



Governance, Validation, and Responsible Metrics in National Research Information Systems: Comparative Evidence from Ukraine and Slovakia

Alla Zharinova, Danica Zendulkova, Sofiia Zhrebchuk, Iryna Tsybenko, Serhii Zharinov, Oleksandr Berezko, Pavlo Stupen

State Scientific and Technical Library of Ukraine, Kyiv, Ukraine

Slovak Centre of Scientific and Technical Information, Bratislava, Slovakia

Lviv Polytechnic National University, Lviv, Ukraine

Odesa Polytechnic National University, Odesa, Ukraine

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Aim of the analysis

This comparative analysis aims to bring together interrelated dimensions:

- governance,
- data quality,
- validation workflows,
- interoperability,
- responsible metrics

Methodology

- This study employs a qualitative comparative research design to examine governance structures, data validation mechanisms, and the use of research metrics in national research information systems, focusing on Ukraine's URIS and Slovakia's SK CRIS.
- The methodological approach is grounded in comparative case study analysis, allowing for an in-depth exploration of complex institutional arrangements and operational practices within their specific national contexts.
- The study is primarily descriptive and analytical rather than explanatory in a causal sense; its objective is not to test hypotheses but to identify patterns, practices, and design choices that contribute to effective CRIS operation.

Methodology

- Both systems represent national-level CRIS infrastructures with comparable functional scope but with several differences
- The analytical framework is structured around four key dimensions:
 - (1) governance models, including the distribution of roles and responsibilities among stakeholders;
 - (2) data quality assurance, focusing on metadata standards, completeness, consistency, and timeliness;
 - (3) validation workflows, including the interaction between automated processes and manual curation;
 - (4) the application of research metrics, with particular attention to principles of responsible evaluation.

Governance models

- Data on science and research constitute a fundamental element of the modern governance of the research and innovation ecosystem.
- In national CRIS infrastructures, governance is not a peripheral concern but a defining element that shapes how data are produced, validated, and ultimately used for decision-making.
- The delineation of roles and responsibilities is therefore critical, not only for ensuring data quality but also for maintaining accountability and operational coherence across a distributed research landscape.

Data quality

- The conceptualization of data quality in CRIS has converged around a set of core dimensions completeness, correctness, consistency, and timeliness.
- Data quality is not simply a technical problem. In the context of CRIS, it is the need for dedicated data stewardship roles, standardized workflows, and ongoing coordination between local and central actors.

Validation

- Closely linked to data quality is the question of validation. Research increasingly points to the necessity of hybrid validation models that combine automated processes with human oversight.
- Automated mechanisms such as schema validation, identifier matching, and deduplication are indispensable for handling large volumes of data efficiently.
- Algorithmic approaches alone cannot resolve ambiguities, manual curation remains essential, in cases where contextual knowledge is required.

Interoperability

- CRIS are expected to integrate data from multiple sources and to enable exchange across institutional and national boundaries.
Solution: standardized data models (CERIF) and use of persistent identifiers (ORCID, DOI)
- The alignment of CRIS with Open Science and FAIR principles further reinforces the importance of interoperability and data quality.
Structuring relationships between entities supports reuse and integration.

Trust

- It is necessary to underline the importance of trust in CRIS. Data quality emerges as a key determinant of user confidence, influencing both adoption and long-term sustainability.
- If users perceive the data as unreliable, they are unlikely to engage with the system, regardless of its technical capabilities.

Two CRIS systems

- National research information systems (CRIS)
 - cornerstone of contemporary research governance
 - providing the data infrastructure necessary for evidence-based decision-making, performance evaluation, and strategic planning

Ukraine's URIS



Slovak SK CRIS



Both systems handle large volumes of data and support critical policy functions and handle large volumes on data.

