

Enabling a Major Defense Shipbuilder's CMMC Compliance through Automated CUI Document Marking and Metadata Control with Iternal



Executive Summary

Challenge: A Major Defense Shipbuilder needed to achieve CMMC (Cybersecurity Maturity Model Certification) compliance before regulatory deadlines, requiring the ability to identify, mark, and control thousands of documents containing Controlled Unclassified Information (CUI) across Word documents, Excel spreadsheets, PowerPoints, PDFs, and engineering drawings—without disrupting existing workflows or relying on manual processes.

Solution: Intel and Iternal Technologies deployed a comprehensive document marking and metadata tagging solution that integrates with the organization's existing data classification platform, enabling automated CUI labeling directly on documents and

NTFS Alternate Data Stream metadata injection for seamless DLP (Data Loss Prevention) integration.

Results:

- Automated marking of 1,000+ unique CUI label types across all major document formats
- NTFS metadata tagging enables Microsoft Purview and other DLP platforms to control document flow
- 100% on-premise operation ensuring sensitive defense data never leaves organizational boundaries
- Processing throughput of ~14,000 files per hour with scalable worker architecture
- CMMC compliance timeline accelerated from manual months to automated days

Technology Stack: Intel Xeon (Server Processing) + Intel Core Ultra (Edge Deployment) | Iternal Document Labeling + Windows File Tagging Server + AirgapAI

The CMMC Compliance Challenge

AI and automation are rapidly becoming strategic assets for defense contractors facing regulatory compliance deadlines. For a Major Defense Shipbuilder—a division of one of America's largest defense companies with over 3,300 employees and billions in Navy contracts—achieving CMMC compliance isn't optional. It's a business imperative that determines eligibility for future Department of Defense contracts.

The challenge is multifaceted: CUI (Controlled Unclassified Information) exists across millions of legacy files spanning decades of ship design, construction, repair operations, and contract documentation. CMMC requirements mandate not just identifying this sensitive data, but visibly marking documents and implementing technical controls to prevent unauthorized disclosure.

Together, Intel and Iternal Technologies have partnered to provide a unique solution that addresses the Major Defense Shipbuilder's CUI marking requirements, transforming a manual, months-long compliance initiative into an automated, scalable operation that integrates with existing infrastructure.

Why CUI Marking Automation Matters

CUI document marking is more than checking a compliance box—it's the foundation for controlling sensitive defense information throughout its lifecycle. Traditional manual marking approaches create insurmountable challenges:

Manual Marking Pain Points:

- **Scale impossibility** - Millions of legacy documents requiring human review and marking
- **Inconsistency** - 1,000+ unique CUI designation categories requiring expert knowledge
- **Format complexity** - Word, Excel, PowerPoint, PDF, and engineering drawings each require different marking approaches
- **Timing pressure** - CMMC certification deadlines leave no room for extended manual efforts
- **Workflow disruption** - Manual processes interrupt normal business operations

Compliance Requirements:

- Documents must be visibly marked with appropriate CUI designations
- Technical controls must prevent unauthorized transmission or disclosure
- Marking must persist with documents as they move through the organization
- DLP platforms must be able to read and enforce document classifications

Without an automated approach, organizations face an impossible choice: delay compliance (losing contract eligibility), hire massive temporary workforces (costly and error-prone), or hope manual spot-checking suffices (regulatory risk).

The Two-Part Solution: Visual Marking + Metadata Control

Intel and Internal's solution addresses both CMMC requirements through an integrated approach:

Part 1: Automated Document Marking

Internal's document manipulation engine can apply visual CUI markings across all major document formats:

Microsoft Word Documents:

- Header and footer injection with classification text
- Support for complex documents with existing images and formatting
- Preservation of original document structure and content

PowerPoint Presentations:

- Overlay labels positioned in corners or as watermarks
- Classification marking on every slide
- Template-based approach ensuring consistency

Excel Spreadsheets:

- Blank worksheet injection at the beginning of workbooks
- Classification clearly visible when files are opened
- Alternative row injection for specific use cases

PDF Documents:

