

ODRAS Tool Overview - Comprehensive Platform Presentation

Slide 1: Introduction to ODRAS

Ontology-Driven Requirements Analysis System

What is ODRAS?

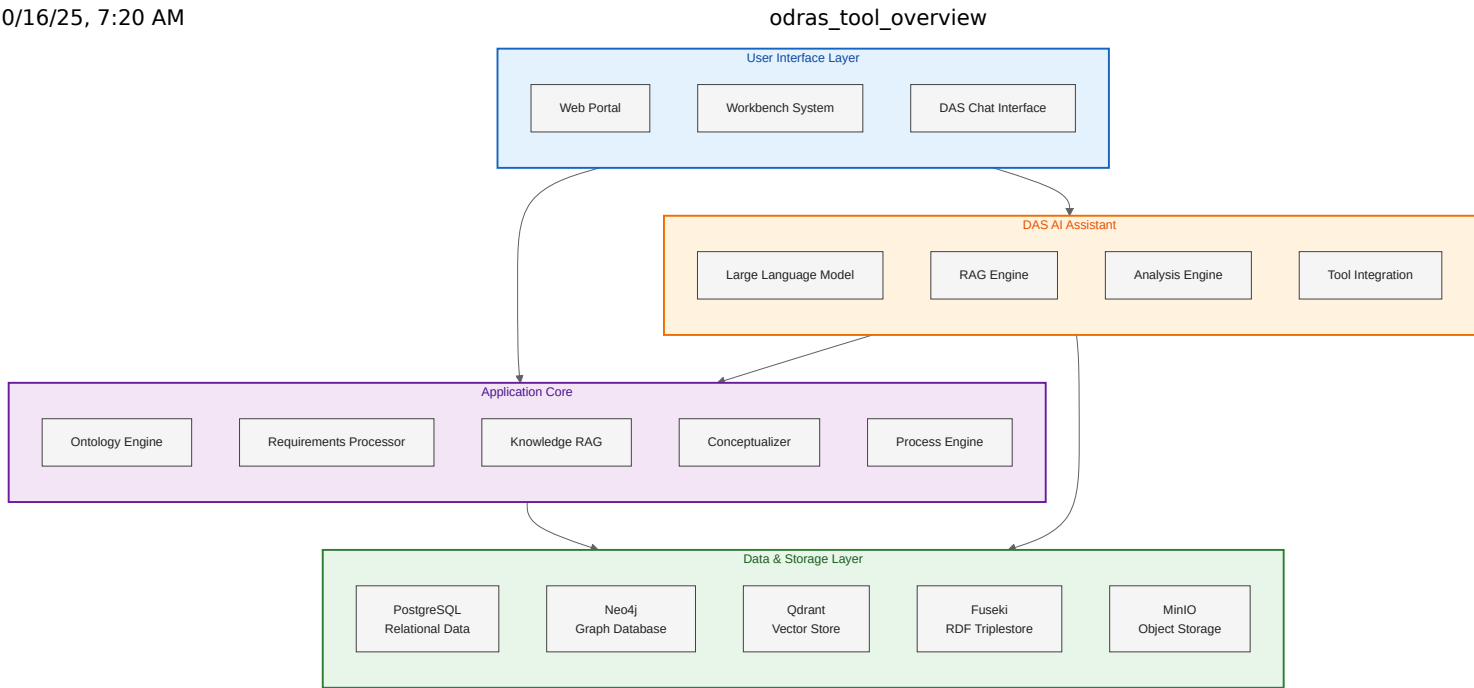
- **Comprehensive Platform:** Integrated environment for requirements analysis, system conceptualization, and knowledge management
- **AI-Powered:** DAS (Design Analysis System) provides intelligent assistance throughout the analysis lifecycle
- **Ontology-Driven:** BSEO (Base Systems Engineering Ontology) foundation ensures consistent terminology and relationships
- **Project-Centric:** Isolated project cells maintain security boundaries and organization

Core Value Proposition

- **Transform Requirements into Concepts:** Extract requirements from documents, analyze with AI, generate system architectures
- **Knowledge Management:** Centralized repository with RAG-powered retrieval and analysis
- **Process Automation:** BPMN workflows orchestrate complex analysis tasks
- **Collaborative Environment:** Multi-user platform with role-based access and audit trails