NATIONAL RESEARCH INFORMATION SYSTEMS: COMPARISON & BEST PRACTICES

UKRAINE: URIS SYSTEM

GOVERNANCE & RESPONSIBILITY



SSTL OF UKRAINE
Coordination, Data Responsibility



VALIDATION & QUALITY CONTROL

500,000+
APPLICATIONS



AUTOMATED



MANUAL
VALIDATION



METRICS USAGE



DORA

Policy Decision-Making,
National Reporting,
Monitoring

KEY ASPECTS FOR THE CRIS COMMUNITY

SCALABILITY

INTEROPERABILITY

KEY ASPECTS FOR THE CRIS COMMUNITY

FAIR PRINCIPLES

OPEN SCIENCE

SLOVAKIA: NATIONAL CRIS



GOVERNANCE MODELS



National Frameworks,
Distributed Competencies

VERIFICATION PROCESSES



QUALITY
CONTROL



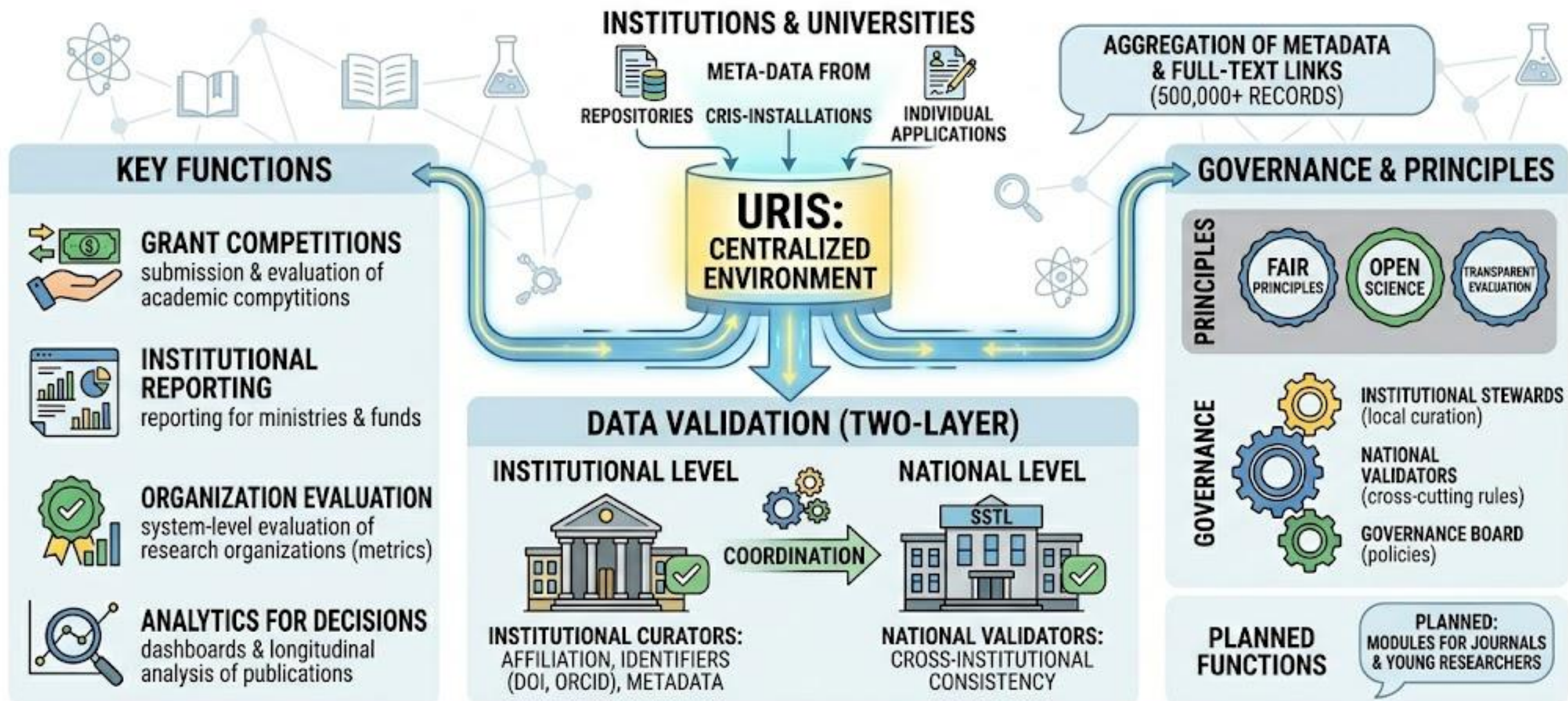
ANALYTICS & EVALUATION



Institutional Evaluation,
Responsible Metrics,
International Standards

#CRIS #Research #Innovation #Ukraine #Slovakia

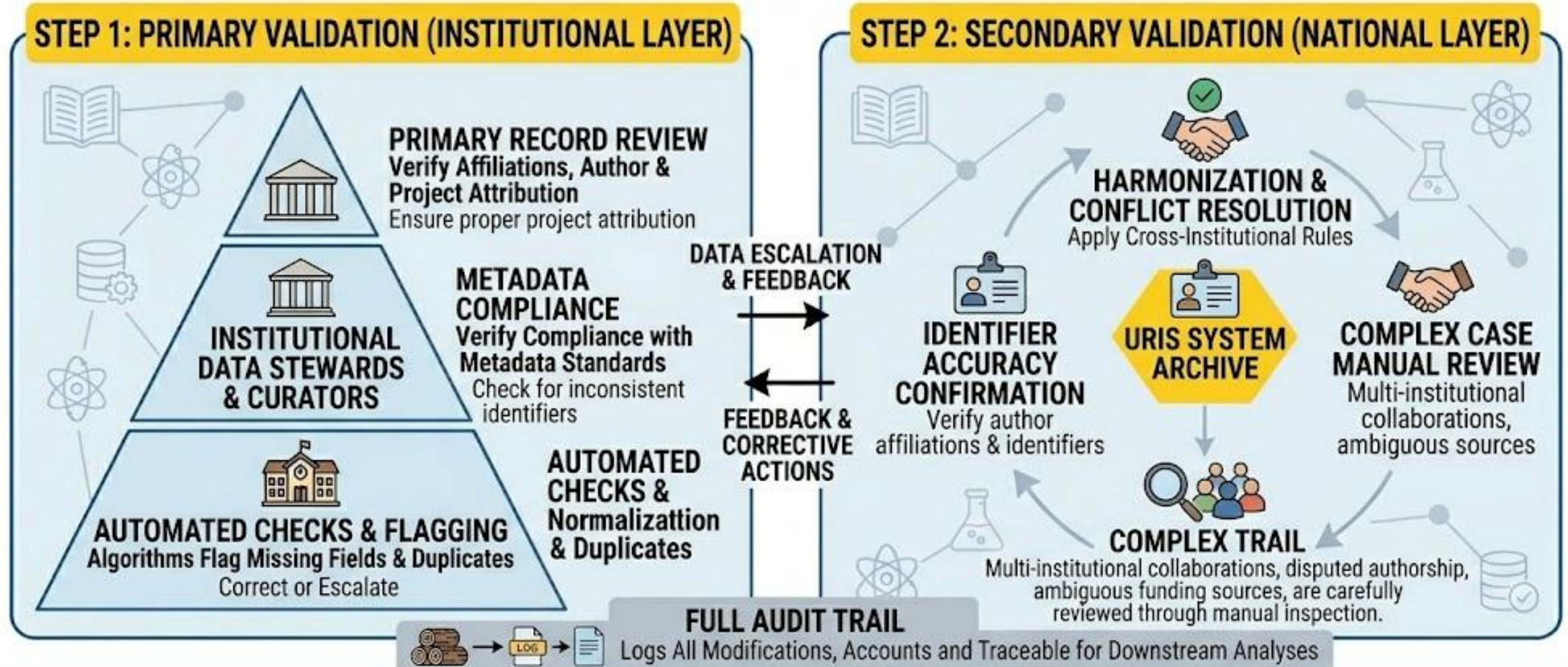
URIS: NATIONAL RESEARCH INFORMATION SPINE IN UKRAINE



