Table of Contents

Section 1: USE CASE DIAGRAM & EXPLANATION

1.1 System boundary: Digital Knowledge Network (DKN)

The Velion Dynamics case study's Digital Knowledge Network (DKN) is introduced in the diagram as a single system boundary that encompasses all essential knowledge-management behaviors. Within the boundary, use cases are categorized into six functional areas that show how employees in international offices find, contribute to, manage, and keep an eye on organizational knowledge.

Fig 1: Use Case Diagram

1.2 Actors and their roles

Six main actors are identified in the diagram, which is based on the case study narrative.

Actors	Role in relation to the DKN
Consultants	Daily users who look for, peruse, and use knowledge resources to assist with onboarding and project work.
Expert Contributors	Senior employees who contribute to resource validation, apply metadata, and produce high-value content.
Knowledge Supervisors	Local "knowledge Supervisors" oversee mentoring, training, and promoting DKN adoption in every office.
System Admins	System administrators are technical personnel who set up user access, oversee infrastructure, and handle problems with integration or performance.
Top Managers	Top Managers Leaders who keep an eye on adoption and evaluate KPIs pertaining to collaboration, duplication, and onboarding time.
Governance Council Members	Members of the Knowledge Governance Council who check the quality and compliance of repository content through auditing, curating, and cleaning.

1.3 Use cases organized into six groups

The six logical groups of use cases reflect the goals of both the DKN design and the Project.

Group	Use cases in the group	Purpose
1. Discovery & Knowledge Consumption	• Search Knowledge Resources • Browse by Category & AI Recommendations • View Resource Details and Meta Data	Enables consultants to locate and examine pertinent knowledge assets, supporting centralization and personalization.
2. Content Creation & Validation	• Upload Content (documents, templates) • Assign Tags and Metadata • Validate Content Quality and Compliance	Captures new information, makes sure it is accurately described, and passes a quality/compliance check before being used more widely.
3. Training & Change Management	• Request Training Session • Deliver Training and Mentoring • Monitor DKN Adoption Metrics	Represents the "Connect to Grow" change initiative, which increases user capacity and monitors adoption throughout offices.
4. Governance & Content Curation	• Audit and Curate Resources • Flag Outdated Content • Detect and Remove Duplicates	Reflects the efforts made by the Knowledge Governance Council to uphold policy, eliminate duplication, and maintain relevance.
5. System Administration	• Configure User Access and Permissions	Includes technical administration topics like performance tuning, legacy integration, and access control.

Group	Use cases in the group	Purpose
	• Manage System Performance and Infrastructure	
6. KPI Reporting & Monitoring	• Monitor and Report Organizational KPIs	Enables senior managers to evaluate results like decreased duplication, quicker onboarding, and improved cross-office cooperation.

1.4 Relationship types used in the diagram

The diagram illustrates how use cases relate to actors and to each other using three essential UML relationships.

- Association (solid line) connects each actor to the use cases they can perform, such as consultants to search and browse, or system admins to configuration and performance management.
- Include (dashed line with «include») is used where one-use case always calls another as part of its behavior, for example Upload Content includes Assign Tags and Metadata, and Audit and Curate Resources includes both Flag Outdated Content and Detect and Remove Duplicates.
- Flow (dashed line with «flow») indicates the normal sequence between use cases within a group, such as Search → Browse → View for discovery, Upload → Tag → Validate for content creation, and Request → Deliver → Monitor for training & adoption

These relationships maintain the diagram's readability while displaying necessary dependencies and the typical sequence in which DKN activities take place.

Section 2: USE CASE DESCRIPTIONS

Use Case 1: Search Knowledge Resources

Primary actors: Consultants, Expert Contributors.

Goal: Find project reports, templates and technical resources relevant to current work.

Scenario:

1. The user opens the DKN search page and enters keywords.
2. The system searches the central repository and returns a ranked list of results.
3. The user selects a promising resource to open UC3: View Resource Details & Metadata.

Extension

1. The user applies filters (such as domain or area), and the list is updated if the results are too general.

Exception

1. If no items match, the system suggests alternative keywords or offers to switch to UC2: Browse by Category & AI Recommendations.

Use Case 2: Browse by Category & AI Recommendations

Actors: Consultants, Expert Contributors

Goal: Discover knowledge by navigating categories and AI suggestions.

Scenario:

1. The user chooses the "Browse" view instead of typing a search.
2. The system shows categories (industry, solution type, technology) and highlights recommended content based on the user's profile.
3. The user navigates into a category and opens a resource, continuing with UC3.

Extension:

1. The user opens a "Recommended for you" list, which contains items surfaced purely by the AI engine.

Use Case 3: View Resource Details & Metadata

Actors: Consultants, Expert Contributors

Goal: Inspect a chosen resource and decide whether to reuse it.