Slide 2: ODRAS Architecture

Modern Microservices Platform



Technology Stack

- **Frontend:** Vanilla JavaScript with modern ES6+ features
- **Backend:** FastAPI (Python) with asyncio for high performance
- **Databases:** PostgreSQL, Neo4j, Qdrant, Fuseki, Redis
- **Storage:** MinIO S3-compatible object storage
- **AI/ML:** OpenAI API, sentence-transformers, custom embeddings
- **Process Engine:** Camunda BPMN for workflow orchestration

Slide 3: Current ODRAS Workbenches

Comprehensive Capability Suite

Analysis & Design Workbenches

1. **Requirements Workbench:** Document ingestion, requirement extraction, ontology mapping, traceability
2. **Ontology Workbench:** Ontology import/export, class management, property definitions, reasoning
3. **Conceptualizer Workbench:** System architecture visualization, component generation, interface mapping
4. **Knowledge Workbench:** Document management, RAG processing, knowledge base queries

Data & Project Management Workbenches

5. **Files Workbench:** Document upload, organization, metadata management
6. **Project Workbench:** Project settings, team management, resource allocation
7. **Graph Workbench:** Neo4j graph visualization and queries
8. **Analysis Lab:** Data analysis, visualization, statistical tools

System & Administration Workbenches

9. **Process Workbench:** BPMN workflow design and management
10. **Thread Manager Workbench:** DAS conversation threads, context management
11. **Admin Workbench:** User management, system configuration, role assignments
12. **Event Manager Workbench:** System events, audit logs, activity tracking
13. **Settings Workbench:** User preferences, system settings
14. **Playground Workbench:** Testing and experimentation environment
15. **RAG Workbench:** RAG configuration and testing

Slide 4: Planned ODRAS Workbenches

Future Capability Expansion

Decision & Analysis Workbenches

1. **Trade Studies Workbench:** Multi-criteria decision analysis, alternatives comparison, sensitivity analysis
2. **Context Management Workbench:** Persona definitions, context assembly, prompt templates
3. **Artifact Management Workbench:** Document generation, version control, artifact linking

Collaboration & Documentation Workbenches

4. **Agent Assistant & Documentation Workbench:** AI-assisted document writing, artifact embedding, export formats
5. **Collaboration Workbench:** Multi-user real-time editing, commenting, review workflows
6. **Reporting Workbench:** Automated report generation, custom templates, scheduled reports

Advanced Analysis Workbenches

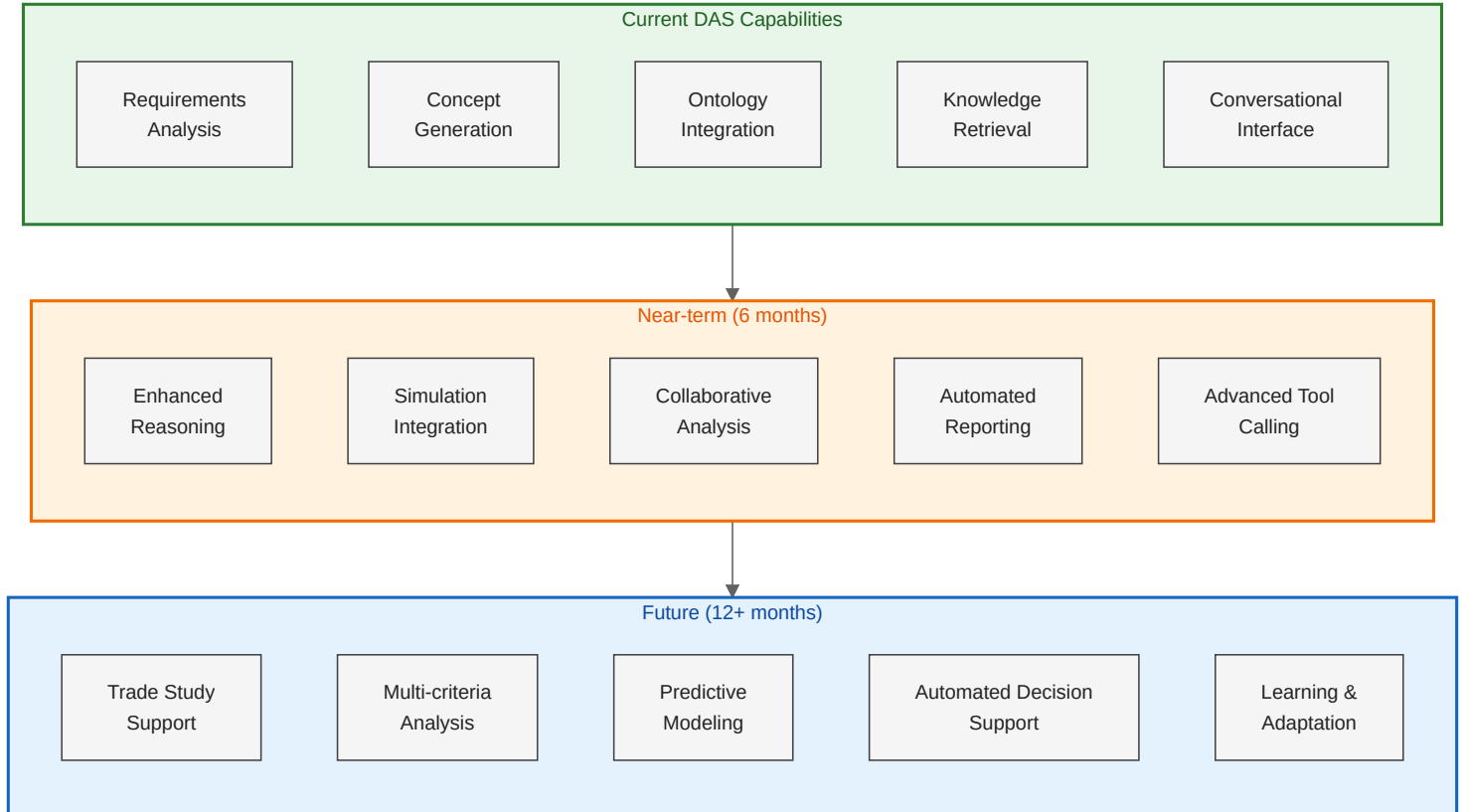
7. **Simulation Workbench:** Performance modeling, system simulation, scenario analysis
8. **Tool Integration Workbench:** External tool connections, API management, schema validation
9. **Task Execution Manager Workbench:** Task monitoring, efficacy analysis, performance optimization