URIS: NOT JUST A REPOSITORY, BUT AN INSTRUMENT OF NATIONAL RESEARCH GOVERNANCE

URIS DUAL-LAYER VALIDATION WORKFLOW: MANAGING DATA COMPLEXITY AND SCALE

URIS GOVERNANCE MODEL: STRUCTURED RESPONSIBILITIES & PARTICIPATORY DECISION-MAKING



MINIMALIST APPROACH: ENHANCING DATA INTEGRITY THROUGH DUAL-LAYERED ACCOUNTABILITY AND TRACEABILITY

URIS: MULTI-LAYERED APPROACH FOR NATIONAL RESEARCH DATA QUALITY

500,000+ RESEARCH RECORDS

LAYER 1: AUTOMATED MECHANISMS

TIER A NORMALIZATION & IDENTIFIER MAPPING



- Standardize names
- Map ORCID/DOI
- Parse bibliographic fields

TIER B DEDUPLICATION & INFLATION PREVENTION



- Identify/Merge duplicate records
- Prevent output count inflation

TIER C COMPLIANCE & ALERTING



- Continuous metadata schema verification
- Trigger alerts for missing/inconsistent fields

HUMAN
ESCALATION

LAYER 2: MANUAL OVERSIGHT

TIER D INSTITUTIONAL CURATION



- Review submissions for accuracy
- Verify author affiliations, project attributions