Scenario:

1. The user selects a resource from searching or browsing results.
2. The system displays its metadata (summary, owner, date, tags, version) and a preview or download link.
3. The user either downloads the file or bookmarks it for later.

Extensions:

1. The user rates the resource and leaves a short comment, which updates its quality indicators.
2. The user flags the item as "possibly outdated", which triggers UC11: Flag Outdated Content.

Exception:

1. If the user's regional permissions do not allow access (e.g. data localization rules), the system blocks the preview and shows an access warning.

Use Case 4: Upload Content

Actor: Expert Contributors

Goal: Add a new knowledge into the DKN.

Scenario:

1. The expert selects one or more files and chooses an appropriate content type (e.g. template, case study).
2. The system saves a draft entry and immediately invokes UC5: Assign Tags & Metadata.
3. After metadata is completed, the draft is queued for UC6: Validate Content Quality & Compliance.

Extension:

1. When a file with the same name and type already exists, the expert can choose to upload it as a new version instead of a separate resource.

Exception:

1. If the file exceeds size or format constraints, the system rejects the upload and shows a message explaining what to fix.

Use Case 5: Assign Tags & Metadata

Actors: Expert Contributors, Governance Council Members

Goal: Ensure uploaded content is accurately described.

Scenario:

1. The system proposes initial tags and attributes using automatic analysis.
2. The expert edits the suggestions, adds key tags, selects business domains and sets confidentiality and region flags.

Extension:

1. During an audit, a Governance Council Member can reopen metadata for a published resource and correct or standardize tags.

Exception:

1. If mandatory fields remain empty, the system prevents saving the record and highlights the missing items.

Use Case 6: Validate Content Quality & Compliance

Actors: Expert Contributors (as reviewers), Governance Council Members

Goal: Decide whether a resource is ready to be published.

Scenario:

1. A reviewer opens a resource in the validation queue and checks for accuracy, relevance and potential duplication.
2. The reviewer confirms that personal or client data complies with GDPR and local regulations.
3. The reviewer approves the item, so the system marks it as "Published" and makes it searchable.

Extensions:

1. The reviewer sends the resource back to the owner with comments; the owner revises it and resubmits for another check.
2. Very low-risk changes (e.g. spelling fixes) are auto-approved under a "lightweight review" rule.

Exception:

1. If a serious compliance problem is found, the resource is rejected, and an incident is logged for legal or security teams.

Use Case 7: Request Training Session

Actor: Consultants

Goal: Ask for help using the DKN or applying its content.

Scenario:

1. From within the DKN, the consultant opens "Request Training" and enters a brief description of the topic.
2. The system routes the request to the appropriate Knowledge Supervisor for the consultant's region.

Extension:

1. When several similar requests are pending, the supervisor merges them into one group session and invites all relevant staff.

Use Case 8: Deliver Training & Mentoring

Actor: Knowledge Supervisors

Goal: Build user capability and encourage good DKN practices.

Scenario:

1. The supervisor schedules a session, sends invitations and delivers the training (online or in person).
2. Key workflows such as searching, uploading and tagging are demonstrated using live examples.
3. Attendance is recorded, and any materials or recordings are added back into the DKN as training resources.

Exception:

1. If technical issues prevent a live session, the supervisor shares pre-recorded material and rearranges the interactive part for a later slot.

Use Case 9: Monitor DKN Adoption Metrics

Actors: Knowledge Supervisors, Top Managers

Goal: Track how actively DKN is being used.

Scenario:

1. The supervisor opens an adoption dashboard that shows activity by region, team and role.
2. Top Managers review trends in usage, contributions and training completion to see whether targets such as reduced onboarding time are being met.

Extension:

1. The supervisor identifies a team with unusually low usage and plans a focused coaching intervention for that group.

Use Case 10: Audit & Curate Resources

Actor: Governance Council Members

Goal: Periodically review content quality and relevance.

Scenario:

1. A council member starts an audit cycle for a chosen area (for example, logistics projects).
2. The system lists resources with indicators such as age, popularity, flags and redundancy signals.
3. The member decides which items should be kept as they are and which require action, invoking UC11 and UC12 where needed.

Extensions:

1. UC10 includes UC11: Flag Outdated Content for items that appear stale.
2. UC10 includes UC12: Detect and Remove Duplicates for items that strongly overlap with others.

Use Case 11: Flag Outdated Content

Actors: Governance Council Members, Consultants (as flaggers)

Goal: Identify and manage stale or superseded resources.

Scenario:

1. A user or auditor marks a resource as potentially outdated.
2. The system notifies the current owner or responsible expert and requests confirmation or an updated version.

Extension:

1. If the owner confirms the resource is obsolete, it is archived but kept for historical reference.

Exception:

1. If the owner has left the company and no replacement is assigned, the council either reassigns ownership or archives the content after a grace period.

Use Case 12: Detect & Remove Duplicates

UC12: Detect & Remove Duplicates

Actor: Governance Council Members

Goal: Reduce duplication so that staff do not reinvent work.

