Integration and Test Plan

Deliverable D7.2

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V0.1	17.08.2026	Scope, application inventory and integration requirements drafted.	FhG
V0.2	25.09.2026	Testing framework: test levels, acceptance vocabulary, verification classes, test environments.	FhG
V0.3	25.09.2026	Aligned with D7.1: Level 2 target for the three Integration Units, requirement-to-test-case mapping for COL-API/SEM/AAI/INF, COL-DEP as test preconditions; all chapters completed.	FhG

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V0.5	30.09.2026	Aligned with the final D7.1 (V1.0): application roles and names, CKR-to-HDTO mapping in T3.4/D3.3, corrected ECHOES DOIs, AAI definition.	FhG
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Project Context

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Project website: https://colours-eccch.eu/

Project Coordinator: Daniele Ferdani - CNR ISPC daniele.ferdani@cnr.it

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COLOURS Consortium

No	Short Name	Institution Name	Country
1	CNR	CONSIGLIO NAZIONALE DELLE RICERCHE	Italy
2	FhG	FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV	Germany
3	FORTH	IDRYMA TECHNOLOGIAS KAI EREVNAS	Greece
4	NTNU	NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU	Norway
5	FBA	FUNDINGBOX ACCELERATOR SP ZOO	Poland
6	FBC	FUNDINGBOX COMMUNITIES SL	Spain
7	ECE	ERASMUS CENTRE FOR ENTREPRENEURSHIP BV	Netherlands
8	ZVKDS	JAVNI ZAVOD REPUBLIKE SLOVENIJE ZA VARSTVO KULTURNE DEDISCINE	Slovenia
9	BCS	Brakebusch Börries	Germany
10	GMB	GALERIA MESTA BRATISLAVY	Slovakia
11	MIC	MINISTERO DELLA CULTURA	Italy

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Executive Summary

This deliverable defines how the COLOURS Vertical Application will be integrated into the European Collaborative Cloud for Cultural Heritage (ECCCH) and how that integration will be tested, validated and released. It is the main output of Task 7.2 (Integration and Test Plan Development, lead FhG) and the verification counterpart of D7.1 (Interoperability Requirements Analysis, lead FORTH).

COLOURS integrates into ECCCH as a single Vertical Application (VA). Its ECCCH-facing surface consists of two data paths — user login brokered through the ECHOES AAI, and publication of semantic output from the Colour Knowledge Repository (CKR) into the ECCCH Knowledge Base through the KBMS APIs — registered with the ECHOES Integration Task Force (EITF) as three Integration Units: COLOURS Platform × AAI, CKR × Knowledge Base (via KBMS) and CKR × HDTO. Three further obligations carry no VA data: registration and re-validation with the EITF, user feedback to the central ECHOES survey endpoint, and an observability interface for the ECHOES analytics framework. **Level 2 (Strategic — semantic and technical federation with centralised authentication) is the target level for all three Integration Units.** Because the ECHOES interoperability levels are cumulative, verifying Level 2 includes verifying every Level 1 requirement.

The plan verifies the 39 interoperability requirements of D7.1 (COL-API, COL-SEM, COL-AAI, COL-INF) and treats the 12 dependencies of the VA on ECCCH capabilities (COL-DEP) as test preconditions. It defines a four-level testing framework — application smoke tests, platform integration tests, ECCCH interface tests and end-to-end scenarios — complemented by operational verification; one test case per requirement, each with a verification class, an acceptance criterion expressed in the evaluation dimensions of ECHOES D9.1 and its precondition; three acceptance gates; a methodology aligned with the six-step EITF workflow; a schedule across WP8 (M13–M24) and WP9 (M25–M33); and the release, monitoring and re-validation procedures of the integration phase.

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1. Introduction

Purpose

The purpose of this deliverable is to define a repeatable integration and testing process that ensures that COLOURS applications and related resources are technically functional, documented, accessible, and prepared for deployment in alignment with ECHOES-ECCCH requirements. The plan translates the ECHOES Integration Strategy and Integration Roadmap into a COLOURS-specific testing and validation methodology.

D7.2 is the main output of Task 7.2 "Integration and Test Plan Development" (lead FhG; contributors FORTH, NTNU, CNR; M7–M12) of Work Package 7 (ECHOES-ECCCH Interoperability & Integration: Requirements & Planning, lead FORTH). It turns the requirements of D7.1 into test cases, acceptance criteria and a step-by-step integration procedure. Together with D7.1 and the other M12 deliverables it verifies milestone MS2 "Requirements, tech adaptation and exploitation strategy", and it prepares the semantic adaptation and cloud implementation phase (WP8, M13–M24) and the deployment and validation phase (WP9, M25–M33).

Scope

This deliverable covers the integration and testing of the COLOURS Vertical Application against the ECHOES-ECCCH Cloud: the COLOURS Platform (the evolution of the PERCEIVE Platform) as the runtime of the VA, including its portal, OAuth 2.0/RBAC layer, Platform API, orchestrator and worker fabric, which is tested against its own contract; the Colour Knowledge Repository (InvenioRDM, Virtuoso) and its publication component, the only COLOURS component that writes to ECCCH; the three Integration Units and the Level 2 requirements mapped to them; the COLOURS applications in their role inside the VA, including the ATON-based Collaborative Simulation Environment; the VA-wide operational requirements for deployment, logging, observability, monitoring and re-validation; and the user-feedback trigger of the COLOURS Portal (COL-API-12). Several aspects are deliberately left outside the current integration cycle. Level 3 targets, including SHACL shapes and a persistent RDF query endpoint (COL-SEM-08), are tested only if Level 3 is claimed for a semantic artefact, and a COLOURS-hosted public SPARQL endpoint is not registered as an integration point in EITF integration cycle 4 (starting October 2026, D7.1). No COLOURS API is exposed to ECCCH in this cycle, so the corresponding test cases are defined but dormant. Alignment of the COLOURS orchestrator with the ECCCH execution plane and use

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of the ECCCH storage plane follow only once ECHOES opens them for integration, and the internal architecture of the VA, including the choice of message broker, is not constrained by ECCCH (D7.1, "Scalability and hosting considerations"). Validation of the scientific quality of the application outputs is addressed by the internal and external validation activities of WP12 and WP13 rather than here. The testing and validation framework of WP12 (D12.1, M15) addresses the validation of the tools within the conservation workflow; D7.2 provides it with the integration status of each application (Gate A) and the end-to-end scenarios, which can be reused in T12.4 to assess the level of integration with the ECCCH.