TIER E NATIONAL VALIDATION (SSTL COORDINATED)



- Review complex cases, ambiguous names, collaborative outputs across institutions

HIGH-QUALITY, RELIABLE METADATA

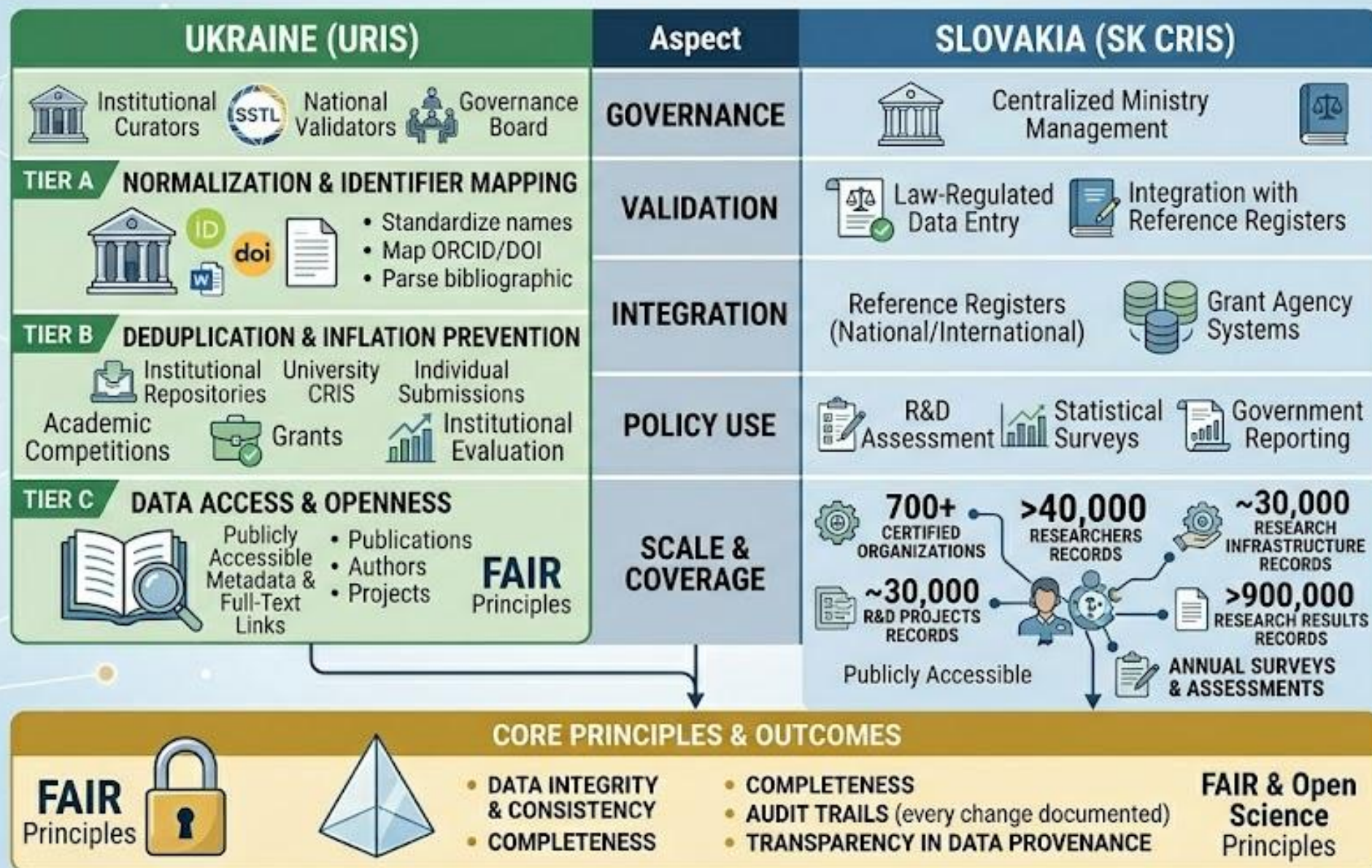
CORE PRINCIPLES & OUTCOMES



- DATA INTEGRITY & CONSISTENCY
- COMPLETENESS

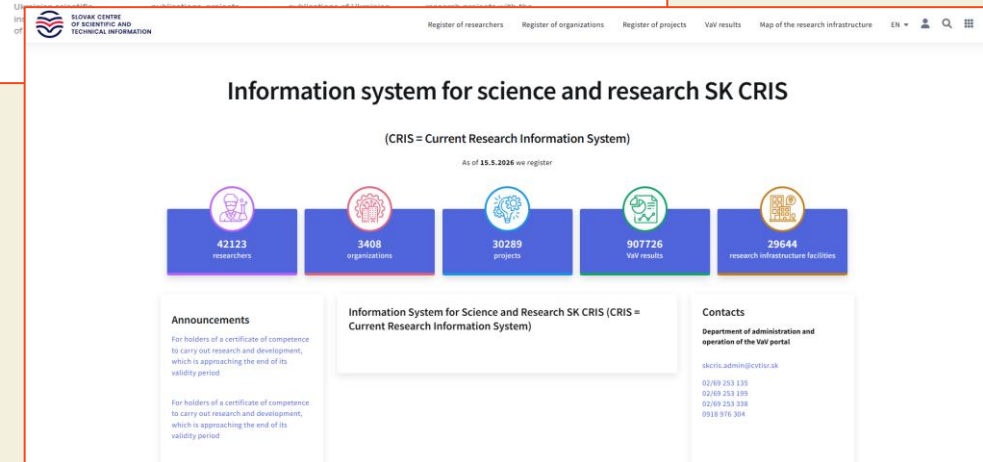
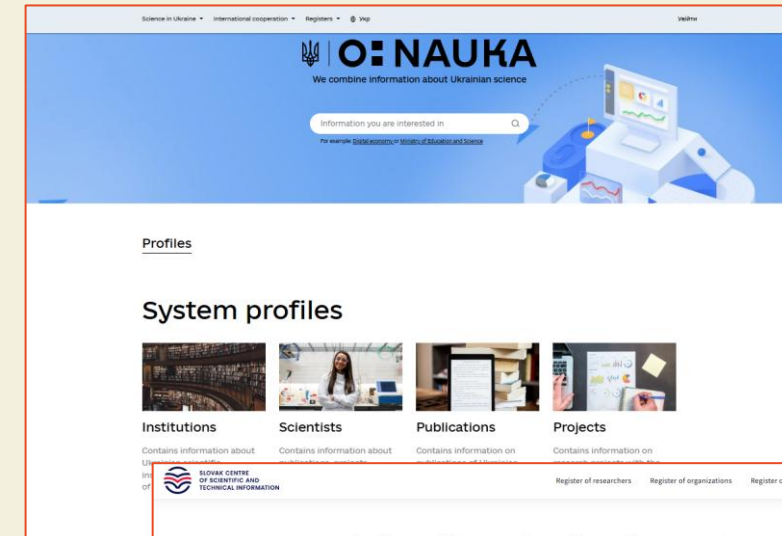
- COMPLETENESS
- AUDIT TRAILS (every change documented)
- TRANSPARENCY IN DATA PROVENANCE

NATIONAL RESEARCH INFORMATION SYSTEMS: COMPARATIVE ANALYSIS (URIS VS. SK CRIS)



Comparison

Aspect	Ukraine (URIS)	Slovakia (SK CRIS)
Governance	Layered governance: institutional curators, national validators, governance board	Centralized government management by Ministry of Education
Validation	Two-layer validation (local + national) ensures consistency and transparency	Data entry regulated by law; integration with reference registers ensures quality
Integration	Institutional repositories, university CRIS, individual submissions	Reference registers (national and international), grant agency systems
Policy use	Supports academic competitions, grants, institutional evaluation, and analytics	Supports R&D assessment, statistical surveys, and government reporting
Data access & openness	Publicly accessible metadata and full-text links; FAIR principles	Publicly accessible; adheres to FAIR and open science principles
Scale & coverage	>500,000 records; national-level governance of research information	~700 certified organizations; annual surveys and assessments



Both CRIS systems rely on persistent identifiers to ensure unambiguous attribution, combine automated and manual validation to address the complexity of research data, and align with FAIR and Open Science principles to support interoperability and transparency.

Key finding

- Data quality is achieved not through isolated technical solutions, but through the alignment of governance structures, validation workflows, and system incentives.
- Different governance models can lead to similarly robust outcomes when they are internally coherent and contextually appropriate.
- The analysis also underscores that scalability and sustainability remain ongoing challenges.
- This study highlights the value of comparative perspectives in understanding CRIS.
- The findings of this study suggest that robust national CRIS are characterized not only by technical sophistication but by well-designed governance arrangements that ensure data quality, transparency, and accountability.



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