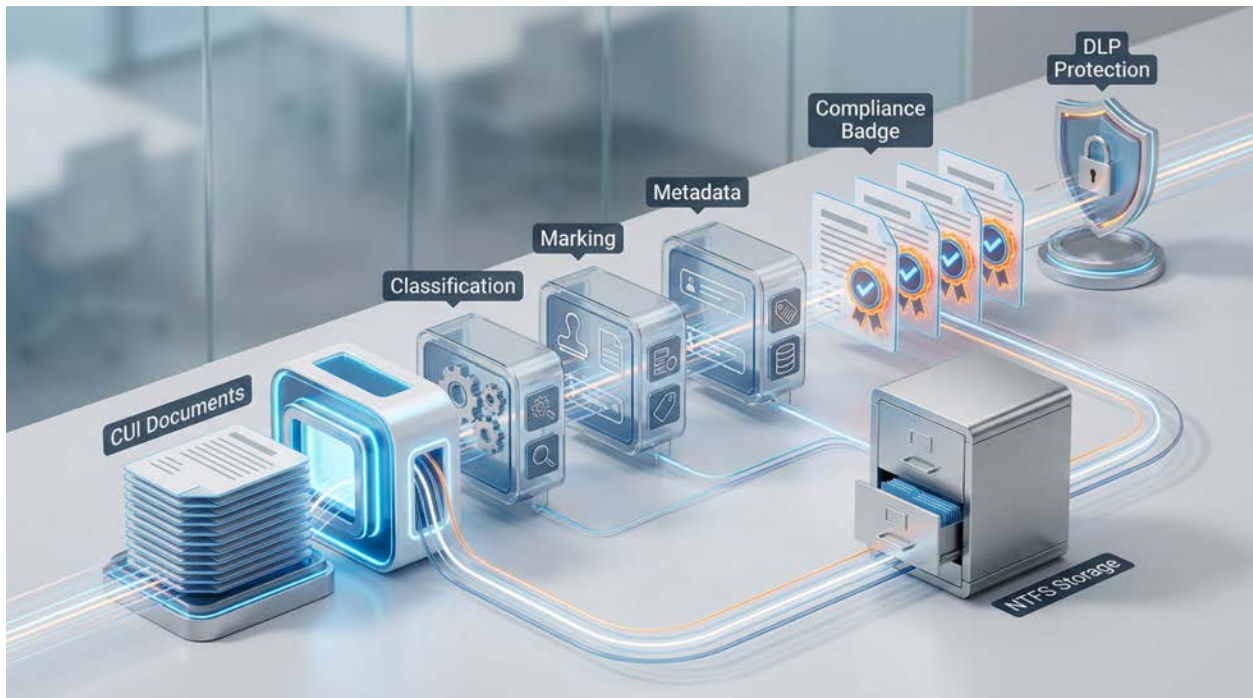
- Overlay marking similar to PowerPoint approach
- Strategic positioning to avoid margin conflicts
- OCR-compatible marking that doesn't interfere with text extraction

Processing Performance:

- Template UUID-based classification lookup
- Bulk processing via API integration
- Support for 1,000+ unique CUI label configurations

Part 2: Windows File Tagging Server (NTFS Metadata Control)

The critical capability that enables technical DLP enforcement: injecting CUI classifications directly into NTFS Alternate Data Streams (ADS).



Key Capabilities:

- **API-Driven Processing** - server accepts classification data and file paths
- **Queue-Based Architecture** - queue workers enable massive parallelization
- **Metadata Persistence** - Tags travel with files when copied on NTFS volumes
- **DLP Integration** - Microsoft Purview and other platforms read ADS metadata to enforce controls
- **Audit Trail** - Complete logging including Splunk HEC integration

Why NTFS ADS?

- Tags are invisible to normal file operations
- Original file content and timestamps are preserved
- DLP platforms can read ADS without opening files
- Tags persist through file system operations on NTFS
- No modification to the document's visible content

Benchmark Results

Processing Throughput (Windows File Tagging Server):

Workers	Files/Second	Files/Hour	Scaling
1	~0.8	~2,900	Baseline
3	~1.4	~5,000	1.75x
9	~3.9	~14,000	4.9x
12	~4.5	~16,200	5.6x

Per-File Processing Includes:

- File validation and security checks
- SHA256 hash computation for integrity
- NTFS ADS stream writes (classification + audit metadata)
- SQLite database updates for tracking
- Splunk logging for audit compliance

Document Marking Performance:

- Template-based marking: <1 second per document
- Bulk API processing: 1,000+ documents per batch
- CUI label lookup: UUID-based instant retrieval



The Workflow: From Classification to Control

Step 1: Data Classification (Existing Infrastructure)

The Major Defense Shipbuilder's existing data classification platform (Verona's) scans documents and identifies:

- CUI designations (1,000+ unique categories)
- ITAR-controlled content
- Social Security numbers and PII
- Contract numbers and technical data

Output: File UUID + Classification type(s) + Location details

Step 2: Document Marking (Iternal)

Based on classification output, Iternal's document manipulation engine:

1. Receives file path and classification designation via API
2. Looks up appropriate marking template (header/footer/overlay style)
3. Applies visual marking to document
4. Returns marked document to original location or designated output folder

Step 3: Metadata Injection (Windows File Tagging Server)

Simultaneously, the tagging server:

1. Receives file path and classification data
2. Creates NTFS ADS with structured JSON payload
3. Preserves original file timestamps
4. Logs operation to Splunk for audit trail

Step 4: DLP Enforcement (Microsoft Purview)

With metadata now embedded in the file:

- Purview reads ADS without opening the document
- Policy rules trigger based on classification
- Unauthorized transmission blocked
- Alerts generated for policy violations
- Complete audit trail maintained

Business Use Cases: CMMC Compliance in Action

- **Legacy Document Remediation** - Process millions of historical files to add missing CUI markings and metadata, accelerating compliance timeline from months to days.
- **Real-Time Classification Enforcement** - As new documents are created or modified, automatically apply markings and metadata before files enter general circulation.
- **Contract Deliverable Preparation** - Ensure all CDRLs, technical manuals, and contract deliverables carry proper CUI markings before transmission to Navy customers.
- **Engineering Drawing Control** - Apply ITAR and export control designations to CAD files and technical drawings with metadata that enables DLP enforcement.
- **Email Attachment Screening** - Integrate with email gateways to verify CUI metadata exists before sensitive attachments leave the organization.
- **Audit Evidence Generation** - Produce comprehensive reports demonstrating systematic CUI marking across the enterprise for CMMC assessors.