Target Audience

- COLOURS application developers;
- technical partners and infrastructure providers;
- application and data owners;
- quality assurance and testing teams;
- pilot-site representatives;
- COLOURS work package leaders;
- ECHOES cloud component providers;
- the ECHOES Integration Task Force;
- reviewers and European Commission representatives.

Relation to Other Deliverables

D7.2 draws on and feeds the following COLOURS and ECHOES deliverables:

Deliverable	Relation to D7.2
COLOURS D7.1	Defines the 39 requirements and the 12 dependencies (COL-DEP) verified by this plan; the COL-* identifiers are the traceability key.
COLOURS D2.1 / D2.2	Target communities from which the COLOURS VO role groups are derived (COL-AAI-04); needs of the collaborative environment, including traceability of interpretations.
COLOURS D3.1 / D3.2	Specifications of the restoration, predictive and simulation tools; basis of the application inventory and of the smoke tests.
COLOURS D3.3 (M18)	Knowledge Repository Design and HDT Mapping (T3.4): documents the CKR-to-HDTO mapping (COL-SEM-04) verified through COL-IU-HDTO, adopting the COLOURS HDTs defined in WP8 (T8.1).
COLOURS D5.1 / D5.2	Colour-management information that must travel with outputs as paradata (COL-SEM-06); used in test data.
COLOURS D1.1 / D1.2	Internal review procedure; data management obligations reflected in the release checklist.

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Deliverable	Relation to D7.2
COLOURS D8.1 (M24)	Receives the status of each Integration Unit and any open gaps at the end of WP8.
COLOURS D9.1 (M33)	Receives the release, monitoring and validation records of WP9.
COLOURS WP12 / WP13	Functional and scientific validation of the tools; D7.2 covers integration testing only.
ECHOES D3.1 / D3.2	Integration Units, integration levels, six-step workflow and integration cycles.
ECHOES D6.2	Requirement catalogue, MoSCoW gating per level, verification classes.
ECHOES D6.3	Architecture baseline: KBMS API, AEM, KBMS, HDT lifecycle.
ECHOES D8.1	Concepts for Vertical Applications; reference applications (OCRA, VTL, CIT).
ECHOES D9.1	Evaluation dimensions used as acceptance vocabulary.

Structure of the Deliverable

After this introduction, the chapter Terminology and Reference Framework fixes the vocabulary, reference documents and standards baseline. COLOURS Integration Scope describes the Vertical Application, the application inventory, the three Integration Units and the target integration level. Integration Governance and Responsibilities assigns roles. Testing Framework defines test levels, acceptance vocabulary, verification classes, environments, test data and end-to-end scenarios, and Validation Protocols maps every D7.1 requirement to a test case and defines the acceptance gates. Step-by-Step Integration Methodology aligns the work with the EITF workflow; it is followed by the Integration and Testing Schedule, Deployment and Operational Readiness, and Monitoring and Reporting, including the risks of the integration phase. The Conclusions summarise the plan.

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2. Terminology and Reference Framework

Definitions

Term	Definition used in this deliverable
ECCCH	European Collaborative Cloud for Cultural Heritage, built by the ECHOES project (GA 101157364).
ECHOES	The Horizon Europe project building the ECCCH; COLOURS is one of its sister projects.
EITF	ECHOES Integration Task Force; coordinates the integration of sister-project outputs and tracks it as GitHub issues (project → resource → Integration Unit).
Vertical Application (VA)	Partner-owned application in the ECCCH Application Layer, integrated as a black box behind platform-facing contracts (ECHOES D6.3, D8.1). COLOURS is integrated as one VA.
COLOURS Platform	Runtime of the COLOURS VA, evolved from the PERCEIVE Platform: portal, OAuth 2.0/RBAC, Platform API, orchestrator and workers.
COLOURS application	Software resource developed or adapted in COLOURS and run inside the VA (see Application Inventory).
CKR	Colour Knowledge Repository (InvenioRDM, Virtuoso); the interoperability node of the VA and the only COLOURS component that writes to ECCCH.
CSE	Collaborative Simulation Environment, based on ATON (WP4).
Integration Unit (IU)	Pair {resource, ECHOES cloud component} registered with the EITF; the unit for which a target level is agreed and validation is tracked.
IU adopter / IU provider	Technical contact on the sister-project side / on the ECHOES component side, jointly responsible for implementing and validating an IU (EITF steps 3–4).
Integration level	L1 Tactical, L2 Strategic, L3 Transformational (ECHOES D6.2); cumulative.
Cloud component	ECHOES capability available for integration, e.g. AAI, SEP, Knowledge Base/KBMS, Storage Registry/Data API; the HDTO is treated as a component.
AAI	ECHOES Authentication and Authorization Infrastructure (EGI Check-in / RCIAM), OIDC-based; manages identity, authentication and VO/group entitlements. Authorisation over ECCCH-governed resources is resolved by the platform control plane and domain services.
SEP / KBMS API	Single Entry Point, the common access boundary of ECCCH; its Integration API exposes the platform-facing contracts through which VAs reach cloud capabilities.
AEM	Access-Entitlement Mapper; resolves rights, targets and quota context for platform-facing requests.
KBMS	Knowledge Base Management System; governs semantic writes and publication to the Knowledge Base.

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Term	Definition used in this deliverable
HDTO	Heritage Digital Twin Ontology, based on CIDOC-CRM, CRMdig and CRMinf.
Digital twin / Heritage Digital Twin	Digital counterpart of a heritage object; in the HDTO, HC1 Heritage Entity and HC2 Heritage Digital Twin.
Proposition Set	CRMinf-based construct recording tool predictions as attributable statements with provenance.
SHACL	W3C Shapes Constraint Language for validating RDF graphs; Level 3 in COLOURS.
Metadata / paradata	Descriptive data about a resource / data about the process that produced it (software version, parameters, calibration, operator, timestamps, inputs).
COL-* requirement	Interoperability requirement of D7.1 (COL-API, COL-SEM, COL-AAI, COL-INF), each with minimum level, priority and verification method.
COL-DEP	Dependency of the COLOURS VA on an ECCCH capability (D7.1); used as test precondition.
Verification	Checking that a requirement is met: static, dynamic, operational or manual audit (ECHOES D6.2).
Validation	Joint acceptance of an IU by adopter and provider in the target environment (EITF step 4).
Acceptance criterion	Observable condition under which a test case passes, expressed in the evaluation dimensions of ECHOES D9.1.
Deployment readiness	State in which a versioned, documented release satisfies the release checklist (Gate C).
Test environment	Dev, Staging, ECCCH integration environment or Production (see Testing Framework).