Scenario:

1. The system highlights pairs or clusters of resources that automated checks consider duplicates.
2. The council member compares them and decides which version should be treated as the main one.
3. The duplicates are either merged into the main item or archived with a note pointing to the preferred version.

Exception:

1. If two variants are intentionally different (for example, EU vs Asia templates), the council keeps both but links them as regional variants instead of deleting either.

Use Case 13: Configure User Access & Permissions

Actor: System Admins

Goal: Control who can see and change what inside the DKN.

Scenario:

1. The admin creates or updates a user account, assigning a role (consultant, expert, supervisor, council, manager) and regional access.

2. The system applies relevant security and data-protection rules based on the role and region.

Extension:

1. The admin sets up temporary access for contractors with an automatic expiry date.

Use Case 14: Manage System Performance & Infrastructure

Actor: System Admins

Goal: Keep the DKN responsive and available across regions.

Scenario:

1. The admin monitors dashboards showing response times, error rates and regional connectivity issues.
2. When performance drops, the admin adjusts capacity, tunes configuration or schedules maintenance.

Exception:

1. If a specific region (for example, an office with unstable networks) cannot maintain a reliable connection, the admin enables fallback options such as local caching or a reduced-function view.

Use Case 15: Monitor & Report Organizational KPIs

Actor: Top Managers

Goal: Evaluate the business impact of the DKN and associated change program.

Scenario:

1. Managers open a KPI dashboard that aggregates metrics such as duplication reduction, onboarding time, collaboration between offices and client satisfaction indicators.
2. They review trends over time and across regions to see whether Project Axis is delivering the expected benefits.

Extension:

1. Based on the data, managers decide to adjust incentives, sponsor further training, or expand the DKN to additional business units.

Section 3: Business Concepts

3.1 Class Diagram

The DKN case study's primary entities and their relationships are shown in the Business Concepts class diagram. Users in various positions, knowledge resources kept in the repository, training sessions from the "Connect to Grow" program, governance audits, duplicate-handling groups, and KPI reports utilized by managers are all displayed. The Associations show ownership, categorization, and governance relationships, such as users possessing resources, resources falling under categories and tags, users attending and delivering training sessions, and audit records connecting members of the governing council to the resources they examine.
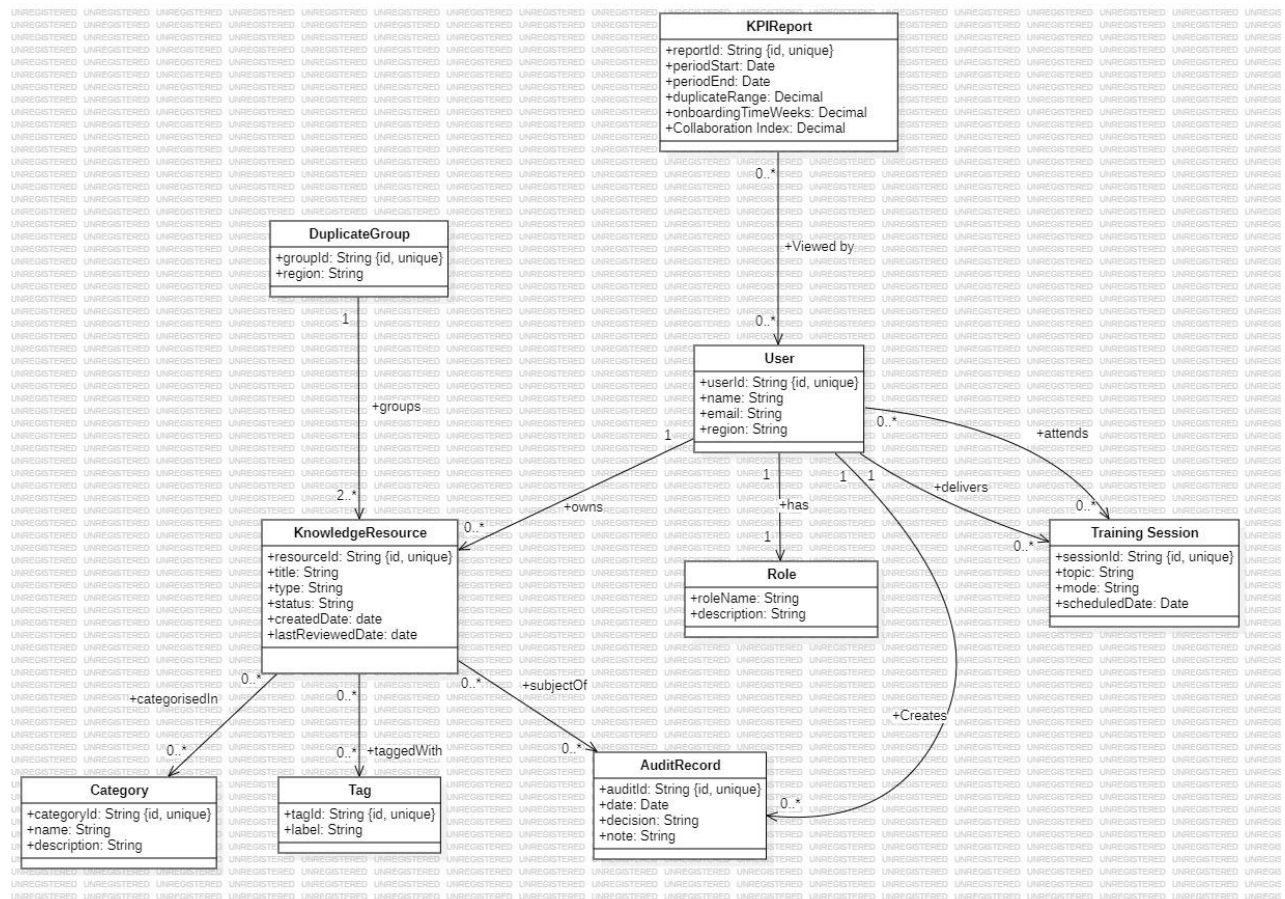

