logic: show advanced metadata fields only if contributor selects 'Advanced Submission'.
  - Include NATO metadata guidance tooltips and examples inline for fields like 'Subject Matter/Topic' and 'Description'.
  - Make 'Resource Title', 'Resource Type', 'Language', and 'URL' mandatory at initial submission; allow other fields to be added later.
  - Enable file upload for supporting documents (e.g., metadata XML, thumbnails) without hosting the learning content itself.
  - Add automated validation to flag missing mandatory fields before submission.
- Simplify the submission form, making some fields optional at entry and requested later via follow-up. Every “forced” field may have a negative impact on willingness to contribute/enter.
- Provide tooltips and examples to help contributors complete metadata fields accurately.

3. Community Building & Continuous Engagement

- Establish an online discussion forum for contributors and users.
- Host quarterly webinars on catalog use, updates, and best practices.
- Solicit regular feedback to improve usability and relevance.

Measures of Success

- 50% increase in number of catalog entries within 12 months.
- Metadata completeness rate of 90% or higher.

Sample Quarterly Engagement Activity Plan

Quarter	Activity	Objective
Q1	Launch call for contributions via NATO ACT and MCDC mailing lists	Increase initial submissions
Q1	Host introductory webinar on catalog and submission process	Build awareness and guide contributors
Q2	Highlight top 5 new contributions in NATO ACT newsletter	Recognize and motivate contributors
Q2	Outreach to underrepresented languages/regions	Improve linguistic diversity
Q3	Conduct metadata quality review and follow-up with contributors	Enhance metadata completeness
Q3	Host best practices webinar featuring successful use cases	Share success stories and foster engagement
Q4	Annual contributor recognition at NATO/MCDC event	Sustain participation and build community
Q4	Review and update submission form based on user feedback	Maintain usability and relevance

ANNEX D: ACKNOWLEDGEMENTS

The following organizations and individuals contributed to this Information Paper:

This paper was drafted by the Partnership for Peace Consortium (PfPC) Advanced Distributed Learning (ADL) Working Group in conjunction with its meeting in Riga in May 2025, sponsored by the George C. Marshall European Center for Security Studies. The meeting was co-chaired by Dr. Stijn van Laer (NATO Allied Command Transformation), Dr. Aaron Presnall (Jefferson Institute, USA) and Lt Col Michael Nickolaus; hosted by Lt. Col Aivis Šaicāns Acting Director, Latvian National Defense Academy (NADAL); and supported by the PfP Consortium Secretariat at the George C. Marshall Center.

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