Reference Documents

Reference	Relevance to D7.2
ECHOES D3.1 Integration Strategy (10.5281/zenodo.17751334)	Integration principles, Integration Units, integration levels, expectations for sister projects
ECHOES D3.2 Integration Roadmap (10.5281/zenodo.17751669)	Six-step integration workflow and integration cycles
ECHOES D6.2 Interoperability Requirements and Guidelines (10.5281/zenodo.18656367)	Requirement catalogue, MoSCoW gating per level, verification classes
ECHOES D6.3 Architecture for Data and Cloud Components (10.5281/zenodo.20444205)	Architecture baseline; KBMS API, AEM, KBMS; HDT lifecycle
ECHOES D8.1 Concepts for Vertical Applications (10.5281/zenodo.20447313)	Vertical Application pattern and reference applications

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Reference	Relevance to D7.2
ECHOES D9.1 Evaluation Framework (10.5281/zenodo.20448152)	Evaluation dimensions used as acceptance vocabulary
ECHOES D7.1 The Digital Commons: Heritage Digital Twin Ontology (10.5281/zenodo.20445937); HDTO v1.1	Semantic target model of the CKR mapping
EITF Integration Handbook and tracking tool (github.com/ECHOES-ECCCH-TECHNICAL/integration-task-force)	Registration and status tracking of resources and Integration Units
COLOURS D7.1 Interoperability Requirements Analysis	Requirements COL-*, dependencies COL-DEP, VA architecture
COLOURS D1.1 Quality Management Plan; D1.2 Data Management Plan	Review procedure; data management, access and preservation obligations
COLOURS D2.1, D2.2, D3.1, D3.2, D5.1, D5.2	User needs, tool specifications, colour-management protocols
PERCEIVE Platform documentation (perceive.ics.forth.gr/docs)	Platform API, worker architecture, authentication and RBAC
PERCEIVE D5.1 Platform Specifications v1.0 (10.5281/zenodo.16903587); PERCEIVE D5.2 PERCEIVE Platform v2.0 (10.5281/zenodo.19366551)	Architecture, hosting model and scalability KPIs of the platform continued as the COLOURS Platform
OWASP, GDPR, WCAG	Security, data protection and accessibility requirements for user-facing applications

Applicable Standards Baseline

- HTTP/HTTPS and TLS;
- REST and OpenAPI specifications;
- JSON and JSON-LD for metadata and semantic exchange; RDF where Level 3 is claimed;
- persistent and resolvable identifiers;
- FAIR principles;
- basic metadata and provenance requirements;
- software versioning and release management;
- open-source and content licensing;
- container or virtual machine deployment specifications;
- OWASP application security guidance;
- GDPR requirements;
- Web Content Accessibility Guidelines, where applicable;
- OAuth 2.0 and OpenID Connect for authentication through the ECHOES AAI;
- SHACL for RDF validation where Level 3 is claimed;

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- ORCID and ROR as persistent identifiers for people and organisations;
- OpenTelemetry (OTLP) for logs, metrics and traces;
- OCI container images for deployable artefacts;
- ECHOES-ECCCH interoperability requirements.

3. COLOURS Integration Scope

Overview of the COLOURS Applications

COLOURS develops nine applications supporting the analysis, documentation, conservation, digital restoration, and presentation of coloured cultural heritage collections. These applications constitute the primary software resources covered by the D7.2 integration and testing plan.

COLOURS integrates into ECCCH as a single Vertical Application. The individual applications do not have an interface to ECCCH of their own: they run inside the VA as platform-managed workers or as standalone web applications, authenticate through the COLOURS Platform, and deliver their outputs, metadata and paradata to the CKR through the COLOURS Platform API. They are therefore tested against the COLOURS Platform (test levels T0 and T1), while the ECCCH-facing tests (T2) address the Platform and the CKR. An application is included in a release of the VA once it has passed the Application Readiness Checklist (Gate A).

The application inventory is presented below.

COLOURS Application Inventory

ID	Application	Short description	Responsible partner	Technical contact
COL-APP-01	doLCE 2.0	doLCE 2.0 reconstructs colour from digitised lenticular films, such as early Kodacolor. Building on work from the PERCEIVE project, it combines image processing with user-guided adjustments to help film archives and collectors recover and display the colour recorded in these historical films.	NTNU	Giorgio Trumpy
COL-APP-02	Light Damage	Application that predicts the light-induced colour change of coloured 2D	FORTH	Panagiotis Siozos

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	Estimator (LDE)	cultural heritage surfaces. It supports conservators and museum experts in planning safe display and lighting conditions.		
COL-APP-03	VarnishLab (Varnish Removal / Revarnish Tool)	VarnishLab virtually removes old, discoloured varnishes and reapplies fresh varnishes on digitised paintings. Using physics-based models, it allows conservators to explore how different treatments could affect a painting's colour and appearance, supporting decisions before physical intervention.	NTNU	Giorgio Trumpy
COL-APP-04	Neg2Pos (Negative to Positive Tool)	Neg2Pos converts digitised colour negatives into positive images, aiming to reproduce the colour, contrast and tonal qualities of traditional analogue photography printing and film projection. It supports film archives, restoration professionals and private collectors in preserving the aesthetics of photochemical images.	NTNU	Giorgio Trumpy
COL-APP-05	StyleShade3D	AI-assisted application for the semantification of 3D cultural heritage assets. The application supports the enrichment of 3D cultural heritage data with structured semantic information.	FhG	Julius Kühn
COL-APP-06	ATON Framework / Collaborative Simulation Environment	Web-based environment for the interactive presentation and exploration of 3D cultural heritage assets. Within COLOURS it provides the Collaborative Simulation Environment (WP4), a standalone web application that accesses CKR data and communicates with the other COLOURS tools and services via REST APIs.	CNR	Bruno Fanini

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COL-APP-07	MuLaX	MuLaX (Multi-Layer eXtensible eXplorer) is a Web3D/WebXR application based on ATON that allows the inspection of multi-layered 2D/3D collections enriched with diagnostic and analytical data.	CNR	Bruno Fanini
COL-APP-08	Degreening Tool	Web based tool, which enables the user to repair greening defects in digitized autochrome colour photography.	FhG	Julius Kühn
COL-APP-09	CoDesign Tool	Web version of the collaborative ideation game integrated in the COLOURS environment, using the Platform authentication.	CNR, FhG	Manuel Olbrich
COL-APP-10	Colour Knowledge Repository (CKR)	Research data repository for colour-related cultural heritage resources, developed in PERCEIVE and extended in COLOURS. Built on InvenioRDM with an E-RIHS-based metadata model, more than 60 resource types, REST API and a Virtuoso triplestore with SPARQL endpoint. Receives outputs, metadata and paradata of all COLOURS tools via the COLOURS Platform API.	FORTH	Marios Pitikakis