Process & Workflow Workbenches

10. **Process Task Orchestration Workbench:** Task routing, execution monitoring, error handling
11. **Decision Thread Analytics Workbench:** Thread similarity analysis, pattern recognition, recommendation generation
12. **Pipeline Management Workbench:** Multi-stage analysis pipelines, data flow visualization

Slide 5: DAS - The Intelligent Core

Design Analysis System



DAS Capabilities Today

- **Natural Language Interface:** Ask questions about requirements, ontologies, or system data
- **Requirement Analysis:** Interpret and validate requirements from documents
- **Concept Generation:** Create system components, interfaces, and functions from requirements
- **Knowledge Retrieval:** RAG-powered access to project knowledge base
- **Ontology Integration:** Leverage BSEO and domain ontologies for consistent analysis

DAS Evolution Path

- **Enhanced Reasoning:** Multi-step analysis with chain-of-thought reasoning
- **Tool Integration:** Call external analysis tools and simulations
- **Collaborative Sessions:** Multi-user DAS interactions with shared context
- **Predictive Analytics:** Forecast system performance and identify risks
- **Learning & Adaptation:** Improve analysis quality based on user feedback

Slide 6: Key Concepts - Ontology-Driven Analysis

Foundation of ODRAS Approach

Base Systems Engineering Ontology (BSEO)

- **Foundation Classes:** System, Component, Interface, Function, Requirement, Constraint
- **Relationships:** hasComponent, performsFunction, satisfiesRequirement, constrainedBy
- **Layered Architecture:** Foundation → Domain → Project-specific ontologies
- **Standards Integration:** SysML, DoDAF, UAF alignment