Fig 2: Business Concepts class diagram of Digital Knowledge Network (DKN)

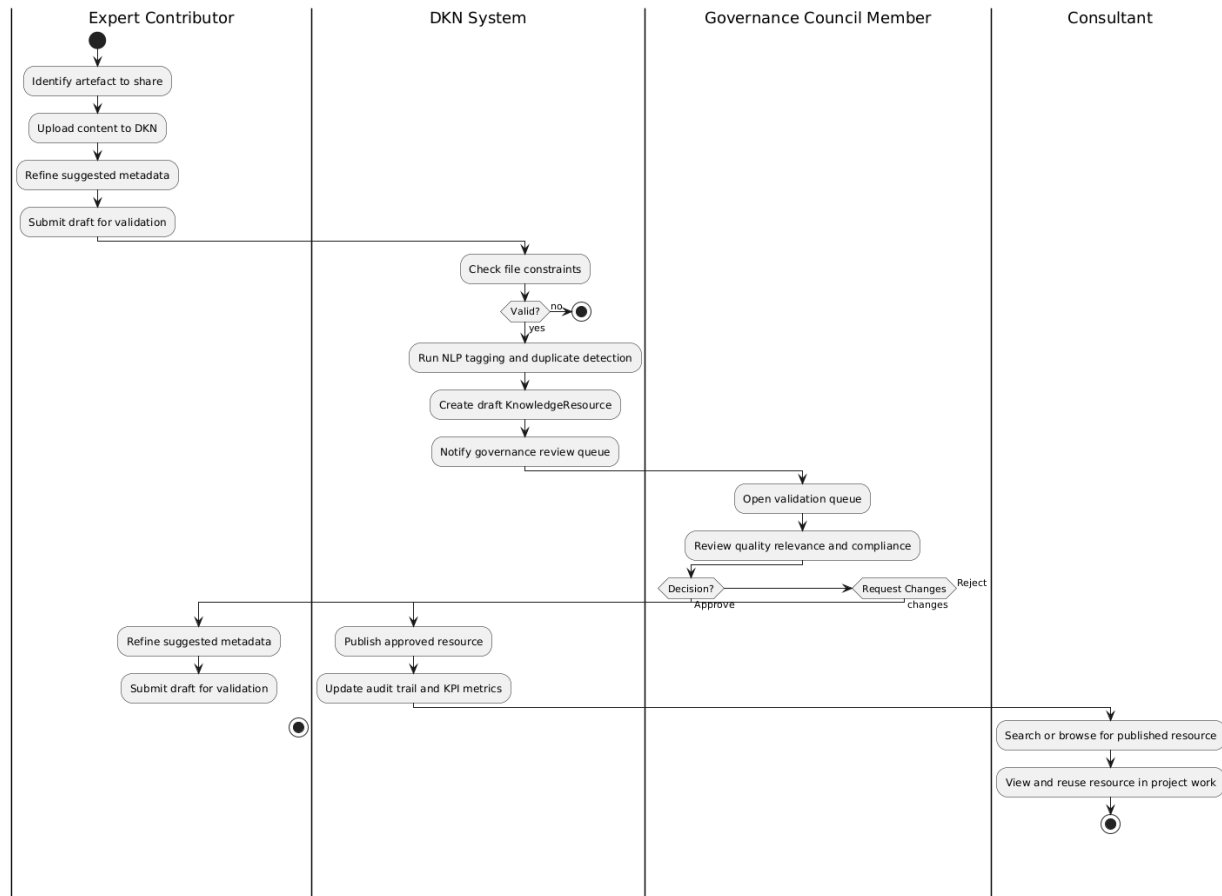| Concept	Purpose in the case study
User	Any staff member who deals with the DKN (consultants, experts, supervisors, administrators, managers, council).
Role	Records permissions and the degree of responsibility (e.g., contributor, governance, management).
KnowledgeResource	Frameworks, templates, and project artifacts are centrally kept.
Category	High-level business classification (technology, industry, solution type).
Tag	Keywords in metadata that are used for personalization and search.
TrainingSession	Activities to promote DKN adoption and train employees.
AuditRecord	Results of resource governance reviews.
DuplicateGroup	NLP tools have found groups of nearly identical resources.
KPIReport	DKN performance metrics are included in management reports.