Role in the VA (D7.1, Table 6): the Light Damage Estimator, doLCE 2.0, degreening tool and the new Neg2Pos and VarnishLab run as platform-managed workers (cloud microservices) and push their outputs and paradata to the CKR through the COLOURS Platform API. StyleShade3D is a standalone web application, containerised within the VA. The Collaborative Simulation Environment (WP4), built on the ATON framework, is a standalone web application that accesses CKR data and communicates with the other COLOURS tools and services via REST APIs; MuLaX is a standalone ATON-based web application. The web version of the CoDesign Tool is a web application integrated in the COLOURS environment; its paper version is printable material outside the VA scope. All applications are accessed through the COLOURS Portal and rely on the Platform's authentication; none maintains a standalone user directory. The CKR is the repository and interoperability node rather than an application, and the only COLOURS component that publishes to ECCCH.

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Origin of the applications (D7.1, Table 6): the Light Damage Estimator, doLCE 2.0, StyleShade3D, MuLaX, the Degreening Tool and the CoDesign Tool (developed by CNR ISPC and FhG IGD) derive from the PERCEIVE project, and the CKR is the extended PERCEIVE repository; ATON is an existing CNR framework on which the Collaborative Simulation Environment is developed in WP4; Neg2Pos and VarnishLab are new. The Degreening Tool is integrated and validated without further algorithmic development (D3.1).

Integration Units

Following ECHOES D3.1, an Integration Unit is a pair consisting of a resource and an ECHOES cloud component. In line with D7.1, the COLOURS VA is registered with the EITF as three Integration Units, all targeting Level 2:

IU	COLOURS resource ↔ ECHOES component	Interaction	Target	Requirements verified	Pre-conditions
COL-IU-AAI	COLOURS Platform ↔ AAI	OIDC login brokered by the Platform; COLOURS VO and role groups; entitlement-to-role mapping; fail-closed authorisation	L2	COL-AAI-01, -02, -03, -04, -07	COL-DEP-01, -02, -03
COL-IU-KB	CKR publication component ↔ Knowledge Base (KBMS API → AEM → KBMS)	Save and publish HDTs for published, public physical-object records; enrichment and re-publication as new versions; rejection handling; operation status	L2	COL-API-10; COL-SEM-01, -02, -06, -07, -09, -10; COL-AAI-06	COL-DEP-04, -05, -07 to -12
COL-IU-HDTO	CKR data model and mapping ↔ HDTO	Versioned CKR-to-HDTO mapping; HC1/HC2 entry points; Proposition Sets for tool predictions; JSON-LD output	L2 (L3 optional)	COL-SEM-03, -04, -05 (-08 if L3 is claimed)	COL-DEP-06

Requirements that apply to every integrated resource irrespective of the IU (VA-wide): COL-API-01, -07, -12, COL-AAI-05 and COL-INF-01 to -11. Among them, D7.1 identifies three obligations that carry no VA data: registration and re-validation with the EITF (COL-API-01, COL-INF-07, COL-INF-11), user feedback to the ECHOES survey endpoint (COL-API-12) and the observability interface for the ECHOES analytics framework (COL-INF-09). Requirements that apply only if a COLOURS API is later registered with the EITF: COL-API-02 to -06, -08 and -11. The storage-related parts of COL-API-10 and COL-INF-04 apply once the ECCCH storage plane is open for integration. Each of these extensions would be registered

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as an additional Integration Unit in a later cycle, and the dormant test cases would then be activated.

Application Readiness Checklist (Gate A)

Every application must satisfy the following conditions before it is included in a release of the COLOURS VA. Where a condition corresponds to a D7.1 requirement, the requirement itself is verified through the VA (e.g. COL-SEM-01 for descriptive metadata, COL-AAI-07 for the access model, COL-INF-07 for the incident contact).

Area	Condition
Identification	The application has a unique name and version
Ownership	A responsible partner, application owner, and technical contact are identified
Discoverability	Descriptive metadata sufficient for the CKR and for the EITF resource record is available
Accessibility	A stable and resolvable application, repository, release, or documentation URL is provided
Hosting	The authoritative hosting location and hosting responsibility are documented
Functionality	The application's core functions pass agreed smoke tests
Inputs and outputs	Supported input data, output data, and formats are documented
Documentation	Installation, access, and user instructions are available
Licensing	The software licence and relevant third-party licences are stated
Provenance	The application records or documents how outputs are generated
Security	HTTPS is used where applicable, and no unresolved critical security issue exists
Data protection	Personal or sensitive data handling is documented where applicable

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Maintenance	A maintainer, support contact, and intended support period are identified
Availability	The application can be reached from the COLOURS staging environment
Limitations	Dependencies, constraints, and known limitations are documented
Release	A versioned and approved application release is available

Target Integration Level

In line with the expectations for ECCCH sister projects expressed in ECHOES D3.1 and with D7.1, COLOURS targets **Level 2 (Strategic)** for all three Integration Units. Level 2 entails the MUST requirements of ECHOES D6.2 at that level: HDTO-aligned metadata in JSON-LD, versioned and machine-readable mappings, automatically generated and linked paradata, and authentication delegated to the ECHOES AAI. As the levels are cumulative, the Level 1 requirements of D7.1 (COL-API-01, COL-SEM-01, -02, COL-AAI-05, -07, COL-INF-07) are part of every Level 2 verification and are checked first. Level 3 is not targeted in the current cycle; if it is claimed for a semantic artefact, COL-SEM-08 (SHACL shapes, URI policy) becomes applicable.