Ontology-Driven Benefits

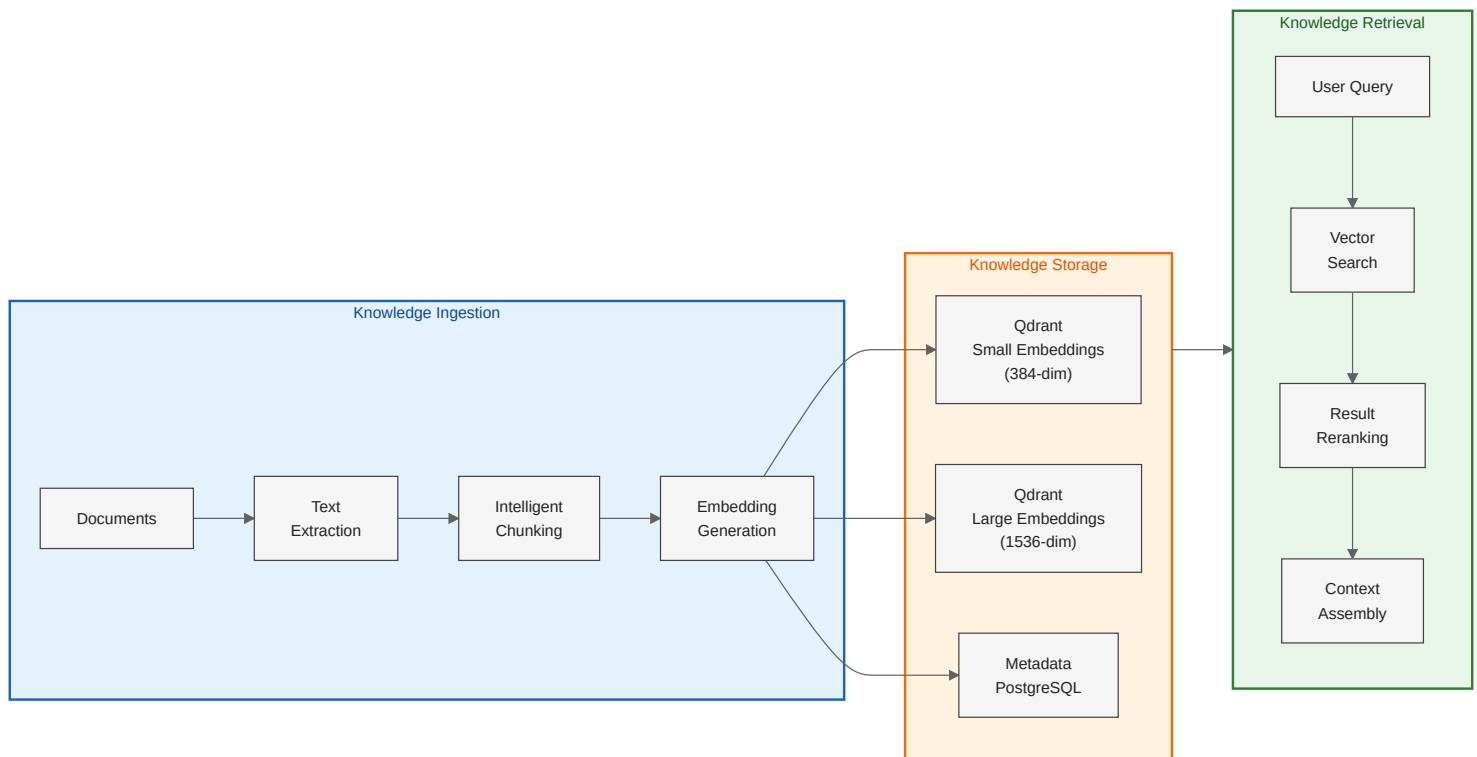
1. **Consistent Terminology:** Shared vocabulary across projects and teams
2. **Automated Reasoning:** Infer relationships and identify inconsistencies
3. **Traceability:** Track requirements through design and implementation
4. **Reusability:** Import domain ontologies and extend for project needs
5. **Validation:** Check completeness and correctness of system designs

Domain Ontology Expansion

- **Aerospace:** Aircraft systems, avionics, propulsion, structures
- **Defense:** Weapons systems, C4ISR, mission systems
- **Automotive:** Powertrain, ADAS, vehicle architecture
- **Energy:** Power systems, distribution, renewable integration

Slide 7: Key Concepts - RAG-Powered Knowledge

Retrieval-Augmented Generation Architecture



Multi-Collection Strategy

- **knowledge_chunks:** Small embeddings (384-dim) for fast retrieval
- **knowledge_large:** OpenAI embeddings (1536-dim) for semantic depth
- **odras_requirements:** Requirements-specific collection
- **das_instructions:** DAS behavior and guidelines
- **project_threads:** Conversation context and history

