CRIS 2026 PRESENTATION

Conceptualizing an AI Module for HISinOne RES:

Pilot Planning at FernUniversität in Hagen

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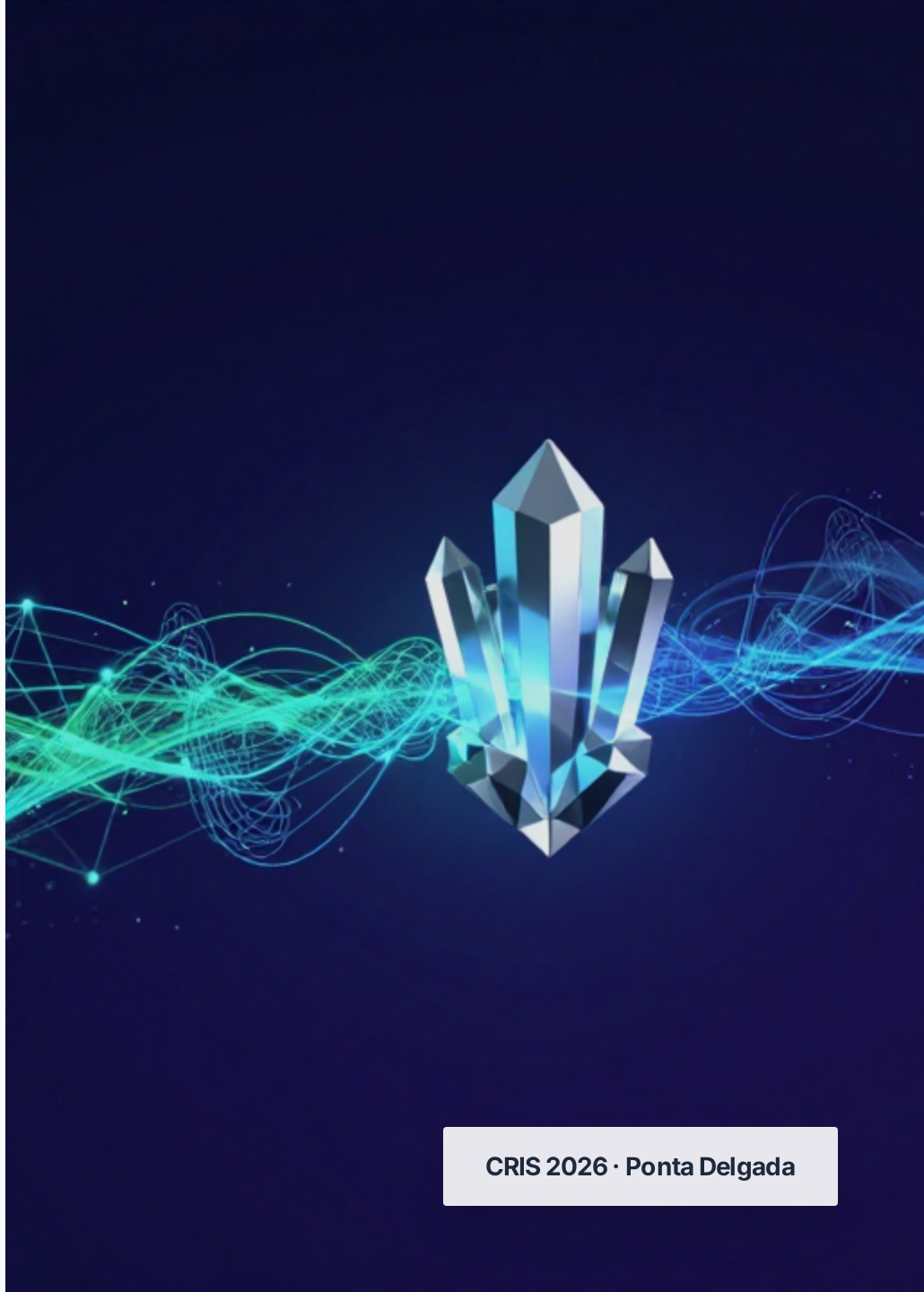


Problem Statement

Limitations of Current CRIS Systems

RETROSPECTIVE DESIGN

Systems record completed activities but lack mechanisms for forward-looking decisions.