Section 4: Business Process Model

Fig: Business Process Model (DKN).

4.1 Overview

The "Upload, Tag, and Validate Knowledge Resource" end-to-end workflow in the Digital Knowledge Network (DKN) is described by the business process model. It demonstrates how coordinated efforts between contributors, the system, and the Knowledge Governance Council turn a single consultant's artifact into an authorized, reusable knowledge resource. By enforcing quality and compliance and allowing consultants to swiftly locate reliable content for projects and onboarding, this procedure directly supports Project's objectives.

4.2 Swimlanes and Responsibilities

Expert Contributor, DKN System, Governance Council Member, and Consultant are the four swimlanes that make up the diagram. Finding a reusable artifact, uploading it, improving the metadata, and submitting a draft for evaluation are all included in the Expert

Contributor Lane. Automated checks including file validation, NLP tagging, draft creation, routing to governance, publishing authorized material, and updating audit/KPI data are displayed in the DKN System Lane. Opening the validation queue, assessing quality, relevance, and regulatory compliance, and reaching one of three decisions approve, request adjustments, or reject are all captured by the Governance Council Member Lane. Lastly, Consultant Lane demonstrates how authorized resources are subsequently found by search or browse and utilized in client work, reducing duplication and expediting the onboarding process.

4.3 Main flow and decision logic

In a typical workflow, the expert uploads the artifact, the system enriches and validates it, and the council approves it. The system then publishes the resource and updates KPIs before consultants utilize it again. Three labelled branches make up the decision node in the governance lane: Request Changes loops back to the Expert Contributor's "Refine suggested metadata / Submit draft for validation" stages, Approve flows to publishing, and Reject ends the process for that draft.

Section 5: Type Model

5.1 Overview

The preceding Business Concepts are refined into more implementation-focused classes by the Type Model, which could be utilized in a component-based DKN solution. Clearer identifiers, data types, and the distinction between domain entities and supporting types like enums or value objects are added while maintaining the same fundamental concepts. As mandated by the marking guide, this section also contains a brief audit table that demonstrates how the Business Concept Model was transformed into the Type Model.
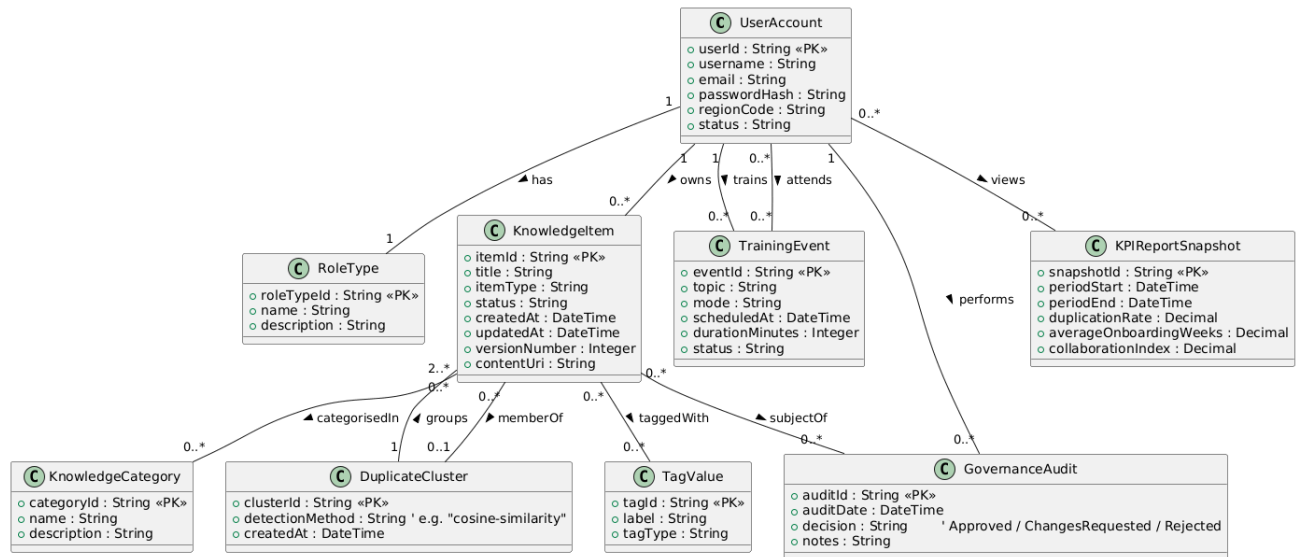