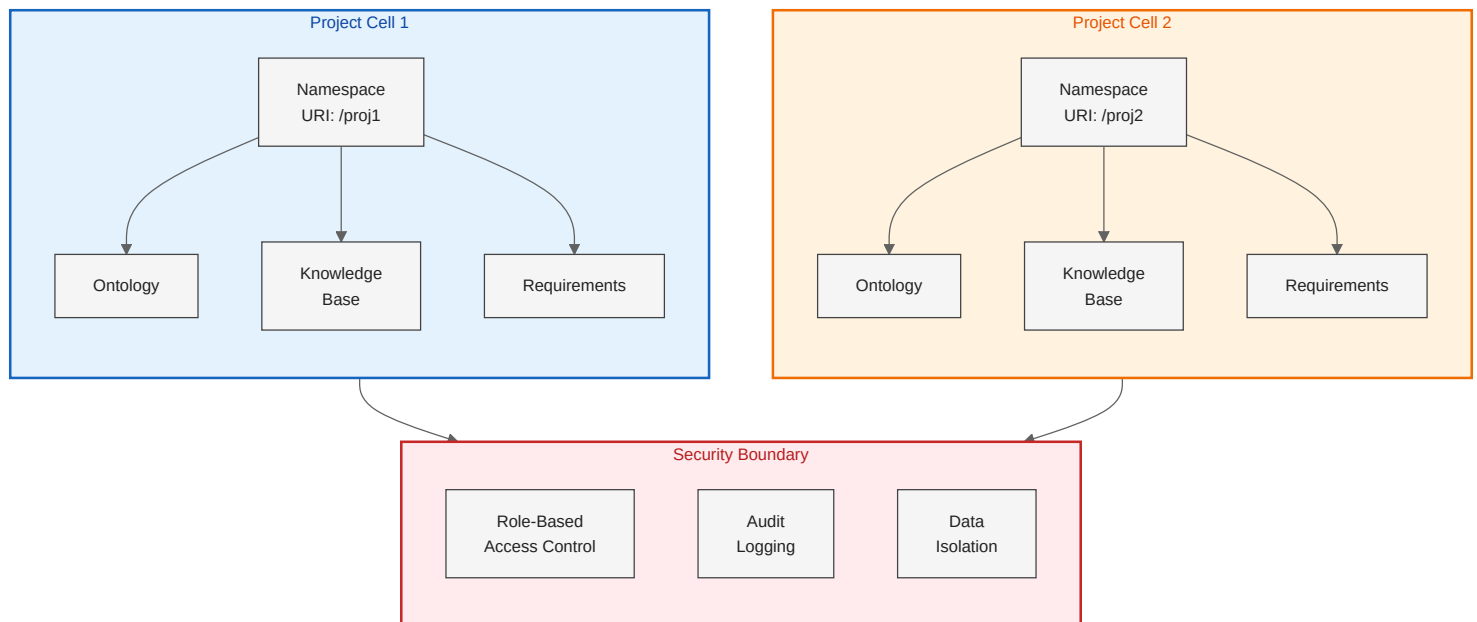
Advanced RAG Features

- **Chunking Strategies:** Semantic chunking, overlap control, metadata preservation
- **Hybrid Search:** Vector similarity + keyword matching + metadata filtering
- **Context Windows:** Dynamic context assembly based on query and token limits
- **Reranking:** Improve relevance with cross-encoder models

Slide 8: Key Concepts - Project Cells

Isolation and Organization

Project Cell Architecture



Project Cell Benefits

- **Security:** Complete isolation between projects with separate namespaces
- **Organization:** Group related requirements, ontologies, and knowledge
- **Scalability:** Independent scaling per project based on demand
- **Collaboration:** Team-based access control and permissions
- **Versioning:** Track changes and maintain project history

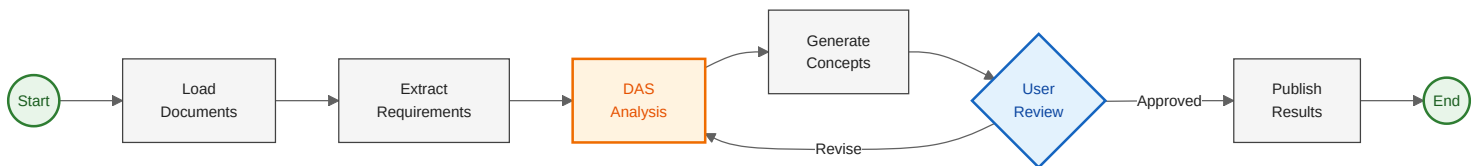
Slide 9: Key Concepts - BPMN Process Automation

Workflow Orchestration for Complex Analysis

Why BPMN for Analysis?