4. Integration Governance and Responsibilities

Roles

The integration involves roles on the COLOURS side, on the ECHOES side and in the EITF process:

Role	Responsibility	Holder
Integration coordinator	Maintains this plan, the test-case register and the IU register; reports to WP8/WP9 and to the EITF	FhG
WP8 / WP9 lead	Owns execution of integration and deployment; decides gates	FORTH
IU adopter — COL-IU-AAI	Implements and co-validates the AAI integration (WP8, T8.2)	FORTH
IU adopter — COL-IU-KB	Implements and co-validates the KBMS publication component (WP8, T8.3)	FORTH
IU adopter — COL-IU-HDTO	Implements and co-validates the CKR-to-HDTO mapping (implemented in the CKR under T3.4 and documented in D3.3; COLOURS HDTs defined in WP8, T8.1)	FORTH

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Role	Responsibility	Holder
IU provider	Technical contact of the ECHOES component team	ECHOES (assigned by the EITF)
EITF representatives	Represent COLOURS in the EITF	FORTH
Application owner	Delivers the application, documentation and test data; runs T0; fixes defects	Partner per Application Inventory
Platform / CKR operator	Operates staging and production together with the hosting operators designated in D8.1; provides test identities, the publication identity and reference records	FORTH
CKR curators	Trigger publication of reviewed physical-object records (D7.1); act as test users for publication scenarios	CKR community curators
Test lead	Maintains test cases, runs T2 and T3 campaigns, records evidence	FhG
Test users	Execute end-to-end scenarios	Pilot partners via WP10/WP12
Security reviewer	Reviews secrets handling, TLS and logging before Gate C	Partner that does not operate the platform

Decision and Escalation

Integration decisions are taken in the monthly WP8 (later WP9) technical call; gate decisions are minuted. Conflicts between a COLOURS requirement and an ECCCH component contract are raised as comments on the corresponding IU issue and, if unresolved within one integration cycle, escalated by the EITF representatives to the EITF coordination team (integration@echoes-eccch.eu) and internally to the Project Management Board.

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5. Testing Framework

Test Levels

Level	Name	System under test	Against	Owner	When
T0	Application smoke test	Individual application	Its documented inputs and outputs	Application owner	Every application release
T1	Platform integration test	Application ↔ COLOURS Platform	Platform API contract: authentication, job submission (workers), CKR write including metadata and paradata	Application owner + platform team	Per application, WP8
T2	ECCCH interface test	COLOURS Platform / CKR ↔ ECCCH	AAI (OIDC); KBMS API → AEM → KBMS (save/publish HDT); HDTO mapping	Test lead + IU adopter + IU provider	Per IU, WP8
T3	End-to-end scenario	Whole VA in ECCCH context	User journeys (see End-to-End Scenarios)	Test lead + test users	Before Gate B and Gate C
T-OPS	Operational verification	Deployed VA	Logging, observability, monitoring, re-validation (COL-INF-07 to -11)	Platform operator + test lead	Staging from WP8; production in WP9

The split follows the VA boundary: T1 never involves ECCCH, T2 never involves an individual application, and only T3 crosses both.

Acceptance Vocabulary

Acceptance criteria use the evaluation dimensions of ECHOES D9.1 so that COLOURS results can be reported in the ECCCH assessment framework without translation:

- **Software:** performance, usability, reliability, maintainability, portability, interoperability;
- **Data, metadata and knowledge graph quality:** findability, accessibility, interoperability, reusability (FAIR), completeness, HDTO conformance;
- **Semantic:** correctness of mapping, vocabulary use, provenance/paradata completeness;
- **Infrastructure:** deployability, observability, security.

Verification classes (ECHOES D6.2)

- **Static** — inspection of artefacts (OpenAPI file, container image, documentation, configuration, SHACL shapes);

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- **Dynamic** — executed test against a running system (auth flow, API call, write to KBMS, catalogue resolution);
- **Operational** — observation over time in a deployed environment (uptime, error rate, latency, log samples);
- **Manual audit** — expert review (security review, licence review, accessibility walkthrough).

Test environments

Environment	Purpose	Contents
Dev	T0, developer T1	Tool + (mock of) Platform API
Staging	T1, T2 (COLOURS side), T3 rehearsals	Full COLOURS Platform + CKR staging instance, test tenant, test VO in AAI, CI runners
ECCCH integration environment	T2, T3	ECHOES-provided test instances
Production	Operational verification, monitoring	Released VA

The Dev environment is operated by each application owner, the Staging environment by FORTH-ICS, hosted on FhG infrastructure for the first instances, the ECCCH integration environment by ECHOES, and Production by the operators designated in D8.1. Availability of the ECCCH capabilities listed as COL-DEP-01 to COL-DEP-12 in D7.1 is a precondition for T2 and T3.

Test Data

- a reference CKR record set covering every state and event of the D7.1 mapping onto the HDT lifecycle: a draft, a published public physical-object record, an embargoed record, enriching records (raw analytical data, simulation data, a spectral protocol), a new version of a published record and a withdrawn record;
- one Light Damage Estimator prediction to be published as a Proposition Set (COL-SEM-05), with paradata including colour-management information according to D5.1/D5.2 (COL-SEM-06);
- no personal data; pilot data only in end-to-end scenarios and with the consent of the data owner (D1.2).

End-to-End Scenarios

ID	Scenario	Requirements
E2E-01	A conservator logs in through the ECHOES AAI, selects an application in the COLOURS Portal, runs it on a CKR asset and finds the result with paradata in the CKR.	COL-AAI-01, -02; T1

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ID	Scenario	Requirements
E2E-02	A CKR curator publishes a reviewed physical-object record; the CKR saves and publishes the HDT through the KBMS API; the operation status is retrieved; the HDT is discoverable in the Knowledge Base with HC1/HC2 typing.	COL-API-10; COL-SEM-01, -04, -10
E2E-03	A draft, an embargoed and a non-public record are never transmitted to ECCCH; the embargoed record is published after the embargo ends.	COL-SEM-10
E2E-04	A new version of a published record and an enriching record are propagated as a new released version of the same HDT lineage, with the superseded version referenced.	COL-SEM-02, -10
E2E-05	A record violating KBMS constraints is rejected; the rejection is surfaced to the curator and reconciled; nothing is silently discarded.	COL-SEM-09
E2E-06	A user without the required entitlement is refused at the correct layer; with the AAI unreachable, restricted COLOURS endpoints fail closed.	COL-AAI-03
E2E-07	A user opens the Collaborative Simulation Environment through the Portal, loads an asset from the CKR and saves annotations; they appear in the CKR with author, date and evidence (D2.2).	COL-AAI-01; COL-SEM-06
E2E-08	A user submits feedback through the Portal trigger; the consent notice is shown first; the submission reaches the ECHOES survey endpoint, pseudonymously if the user is authenticated.	COL-API-12

6. Validation Protocols

Test Case Format

Each test case records: identifier · verified requirement (level · priority) · Integration Unit or scope · test level · verification class · precondition (COL-DEP) · steps · acceptance criterion · D9.1 evaluation dimension · evidence to be recorded · severity if failed. The complete test cases are maintained as a living test-case register in the project repository; the table below gives the mapping and the abridged acceptance criteria.