DOCUMENTATION-CENTRIC

Primary function is data storage and reporting, not analytical or advisory support.

NO INTELLIGENT FEATURES

Built-in support for research trend analysis and collaboration discovery is missing.

GAP IN DECISION SUPPORT

Managers lack tools for evidence-based strategic planning within the CRIS environment.

Architectural constraints hinder the transition from passive data repositories to intelligent infrastructure.

Motivation

Why Intelligent CRIS Matters

Exponential Data Growth

Complex, heterogeneous datasets (research output, funding, networks) exceed manual analysis capacity.

01

Strategic Decision Requirements

Institutions require data-driven insights to optimize research portfolios and respond to competitive dynamics.

02

Administrative Pressure

Growing demands for accountability, efficiency, and proactive engagement with external partners.

03

"Three converging pressures necessitate the evolution of CRIS into intelligent systems."

Research Objective

Embedding AI within CRIS

PRIMARY GOAL

Develop a conceptual AI module natively integrated into HISinOne RES to transform research data into actionable intelligence.

Native Integration

Module is embedded within the system, not an external tool.

Data-to-Insight

Leveraging CRIS data to produce structured intelligence.

Modularity

Supports incremental deployment and domain extensions.

Applicability

Designed to generalize to other HISinOne RES adopters.

Transitioning from passive data storage to proactive research management.

Key Contribution

A Three-Layer AI Architecture

SEMANTIC LAYER

Knowledge extraction from unstructured data

- NLP & Word Embeddings
- Topic Modeling (LDA)

PREDICTIVE LAYER

Forecasting research trends & funding

- Machine Learning
- Time-Series Analysis

NETWORK LAYER

Mapping collaboration structures

- Graph Theory
- Network Analysis

CROSS-CUTTING PRINCIPLES

Explainability (XAI) | Governance & Compliance | Feedback Loops

System Architecture

Design Principles and Data Flow

THE FOUR-STAGE PIPELINE

1. Data
FIS Data Sources

2. Processing
AI Processing Modules

3. Insights
Actionable Intelligence

4. Dashboard
Visualization Engine

CORE DESIGN PRINCIPLES

Separation of Concerns
Each layer has defined inputs, outputs, and responsibilities.

Governance Layer
Ensures data integrity, compliance, and transparency.