- **Visual Design:** Graphical workflow creation instead of hard-coded pipelines
- **Flexibility:** Easy modification without code changes
- **Orchestration:** Coordinate multiple services and tools
- **Human-in-Loop:** User tasks for review and decision points
- **Audit Trail:** Complete execution history and compliance tracking

ODRAS BPMN Patterns



Common Analysis Workflows

- **Requirements Extraction Pipeline:** Document → Text → Requirements → Validation
- **Conceptualization Workflow:** Requirements → DAS Analysis → Concepts → Review → Export
- **Knowledge Processing:** Upload → Chunk → Embed → Index → Verify
- **Trade Study Process:** Define Alternatives → Analyze → Compare → Recommend → Document

Slide 10: Integration Capabilities

Connecting ODRAS to Your Ecosystem

Import Capabilities

- **Documents:** PDF, Word, Excel, Markdown, Text
- **Ontologies:** OWL, RDF/XML, Turtle, JSON-LD
- **Requirements:** ReqIF, Excel templates, CSV
- **Models:** Cameo/MagicDraw exports, SysML XML
- **Data:** JSON, CSV, database connections

Export Capabilities

- **System Models:** Cameo/MagicDraw import format
- **Documents:** PDF, Word, Excel, Markdown
- **Ontologies:** OWL, RDF/XML, Turtle, JSON-LD
- **Requirements:** ReqIF, Excel, CSV
- **Reports:** Custom templates, automated generation
- **Data:** JSON, CSV, REST API access

API Integration

- **RESTful APIs:** Full system access for external tools
- **Webhooks:** Event-driven notifications
- **GraphQL:** Flexible data queries
- **BPMN Service Tasks:** Call external services from workflows
- **Tool Integration:** Schema-based tool execution

Slide 11: Use Cases & Applications

ODRAS Across Domains

Aerospace & Defense

- **Requirements Analysis:** Extract and analyze system requirements from specifications
- **System Conceptualization:** Generate preliminary architectures from requirements
- **Trade Studies:** Compare design alternatives with multi-criteria analysis
- **Compliance Tracking:** Ensure requirements meet regulatory standards

Automotive & Transportation

- **ADAS Development:** Analyze requirements for autonomous driving systems
- **Powertrain Design:** Conceptualize hybrid and electric propulsion systems
- **Safety Analysis:** Track safety requirements through design and validation
- **Standards Compliance:** Ensure ISO 26262 and other standards adherence

Energy & Infrastructure

- **Smart Grid Design:** Analyze requirements for grid modernization
- **Renewable Integration:** Conceptualize energy storage and distribution systems
- **Regulatory Compliance:** Track requirements for environmental and safety regulations
- **Asset Management:** Knowledge management for infrastructure maintenance

Software & Systems Engineering

- **Requirements Engineering:** Capture, analyze, and trace software requirements
- **Architecture Design:** Generate system architectures from functional requirements
- **API Design:** Conceptualize interface definitions and data flows
- **Technical Documentation:** Generate and maintain system documentation

Slide 12: Deployment Options

Flexible Installation Models

On-Premises Deployment

- **Complete Control:** Full data sovereignty and security
- **Custom Configuration:** Tailored to organizational needs
- **Air-Gapped:** Isolated networks for classified work
- **Performance:** Dedicated resources for optimal performance

Cloud Deployment

- **Scalability:** Auto-scaling based on demand
- **High Availability:** Multi-region redundancy
- **Managed Services:** Reduced operational overhead
- **Cost Efficiency:** Pay-as-you-go pricing

Hybrid Deployment

- **Sensitive Data On-Prem:** Critical data stays internal
- **Compute in Cloud:** Leverage cloud AI/ML capabilities
- **Flexible Workload:** Route tasks based on security and performance needs

Quick Setup Script

```
# Clone repository
git clone https://github.com/your-org/ODRAS.git
cd ODRAS

# Run installation
./install.sh

# Initialize databases
./odras.sh init-db

# Start services
./odras.sh start

# Access at http://localhost:8000
```

Slide 13: Security & Compliance

Enterprise-Grade Protection

Authentication & Authorization

- **Multi-Factor Authentication:** Support for TOTP, hardware tokens, biometric
- **SSO Integration:** SAML, OAuth2, LDAP/Active Directory
- **Role-Based Access Control:** Fine-grained permissions per workbench
- **Project-Level Isolation:** Complete separation between projects
- **CAC/PIV Support:** Common Access Card integration for DoD environments