Requirement-to-Test-Case Mapping

Every D7.1 requirement maps to exactly one test case (COL-API-09 is intentionally unassigned in D7.1). Scope: AAI, KB and HDTO denote the Integration Units COL-IU-AAI, COL-IU-KB and COL-IU-HDTO; VA denotes VA-wide requirements; dormant test cases become active when a COLOURS API is registered with the EITF (API) or Level 3 is claimed (SEM-08). Preconditions refer to the dependencies COL-DEP of D7.1.

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Several preconditions depend on information still pending from ECHOES (D7.1, Table 9): the publication identity (COL-DEP-04), the KBMS validation rules (COL-DEP-07), the working-state space, the storage plane, the ECCCH web interface (COL-DEP-02), the AAI role model (COL-DEP-03) and PID assignment (COL-DEP-09). Until an item is resolved, the affected test cases are executed against the working assumption of D7.1 and repeated against the resolved behaviour in the following integration cycle; the fallbacks defined in D7.1 serve as alternative acceptance paths.

Test case	Requirement · level · priority	Scope	Class	Acceptance criterion (abridged)	Pre-condition
TC-API-01	API-01 · L1 · M	VA	Static	Stable service identifier and description published in the EITF resource record and the platform documentation	—
TC-API-02	API-02 · L2 · M	dormant	Static	OpenAPI 3.x contract parses and covers every exposed path	API registered
TC-API-03	API-03 · L2 · M	dormant	Dynamic	Negative requests return documented status codes and a machine-readable error object	API registered
TC-API-04	API-04 · L2 · M	dormant	Static	Explicit versioning; changelog and deprecation policy published	API registered
TC-API-05	API-05 · L2 · M	dormant	Dynamic	Collection endpoints paginate as documented	API registered
TC-API-06	API-06 · L2 · S	dormant	Dynamic	Filtering and sorting behave as documented where implemented	API registered
TC-API-07	API-07 · L2 · M	VA	Dynamic	/health and /ready respond with correct semantics in staging and production	—
TC-API-08	API-08 · L2 · S	dormant	Dynamic	Deployed version retrievable via /version or runtime metadata	API registered
TC-API-10	API-10 · L2 · M	KB	Dynamic, static	Call traces show semantic output written only via KBMS API → KBMS; no storage or repository target in code or configuration; asset writes tested once the storage plane opens	DEP-05, -12
TC-API-11	API-11 · L2 · S	dormant	Static	Rate-limit, request-size and timeout policies documented and configured	API registered
TC-API-12	API-12 · L2 · M	VA	Manual audit	Visible trigger; consent notice before capture; quick review with opt-in questionnaire; network trace to the ECHOES survey endpoint; pseudonymous ID if authenticated, anonymous as guest	ECHOES survey endpoint (PSNC)
TC-SEM-01	SEM-01 · L1 · M	KB	Static	Every published record carries title, description, provider/owner, contact point, licence, version/last-modified date	DEP-11
TC-SEM-02	SEM-02 · L1 · M	KB	Static, dynamic	Globally unique, stable identifier resolves; supersession expressed explicitly	DEP-09, -10

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Test case	Requirement · level · priority	Scope	Class	Acceptance criterion (abridged)	Pre-condition
TC-SEM-03	SEM-03 · L2 · M	HDTO	Static, dynamic	JSON-LD produced, or a deterministic transformation yields identical output on repeated runs; schema/profile declared; @context resolvable and versioned	—
TC-SEM-04	SEM-04 · L2 · M	HDTO	Static	Versioned, machine-readable mapping artefact referencing CKR schema and HDTO versions; HC1/HC2 entry points used; controlled-vocabulary IDs stable and dereferenceable; language tags present	DEP-06
TC-SEM-05	SEM-05 · L2 · M	HDTO	Static	LDE prediction recorded as Proposition Set within HC2; paradata machine-readable and separable	DEP-06
TC-SEM-06	SEM-06 · L2 · M	KB	Static	Every derived artefact carries software version, parameters, calibration, operator (ORCID or pseudonymous), timestamp and source inputs	DEP-08
TC-SEM-07	SEM-07 · L2 · M	KB	Static	ORCID/ROR used where available; licence attachable to every dataset	—
TC-SEM-08	SEM-08 · L3 · M	dormant	Static	SHACL shapes provided; validation report passes; URI deprecation policy published	L3 claimed
TC-SEM-09	SEM-09 · L2 · M	KB	Dynamic	Valid set accepted by KBMS; negative fixtures rejected; rejection or partial acceptance surfaced and reconciled, none silently discarded	DEP-07, -12
TC-SEM-10	SEM-10 · L2 · M	KB	Static, dynamic	Each state and event of the D7.1 CKR-to-HDT mapping behaves as specified: drafts, embargoed and non-public records not transmitted; published public physical object → HDT; re-publication → new version in the same lineage, no new HDT, no overwrite	DEP-05, -10
TC-AAI-01	AAI-01 · L2 · M	AAI	Dynamic	OIDC flow against the ECHOES AAI completes; tokens with wrong issuer, audience, expiry or signature rejected	DEP-01, -02
TC-AAI-02	AAI-02 · L2 · M	AAI	Static, dynamic	Entitlement-to-role mapping documented; a group change in the AAI changes the COLOURS role at next login; no competing user directory in production	DEP-03
TC-AAI-03	AAI-03 · L2 · M	AAI	Static, dynamic	All restricted endpoints enforce authorisation with no bypass route; fail closed when AAI or entitlements are unavailable; ECCCH-governed operations decided by ECCCH	DEP-03
TC-AAI-04	AAI-04 · L2 · M	AAI	Static	COLOURS VO and role groups (derived from the D2.1 target communities) configured in the AAI	DEP-03
TC-AAI-05	AAI-05 · L1 · M	VA	Dynamic	CI secret scan clean; TLS enforced on all network services	—