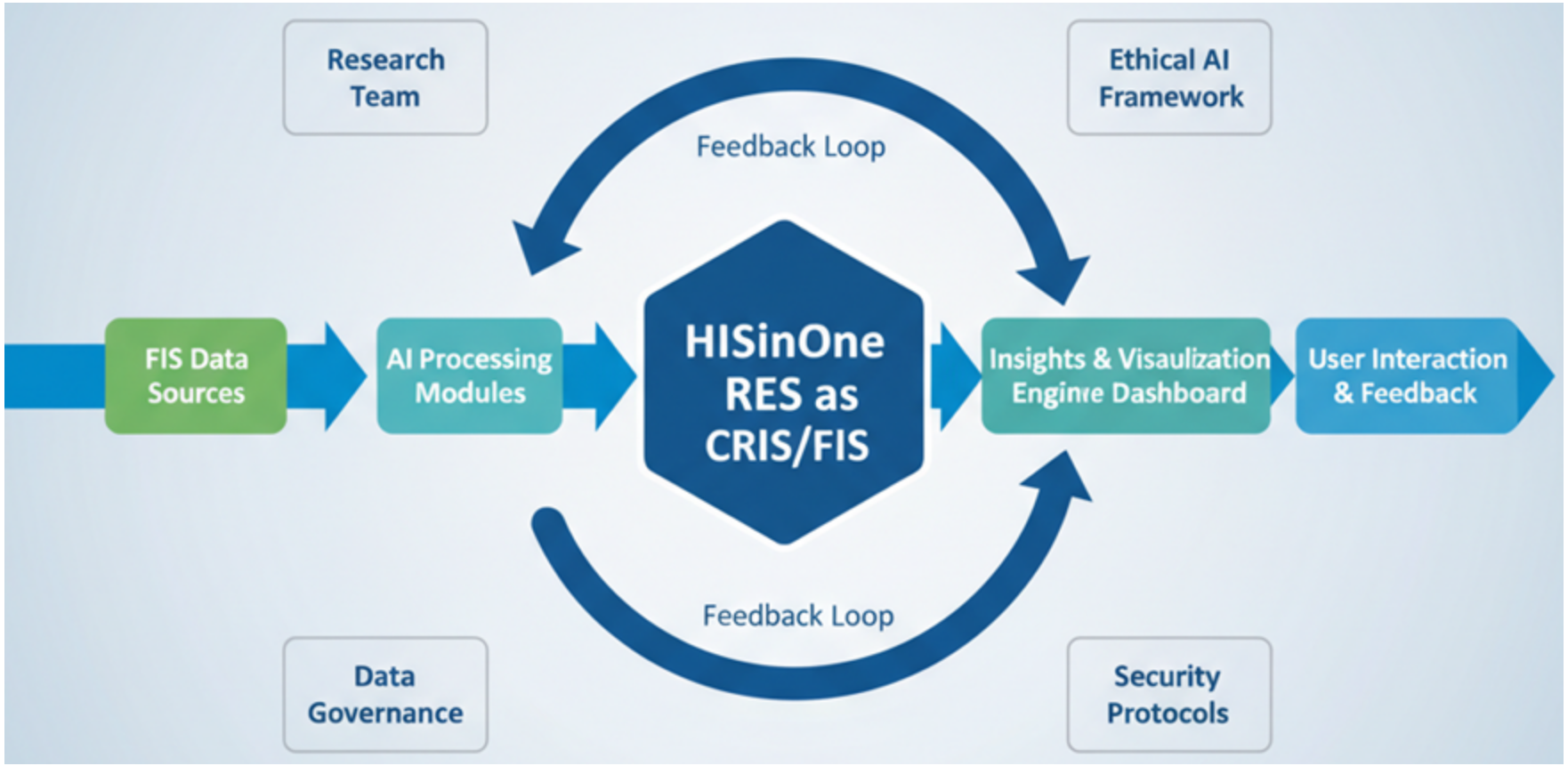
Continuous Feedback
User interactions and expert validation improve models.

Scalability
Modular design enables horizontal scaling without disruption.

Native integration within HISinOne RES environment

Architecture Diagram

HISinOne RES AI Module Framework



PROCESSING LAYERS GOVERNANCE & CORE

Conceptual Framework for FernUniversität in Hagen

AI Layer 1 – Semantic Analysis

Extracting Knowledge from Unstructured Research Data

Transforms raw text into structured intelligence by identifying latent research themes and interdisciplinary connections.

Technical Components

- **NLP Pipeline:**
  Named entity recognition and relation extraction.
- **Embedding Models:**
  Dense vector representations for semantic similarity.
- **Topic Modeling:**
  Unsupervised theme detection via LDA & BERTopic.

Core Outputs

- Research Topic Clusters & Thematic Maps
- Semantic Search across CRIS Content
- Automated Classification and Tagging

AI LAYER 2 – PREDICTIVE ANALYTICS

Strategic Forecasting & Institutional Decision Support

TECHNICAL COMPONENTS

Supervised Machine Learning

Classification and regression models for research outcome prediction.

Time-Series Analysis

Detection of longitudinal trends in research activity and output volume.

Funding Success Estimation

Probabilistic models trained on historical grant and success data.