Data Protection

- **Encryption at Rest:** AES-256 for all stored data
- **Encryption in Transit:** TLS 1.3 for all communications
- **Key Management:** FIPS 140-2 compliant key storage and rotation
- **Data Residency:** Control where data is stored geographically
- **Secure Enclaves:** Hardware security module (HSM) integration

Federal & Industry Compliance Standards

- **NIST SP 800-53:** Security and privacy controls for federal information systems
- **NIST SP 800-171:** Protecting Controlled Unclassified Information (CUI)
- **FedRAMP:** Preparing for Moderate baseline authorization
- **CMMC Level 2:** Cybersecurity Maturity Model Certification for defense contractors
- **ISO 27001:** Information security management system certification
- **SOC 2 Type II:** Service organization controls for security and availability
- **ITAR Compliance:** International Traffic in Arms Regulations readiness
- **GDPR:** General Data Protection Regulation for EU data

Audit & Compliance Features

- **Complete Audit Trail:** Every action logged with user, timestamp, details
- **Event Manager:** Real-time monitoring and alerts
- **Compliance Reports:** Automated generation for auditors
- **Data Retention:** Configurable policies meeting regulatory requirements
- **Chain of Custody:** Full traceability for all data and decisions

Network Security

- **Firewall Integration:** Support for enterprise firewalls and DMZ deployment
- **VPN Access:** Secure remote connectivity with multi-factor authentication
- **API Security:** Rate limiting, authentication, input validation, DDoS protection
- **Vulnerability Scanning:** Regular security assessments and penetration testing
- **Intrusion Detection:** Integration with SIEM systems
- **Air-Gapped Deployment:** Support for classified and isolated networks

Slide 14: Performance & Scalability

Built for Enterprise Scale

Current Performance Metrics

- **Document Processing:** 100+ pages/minute
- **Requirement Extraction:** 500+ requirements/minute
- **Vector Search:** <100ms for 10M+ vectors

- **Concurrent Users:** 50+ users per instance
- **Knowledge Base Size:** Millions of chunks per project

Scalability Approach

- **Horizontal Scaling:** Add instances for increased capacity
- **Database Partitioning:** Project-based data distribution
- **Caching Strategy:** Redis for frequently accessed data
- **Queue Management:** Celery for background task processing
- **Load Balancing:** Distribute requests across instances

Optimization Features

- **Lazy Loading:** Load data only when needed
- **Incremental Updates:** Process only changes, not full datasets
- **Batch Processing:** Group operations for efficiency
- **Smart Caching:** Intelligent cache invalidation
- **Connection Pooling:** Efficient database connection management

Slide 15: Development Roadmap

ODRAS Evolution

Q1 2026 - Enhanced Analysis

- **Trade Studies Workbench:** Multi-criteria decision analysis
- **Advanced DAS Reasoning:** Chain-of-thought and multi-step analysis
- **Simulation Integration:** Connect to external modeling tools
- **Enhanced Reporting:** Automated report generation with templates

Q2 2026 - Collaboration & Integration

- **Real-time Collaboration:** Multi-user editing and commenting
- **Context Management Workbench:** Persona and prompt management
- **Tool Integration Framework:** Schema-based external tool calls
- **Enhanced Export:** Direct Cameo/MagicDraw integration

Q3 2026 - Intelligence & Automation

- **Task Execution Manager:** Efficacy tracking and optimization
- **Process Task Orchestration:** Enhanced workflow automation
- **Predictive Analytics:** Forecast project outcomes and risks
- **Learning & Adaptation:** Improve DAS based on usage patterns

Q4 2026 - Enterprise Features

- **Advanced Security:** Hardware security module integration
- **Multi-Tenancy:** Support for multiple organizations
- **Advanced Analytics:** Business intelligence dashboards
- **Marketplace:** Plugin and extension ecosystem

Slide 16: Measuring ODRAS Effectiveness

What We Will Measure in WIRR and Future Projects

Phase 1: Foundation Building (Metrics)

Capture Requirements, Ontologies, and Concepts

- **Requirements Extraction Rate:** Number of requirements extracted per document per hour
- **Ontology Mapping Coverage:** Percentage of requirements mapped to ontology concepts
- **Conceptualization Speed:** Time from requirements to initial system concept generation
- **Individual Instance Count:** Number of conceptualized individuals (components, interfaces, functions)
- **Traceability Coverage:** Percentage of concepts traceable to source requirements