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Test case	Requirement · level · priority	Scope	Class	Acceptance criterion (abridged)	Pre-condition
TC-AAI-06	AAI-06 · L2 · M	KB	Static, dynamic	Publication component uses the identity KBMS requires; if a service identity: registered, least-privilege, VO-scoped client credentials, externalised, rotation exercised	DEP-04 (open)
TC-AAI-07	AAI-07 · L1 · M	AAI	Static, dynamic	Endpoint inventory classifies public/restricted/internal endpoints with their authentication mechanism; unauthenticated calls to restricted endpoints refused	—
TC-INF-01	INF-01 · L2 · M	VA	Static	Runbook lets a second operator reproduce the runtime; configuration and secrets externalised and rotatable	—
TC-INF-02	INF-02 · L2 · M	VA	Static, dynamic	Scripted deployment recreates staging from a clean host; published artefacts versioned and immutable	—
TC-INF-03	INF-03 · L2 · S	VA	Static	Shared services and workers delivered as container images	—
TC-INF-04	INF-04 · L2 · M	VA	Static, dynamic	NextCloud not used as ECCCH storage target; binaries referenced from published records served via stable public URLs; Data API resolution tested once the storage plane opens	—
TC-INF-05	INF-05 · L2 · S	VA	Dynamic	InvenioRDM metadata URLs stable, versioned, paginated and filterable	—
TC-INF-06	INF-06 · L2 · M	VA	Static, dynamic	Backup and recovery exercised once; KBMS unavailability handled without data loss	—
TC-INF-07	INF-07 · L1 · M	VA	Static	Logging policy in place; log samples free of secrets and tokens; responsible party and incident contact declared to the EITF	—
TC-INF-08	INF-08 · L2 · M	VA	Operational	One publication traceable end-to-end via correlation ID across Platform, CKR and publication component	—
TC-INF-09	INF-09 · L2 · M	VA	Operational	OTLP endpoint reachable by the ECHOES analytics framework, or verified access grant	ECHOES analytics framework
TC-INF-10	INF-10 · L2 · M	VA	Operational	Automated probes on /health and /ready; alert fires on an induced sustained failure	—
TC-INF-11	INF-11 · L2 · M	VA	Manual audit	Re-validation trigger process documented (major release, mapping/schema change, AAI/policy change); remediation or downgrade procedure defined	—

Severity and Pass Criteria

Severity	Definition	Consequence
S1 Blocking	A MUST requirement of the target level fails, or a security finding	Gate not passed

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Severity	Definition	Consequence
S2 Major	A SHOULD requirement fails, or a MUST fails only under non-default conditions	Gate passed with documented exception and fix date within the next phase
S3 Minor	Documentation or cosmetic issue	Recorded, no gate impact

A test case passes when all its acceptance criteria hold in the designated environment on two consecutive executions. Results are recorded with evidence (logs, traces, screenshots, validator output). Defects are raised in the COLOURS issue tracker with the test-case identifier; failures attributable to an ECCCH component are mirrored as comments on the corresponding IU issue in the EITF tracker.

Acceptance Gates

Gate	Scope	Entry criteria	Decision
A — Platform-ready	Per application	T0 and T1 passed; Application Readiness Checklist complete	WP8 lead
B — Level 2 validated	Per IU	All active MUST test cases of the IU passed, including the Level 1 requirements; no open S1; COL-DEP preconditions available	IU adopter + provider; EITF issue "validated"
C — Release-ready	VA	All three IUs at Gate B; VA-wide test cases passed; E2E-01 to E2E-08 passed; security review done; release checklist complete	WP9 lead + Project Coordinator; EITF issues "completed"

7. Step-by-Step Integration Methodology

The integration follows the six-step workflow of ECHOES D3.2 and the EITF. The table maps each step to COLOURS activities, artefacts, responsibilities and timing; the phases P0–P4 are defined in the schedule.

EITF step	COLOURS activities	Artefacts	Responsible	Timing
1 Candidate resource identification	Three IUs registered with the EITF at target Level 2 (D7.1); application resources registered as sub-issues of the COLOURS project issue	EITF issues; IU register	FhG with FORTH (EITF representatives)	WP7, P0
2 Interoperability self-assessment	Per IU: self-assessment against the Level 2 package of D6.2; availability of the COL-DEP capabilities confirmed with the provider; start and end dates agreed	Self-assessment per IU; gap list	IU adopters, EITF representatives	WP8, P1

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EITF step	COLOURS activities	Artefacts	Responsible	Timing
3 Technical onboarding	COL-IU-HDTO in T3.4 (CKR mapping, documented in D3.3) on the basis of the COLOURS HDTs of T8.1, COL-IU-AAI in T8.2, COL-IU-KB in T8.3; provider contact and test access obtained; implementation; T1 for each application as it reaches tight integration (Gate A)	Integration in staging; T1 and T2 results	IU adopters + providers; application owners	WP8, P1–P2
4 Integration validation	T2 suite of each IU run in the ECCCH integration environment; adopter and provider sign off (Gate B)	Test reports; EITF issue "validated"	Test lead, adopters, providers	WP8, P2
5 Release and monitoring	VA deployed to production; observability access for ECHOES (COL-INF-09); monitoring (COL-INF-10); re-validation triggers (COL-INF-11); Gate C	Release record; monitoring configuration; EITF issues "completed"	WP9 lead, platform operator	WP9, P3
6 User evaluation	End-to-end scenarios with pilot users; feedback through the Portal trigger (COL-API-12); results fed to WP12/WP13 and to the ECHOES evaluation	Evaluation results	WP9 with WP12/WP13	WP9, P4

Each application follows the same repeatable sequence: application description and test data delivered → T0 passed → containerised and registered with the orchestrator (platform-managed workers) or connected to the Platform authentication (standalone web applications) → T1 passed → Application Readiness Checklist complete → Gate A → included in the next VA release and in the end-to-end scenarios.

8. Integration and Testing Schedule

The COLOURS integration phases follow the work-package structure. COLOURS registered its three Integration Units for EITF integration cycle 4, which starts in October 2026 and thus coincides with the start of P1 (D7.1). The EITF integration cycles run until June 2027 and are followed by a roadmap review from July 2027 to November 2028; the mapping of P2–P4 to the later cycles is agreed with the EITF.

Phase	Period	Objectives	Gates / outputs
P0	M12 (Sep 2026)	D7.1 and D7.2 submitted; three IUs registered at Level 2; staging and ECCCH test access requested	MS2

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Phase	Period	Objectives	Gates / outputs
P1	M13–M18	Self-assessment per IU; AAI federation in staging; CKR-to-HDTO mapping of the reference record set (D3.3, M18); KBMS publication prototype; shared T1 suite; first applications through Gate A	Gate A (first applications)
P2	M19–M24	Remaining applications through Gate A; full T2 per IU; T-OPS in staging	Gate B for all three IUs; D8.1
P3	M25–M30	Production deployment; end-to-end scenarios; security review; monitoring live	Gate C
P4	M28–M33	User evaluation; re-validation cycle; residual gaps closed	D9.1

Test cadence: T1 and T2 regression in continuous integration on every release; a full T2 campaign at the end of P1 and P2; end-to-end scenarios as rehearsal at the end of P2 and as acceptance at the end of P3; T-OPS continuously from P2.