Fig: Type Model Class Diagram

5.2 Type Model Classes

1. **UserAccount**: Technical representation of a DKN user that is utilized as an owner or participant in other entities and has attributes including userId, username, email, passwordHash, regionCode, and status. It is connected to a RoleType.
2. **RoleType**: Lookup classes that are used for authorization include Consultant, ExpertContributor, KnowledgeSupervisor, SystemAdmin, GovernanceCouncilMember, and TopManager.
3. **KnowledgeItem**: An implementation-focused version of KnowledgeResource that stores artifacts in the repository with itemId, title, itemType, status, createdAt, updatedAt, ownerId, contentUri, and versionNumber.
4. **KnowledgeCategory**: For browsing and reporting, a category type with categoryId, name, and description is linked many-to-many with KnowledgeItem.

5. **TagValue**: Each KnowledgeItem has numerous metadata values attached to it via the tag type with tagId, label, and tagType.
6. **TrainingEvent**: EventId, topic, mode, scheduledAt, durationMinutes, and status are all included in this comprehensive training session, which is linked to a single trainer (UserAccount) and numerous participants.
7. **GovernanceAudit**: To preserve a transparent governance trail, a detailed audit record that stores auditId, auditDate, decision, notes, reviewerId, and itemId.
8. **DuplicateCluster**: Implementation of DuplicateGroup that groups two or more KnowledgeItem records that have been identified as duplicates using clusterId, detectionMethod, and createdAt.
9. **KPIReportSnapshot**: Stored KPIReport including snapshotId, periodStart, periodEnd, duplicationRate, averageOnboardingWeeks, collaborationIndex, and createdBy and createdAt.

5.3 Audit table: refactoring from Business Concepts to Type Model

Business Concept class	Type Model class	Refactoring / change made
User	UserAccount	Technical characteristics (username, passwordHash, status, and regionCode) were added, and the name was changed to highlight the login and account focus.
Role	RoleType	Refined into a type/lookup table with authorized roles.
KnowledgeResource	KnowledgeItem	To better facilitate repository implementation, the name was changed and expanded with contentUri and versionNumber.
Category	KnowledgeCategory	The structure remained the same, but the term was changed to make it clear that it classifies knowledge pieces.

Business Concept class	Type Model class	Refactoring / change made
Tag	TagValue	To differentiate between various types of tags, they were renamed and expanded with tagType.
TrainingSession	TrainingEvent	More scheduling attributes, including durationMinutes and status, were added and the name was changed.
AuditRecord	GovernanceAudit	For improved traceability, it was renamed and expanded with reviewerId and itemId foreign keys.
DuplicateGroup	DuplicateCluster	To accommodate various NLP techniques over time, it was renamed, given detectionMethod, and createdAt.
KPIReport	KPIReportSnapshot	The structure is in line with the reporting implementation; the name has been changed to reflect a stored snapshot.

Section 6: Component Specifications

6.1 Business rules

1. **Unique IDs**: There is a unique identification for each UserAccount, KnowledgeItem, KnowledgeCategory, TagValue, TrainingEvent, GovernanceAudit, DuplicateCluster, and KPIReportSnapshot.
2. **Single owner**: There is only one UserAccount that owns each KnowledgeItem.
3. **Approval before publish**: Only when there is at least one GovernanceAudit with the decision "Approved" for that item is the status "Published" permitted.
4. **Duplicate clusters**: Two or more KnowledgeItems must be referenced by a DuplicateCluster.
5. **Role permissions**
    *   Knowledge items can only be uploaded or modified by KnowledgeSupervisor or ExpertContributor.
    *   Decisions about Governance Audits can only be made by members of the Governance Council.
    *   KPIReportSnapshots can only be created by TopManager.
6. **Training completion**: Only when a trainer and at least one participant are documented can a training event be considered "completed."
7. **Regional access**: Only KnowledgeItems whose regionCode matches the user's area and data-localization rules may be seen.

6.2 System Interfaces

Interface	Component	Key operations	Purpose
IKnowledgeRepository	Knowledge Management	searchItems(), getItem(), createDraft(), updateItem(), publishItem()	CRUD and publish flow for KnowledgeItem.
IMetadataService	Metadata & NLP	suggestTags(), suggestCategories(), detectDuplicates()	NLP tagging, categorisation, duplicate detection.

Interface	Component	Key operations	Purpose
IGovernanceService	Governance	getPendingAudits(), recordDecision(), getAuditHistory()	Support GovernanceAudit workflow.
ITrainingService	Training & Adoption	requestTraining(), scheduleEvent(), recordAttendance()	Manage TrainingEvent and adoption activities.
IUserAccessService	Identity & Access	authenticate(), getUserProfile(), checkPermission()	Login and role-based access control.
IKPIReportingService	Analytics & Reporting	generateSnapshot(), getSnapshot()	Create and read KPIReportSnapshot for managers.