Phase 2: Analysis & Knowledge Integration (Metrics)

Tabularization and Knowledge Capture

- **Tabularizer Effectiveness:** Complex table generation speed and accuracy
- **Knowledge Capture Volume:** Local, tribal, and vendor knowledge items captured per project
- **Concept-Knowledge Linkage:** Percentage of concepts with supporting knowledge artifacts
- **Vendor Capability Mapping:** Number of vendor capabilities mapped to requirements/concepts
- **Knowledge Query Response Time:** Speed of retrieving relevant knowledge for analysis

Phase 3: Vendor Evaluation & Gap Analysis (Metrics)

Compare Capabilities, Assess TRL, Identify Gaps

- **Vendor Coverage Analysis:** Percentage of requirements/concepts addressed by each vendor
- **TRL Assessment Accuracy:** Technology Readiness Level evaluation completeness
- **Gap Identification Rate:** Number of capability gaps identified per concept
- **Tech Program Needs:** Quantity and priority of identified technology development needs
- **Comparison Table Complexity:** Number of criteria in multi-vendor comparison matrices

Process Efficiency Metrics

Overall System Effectiveness

- **End-to-End Cycle Time:** Days from requirements upload to gap analysis completion
- **Rework Reduction:** Percentage reduction in analysis iterations
- **Team Productivity:** Analysis throughput per engineer vs. manual methods
- **Decision Quality:** Number of issues caught early vs. late in process
- **Audit Trail Completeness:** Percentage of decisions with full supporting documentation

Success Criteria for WIRR

- **Complete requirements extraction** from FLRAA and Marine Appendix
- **Generate comprehensive system concepts** with ontology-mapped individuals
- **Build detailed comparison tables** across 4 airframers (Bell, Boeing, LMCO, Leonardo)
- **Assess vendor TRL** for all critical system concepts
- **Identify capability gaps** and establish technology program roadmap
- **Capture tribal knowledge** from pre-Milestone A discussions
- **Deliver traceable analysis** for trade study foundation

Slide 17: Getting Started with ODRAS

Your Journey Begins

Evaluation Phase (Week 1-2)

1. **Setup Demo Environment:** Deploy ODRAS on test infrastructure
2. **Import Sample Project:** Load example requirements and ontologies

3. **Explore Workbenches:** Familiarize team with core capabilities
4. **Run Analysis Workflow:** Execute end-to-end requirement to concept flow

Pilot Project (Month 1-2)

1. **Select Pilot Project:** Choose representative project for trial
2. **Data Migration:** Import existing requirements and documents
3. **Ontology Configuration:** Customize or import domain ontologies
4. **Team Training:** Hands-on training for core team members
5. **Pilot Execution:** Run project through ODRAS workflows

Production Rollout (Month 3-6)

1. **Infrastructure Setup:** Deploy production environment
2. **Security Configuration:** Integrate with enterprise security
3. **Project Migration:** Move projects from pilot to production
4. **Team Onboarding:** Train broader organization
5. **Process Integration:** Incorporate ODRAS into standard workflows

Ongoing Support

- **Technical Support:** Dedicated support team for issues
- **Regular Updates:** Quarterly feature releases
- **Training Resources:** Videos, documentation, workshops
- **Community Forum:** User community for best practices

Slide 18: Summary & Call to Action

Transform Your Requirements Analysis

ODRAS Key Advantages

- ✓ **AI-Powered Analysis:** DAS provides intelligent assistance throughout lifecycle
- ✓ **Ontology-Driven:** Consistent terminology and automated reasoning
- ✓ **Comprehensive Platform:** 15+ workbenches for complete analysis workflow
- ✓ **Knowledge Management:** RAG-powered retrieval and searchable repository

- ✓ **Process Automation:** BPMN workflows for repeatable analysis
- ✓ **Enterprise-Ready:** Security, scalability, and compliance built-in

Next Steps

1. **Schedule Demo:** See ODRAS in action with your data
2. **Technical Workshop:** Deep dive into architecture and capabilities
3. **Proof of Concept:** 30-day evaluation with pilot project
4. **Custom Proposal:** Tailored deployment and pricing

Contact Information

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- **Phone:** [Contact Number]
- **Documentation:** docs.odras.io
- **GitHub:** github.com/your-org/ODRAS

Transform requirements into reality with ODRAS