9. Deployment and Operational Readiness

Release Management

- semantic versioning for the Platform, the CKR, the publication component and every application; immutable, tagged container images in a registry; release notes per version (COL-INF-02);
- scripted deployment (infrastructure as code); staging and production built from the same definitions; environment-specific configuration and secrets externalised and rotatable (COL-INF-01);
- a VA release bundles pinned component versions; components pass T1 and T2 regression before inclusion;
- rollback: the previous VA release can be redeployed from the deployment scripts; publication to the Knowledge Base can be paused during a rollback;
- re-validation (COL-INF-11): every major release, schema or mapping change and every AAI or policy change triggers re-validation of the affected IUs with the EITF; on a critical conformance failure COLOURS provides a remediation plan or accepts a level downgrade.

Release Checklist (Gate C)

Application Readiness Checklist complete for every included application · all three IUs validated · VA-wide test cases passed · end-to-end scenarios passed · security review signed · licences and third-party notices published · user and operator documentation published · incident contact and responsible party registered with the EITF · data management obligations for CKR content met · data protection assessment for user data in the Platform completed.

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Hosting

The first cloud instances of the COLOURS Platform run on FhG infrastructure, as foreseen in the Grant Agreement; the ATON-based applications (ATON and MuLaX) already run on E-RIHS.it servers in Rome, in line with the temporary hosting on the E-RIHS.it infrastructure also foreseen in the Grant Agreement. Production hosting is decided in D8.1 among FhG, CNR and ECCCH-provided infrastructure, or a federation of them, once the ECCCH deployment model for Vertical Applications is defined. Hosting changes do not alter the ECCCH-facing interfaces and remain invisible to ECCCH as long as the every component authenticates through the COLOURS Platform and writes to the CKR through the Platform API, and the test cases of the Validation Protocols continue to pass.

Operational Readiness

Operator runbook; incident contact; backup and recovery exercised (TC-INF-06); capacity assumptions documented; dependency list with versions and upstream contacts for AAI, KBMS and SEP.

10. Monitoring and Reporting

Monitoring

Monitoring implements COL-INF-08 to COL-INF-10. The thresholds below are proposals and are calibrated in P1. The proposals are based on the results of the PERCEIVE platform as they were reported in PERCEIVE D5.2 (Performance & Scalability Validation).

Metric	Source	Threshold (proposed)
Availability of portal and Platform API	Health and readiness endpoints (COL-API-07), external probe	≥ 99 % per month in production
Error rate of ECCCH-facing calls (AAI, KBMS)	Structured logs (COL-INF-08)	< 1 % of calls; no open S1
Latency of the Platform API	Metrics endpoint	[p95 < 1s]
Pending publications CKR → Knowledge Base	Publication component, operation status (COL-DEP-12)	Alert when a curator-triggered publication is pending for more than 24 h
Worker job success rate	Orchestrator	≥ 95 %, excluding user input errors
Security	CI secret scan, image scan	No critical finding at release

Logs, metrics and traces are exposed to the ECHOES analytics framework via OpenTelemetry (OTLP) or an equivalent access grant (COL-INF-09). Performance benchmarking and stress testing of the deployed VA are carried out in T9.2 (M28–

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M33, phase P4) against the thresholds above, with load profiles derived from the Internal and External Pilots.

Reporting

- the test-case register and the IU register are maintained as living documents in the project repository and summarised monthly in the WP8/WP9 call;
- the status of each IU is mirrored in the EITF tracker (proposed → in progress → validated → completed), the reporting channel towards ECHOES;
- gate decisions are minuted; gates, open exceptions and monitoring baselines are reported in D8.1 (M24) and D9.1 (M33);
- user feedback collected through the Portal trigger (COL-API-12) is transmitted to the ECHOES survey endpoint and feeds EITF step 6;
- the integration status is reported to the Project Management Board in the internal progress reports (D1.1).

Risks of the Integration Phase

Risk	Impact	Mitigation
Identity required by KBMS for publication (COL-DEP-04) undecided	Design of the publication component; TC-AAI-06	Working assumption and fallback as in D7.1, Table 9: a registered service identity scoped to the COLOURS VO; otherwise a delegated user token, with publication run in the curator's session
ECCCH capabilities COL-DEP-01 to -12 not available or unstable when P1 starts	T2 blocked	Develop against documentation and mocks; escalate via the EITF; keep T0 and T1 independent of ECCCH
ECCCH storage or execution plane opened during the project	Additional requirements become applicable	Register an additional IU; activate the dormant test cases
COLOURS VO role groups not derivable from D2.1 in time	Gate B of COL-IU-AAI delayed	Start with a minimal role set; refine in P2
HDTO evolves during WP8	Rework of the mapping	Pin the HDTO version per phase; versioned mapping (COL-SEM-04); follow the HDTO working group
Application descriptions or test data delivered late	Gate A delayed	Shared T1 suite; escalation in the WP8 call
Level 2 not reached for an IU within WP8	Partial integration at M24	Documented exception in D8.1; closure in P3–P4
Updated LDE release not available when Gate A is assessed	LDE excluded from the first VA release	Release the existing LDE with the sRGB pathway as a versioned baseline; add additional capabilities and functions in a later release

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11. Conclusions

D7.2 turns the 39 requirements of D7.1 into one test case each and uses the 12 COL-DEP dependencies as explicit preconditions, so that every result can be traced from requirement to evidence. Because COLOURS integrates as a single Vertical Application whose ECCCH-facing data paths are limited to AAI login and KBMS publication, the ECCCH interface tests concentrate on three Integration Units, all targeting Level 2, while the nine applications are brought to tight integration with the COLOURS Platform through a shared, parameterised test suite. Seven API test cases and the Level 3 semantic test case are defined but dormant until an API is registered or Level 3 is claimed. Gates, schedule and reporting follow the EITF workflow, so that the progress of COLOURS is visible in the ECHOES tracking tool. The items still pending from ECHOES (D7.1, Table 9), such as the identity required by KBMS for publication (COL-DEP-04), are covered by working assumptions and fallbacks and do not change the structure of this plan.

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