Section 7: Component Architecture

7.1 Component Architecture

The diagram shows the high-level component architecture of the Digital Knowledge Network (DKN). The Web Client talks to an API Gateway, which routes requests to back-end components for identity and access, knowledge management, metadata/NLP, governance, training and analytics, all persisting to the shared DKN database. Each component exposes a clear service interface (for example IUserAccessService or IKnowledgeRepository) so that communication is strictly via well-defined contracts
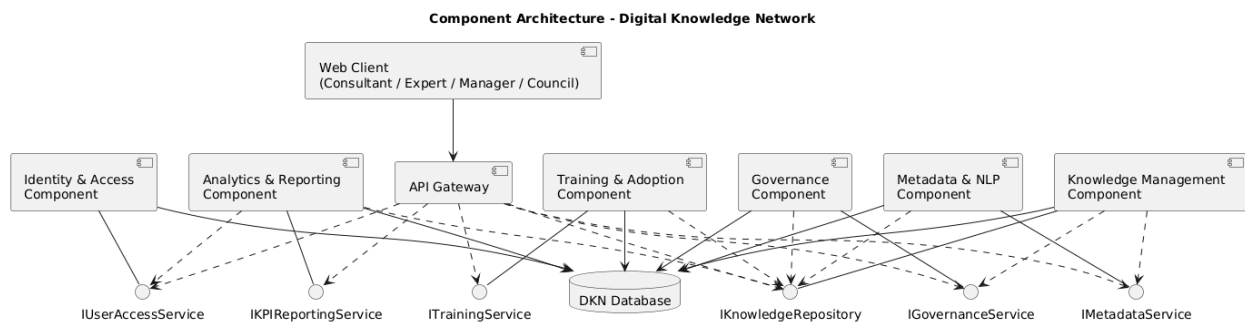

Fig : Component Architecture – Digital Knowledge

7.2 Interaction diagrams

7.2.1 Search knowledge resources

The image shows how various components interact while a consultant looks for knowledge resources. The Web Client contacts the API Gateway, which uses the Identity & Access component to verify permissions before assigning the task of querying KnowledgeItem data in the database to the Knowledge Management component. The client receives a list of resources that match the results via the gateway
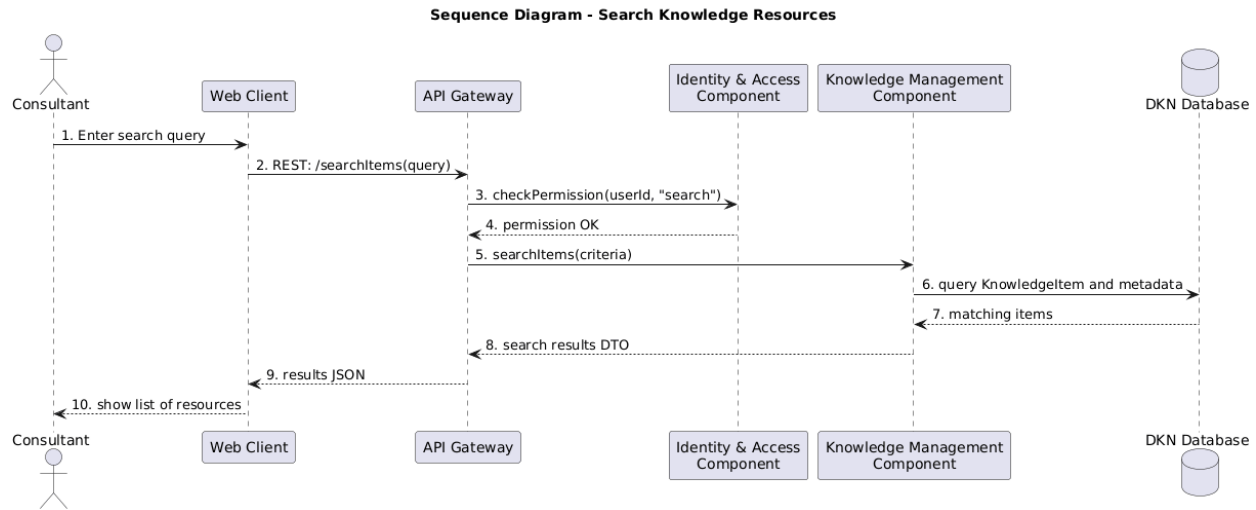
Sequence Diagram - Search Knowledge Resources

Fig: Sequence diagram – Search for knowledge resources via the DKN components.