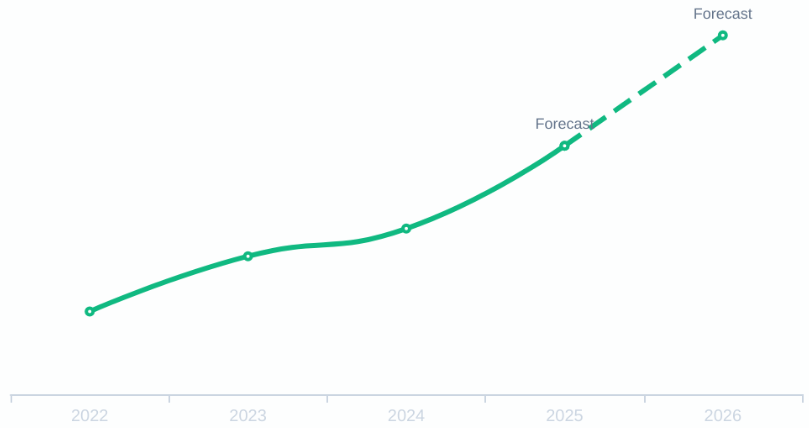
Anomaly Detection

Identification of unusual patterns in research performance metrics.

MODULE OUTPUTS

- Research Trend Forecasts
- Funding Opportunity Scoring
- Risk Indicators & Mitigation

TREND FORECASTING VISUALIZATION



AI Layer 3: Network Analysis

Mapping and Analyzing Research Collaborations

GRAPH THEORY
Centrality and clustering on authorship graphs

COMMUNITY DETECTION
Identifying disciplinary sub-networks

PATTERN MINING
Temporal dynamics of partnership formation

AI RECS
Suggestions for new strategic partners

Module Objective

- Model structural properties of research networks
- Analyze temporal dynamics in partnership formation
- Identify clusters and disciplinary sub-networks

Key Outputs

01 Network Visualizations
Co-authorship and institutional maps

02 Collaboration Gap Analysis
Identifying missing links in research areas

03 Personalized Recommendations
AI-driven partner matching for researchers

Leveraging graph theory to optimize institutional collaboration structures.

Governance

Trustworthy AI by Design

EXPLAINABILITY	SHAP/LIME-based reasoning; traceable recommendation chains.
PRIVACY	GDPR alignment; role-based access; data minimization.
HUMAN CONTROL	Expert validation workflows; manual override mechanisms.
AUDITABILITY	Continuous logging of model decisions; version control.
FAIRNESS	Regular fairness audits; diverse training data requirements.

A holistic governance framework ensures that AI integration remains ethical, compliant, and transparent.

Pilot Study

FernUniversität in Hagen as Research Testbed

RATIONALE FOR SELECTION

Distributed Environment

Geographically dispersed research structure unique to Germany's distance-learning university.

Mature Infrastructure

Existing HISinOne RES deployment allows for direct and seamless AI integration.

Scale and Diversity

Heterogeneous data spanning multiple faculties provides a robust testing ground.

Transferability

Findings and framework directly applicable to other HISinOne RES institutional adopters.

PILOT SCOPE

1. Conceptual Validation of the Architecture
2. Deep Stakeholder Requirements Analysis
3. Technical & Architectural Feasibility Assessment

EMPIRICAL VALIDATION PHASE

Expected Impact

Multi-Level Benefits of AI Integration

RESEARCHER

- Reduced review time for funding
- AI-assisted partner identification
- Optimized grant proposal targeting

MANAGEMENT

- Predictive strategic research planning
- Real-time performance monitoring
- Automated compliance reporting

INSTITUTIONAL

- Enhanced funding competitiveness
- Data-driven portfolio allocation
- Scalable ecosystem-wide framework

Strategic transformation from passive reporting to proactive research intelligence.

Conclusion & Future Directions

Evolution of Intelligent CRIS Infrastructure

KEY CONTRIBUTIONS

- Defined CRIS limitations in decision support
- Proposed modular 3-layer AI architecture
- Established ethical AI governance framework
- Selected FernUni as optimal pilot site

> *"CRIS must transition from passive repositories to proactive decision-support infrastructures. AI integration is the next evolutionary step."*

FUTURE WORK

01 Empirical Pilot Implementation
Full validation at FernUniversität in Hagen.

02 Platform Cross-Evaluation
Comparative testing across diverse CRIS platforms.

03 Interoperability Standards
Standardized AI-CRIS specifications development.

04 Community Engagement
Collaboration with euroCRIS and stakeholders.

Thank you for your attention!