7.2.2 Upload and validate knowledge resources

The component-level interaction for uploading and verifying a new knowledge resource is depicted in the diagram. Using the Knowledge Management component to generate a draft item and the Metadata & NLP component to enhance it with recommended tags and duplicate checks, the expert contributor uploads content using the Web Client and API Gateway. The draft is subsequently sent to the Governance component, where a council member enters an approval decision. Knowledge Management then publishes the item in the database so that other users can access it.
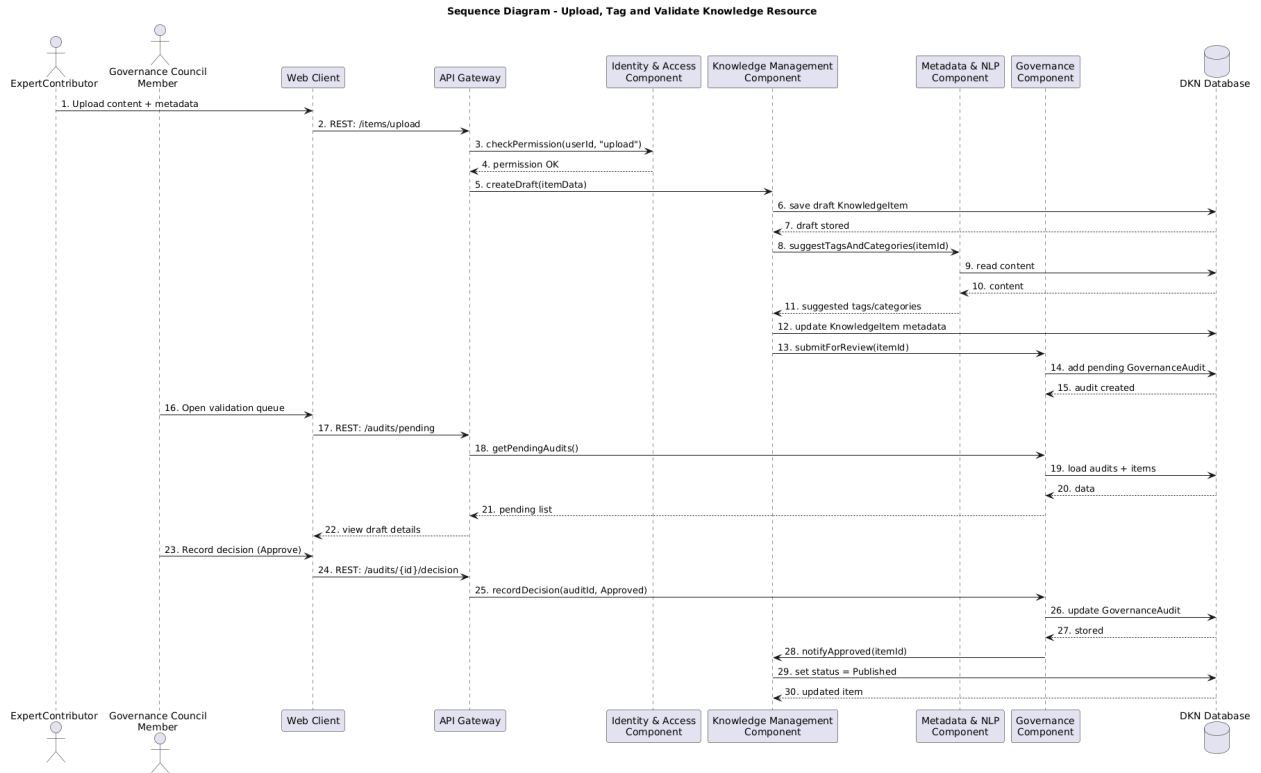
Sequence Diagram - Upload, Tag and Validate Knowledge Resource

Fig: Sequence Diagram – Upload, Tag and Validate Knowledge Resource

References

Visual Paradigm, "What is Use Case Diagram?" 2024. Available at: https://www.visual-paradigm.com/guide/uml-unified-modeling-language/what-is-use-case-diagram/

ProcedureFlow, "How Knowledge Management and Organizational Learning Build Success," 2025. Available at: https://blog.procedureflow.com/knowledge-management/knowledge-management-organizational-learning

Visual Paradigm, "Using BPMN Pool and Lane in Business Process Diagram," 2013. Available at: https://knowhow.visual-paradigm.com/business-process-modeling/pool-and-lane/

Visual Paradigm, "Transforming a Class Diagram into an Entity-Relationship Diagram (ERD)," 2023. Available at: https://guides.visual-paradigm.com/transforming-a-class-diagram-into-an-entity-relationship-diagram-erd-for-effective-data-model

Microservices.io, "Pattern: API Gateway / Backends for Frontends," 2025. Available at: https://microservices.io/patterns/apigateway.html

Digital Workplace Group, "Why You Can't Manage Knowledge – and What to Do Instead," 2025. Available at: https://digitalworkplacegroup.com/why-you-cant-manage-knowledge-and-what-to-do-instead/

Freshworks, "12 Change Management Metrics & KPIs to Track in 2025," 2025. Available at: https://www.freshworks.com/change-management/metrics/