On-Premise Deployment: 100% Air-Gapped Capable



The entire solution deploys within the organization's network boundary:

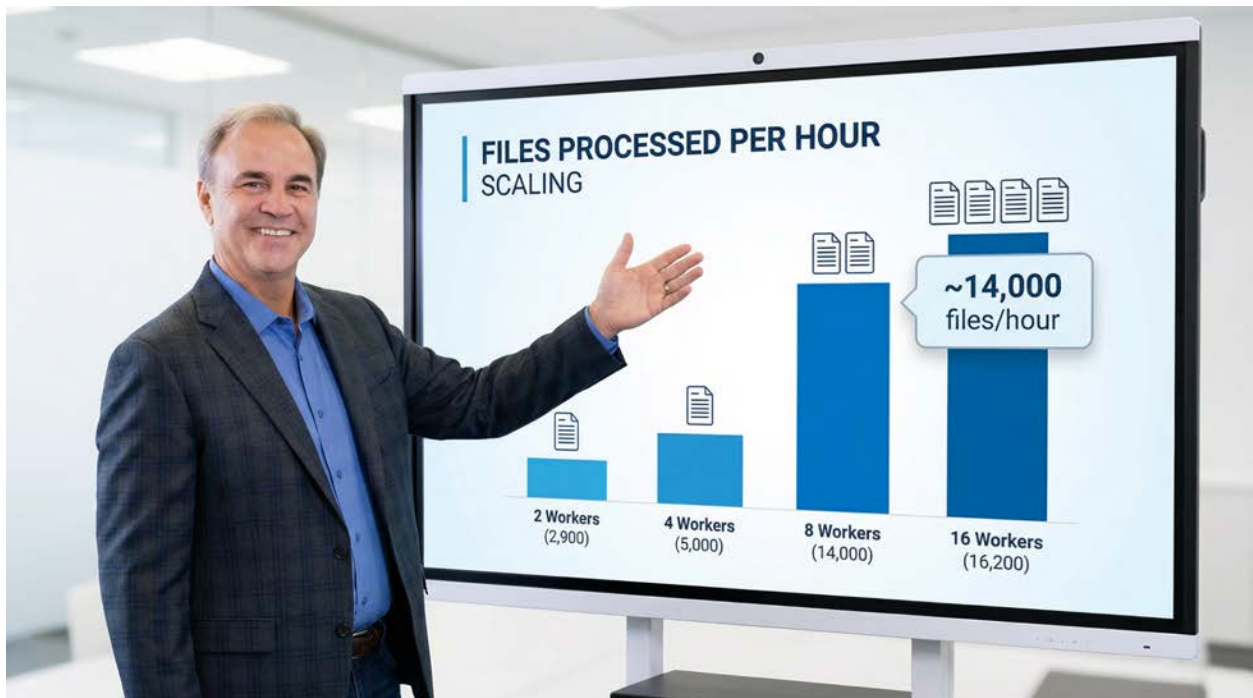
No External Dependencies:

- No cloud API calls required
- No data transmission outside organizational boundaries
- All processing occurs on local infrastructure
- Suitable for classified and CUI-restricted environments

Deployment Options:

- Single server for pilot deployments
- Multi-server clusters for enterprise scale
- Integration with existing virtual infrastructure

The Next Step: AirgapAI for Intelligent Content Analysis



Beyond marking and metadata, the next phase of the Major Defense Shipbuilder's AI journey extends into Iternal's AirgapAI solution for AI-powered knowledge retrieval and content workflows:

Planned Applications:

- Natural language queries against technical documentation
- Automated contract clause extraction and analysis
- Engineering specification search and retrieval
- AI-assisted proposal generation

AirgapAI Capabilities:

- 100% offline operation on Intel Core Ultra AI PCs
- 78x improved accuracy through Blockify data optimization
- Pre-configured workflows for defense industry use cases
- Integration with the same infrastructure supporting CUI marking

This positions the Major Defense Shipbuilder's roadmap for progressive AI adoption while maintaining the security posture required for defense work.

Maximizing AI Investment with The AI Strategy Blueprint

Technology alone doesn't guarantee success—85% of enterprise AI investments fail to deliver expected results. Iternal enhances its technology deployment with *The AI Strategy Blueprint*, a complete framework for AI transformation written by Iternal's CEO based on seven years of enterprise deployment experience.

The Blueprint addresses the 70% of AI success that depends on people and processes:

- **5x revenue gains** compared to competitors stuck in pilot programs
- **Governance frameworks** that enable speed rather than create barriers
- **Crawl-walk-run deployment strategies** that prove value before scaling risk
- **ROI quantification methodologies** that satisfy CFO scrutiny

This strategic foundation ensures the Major Defense Shipbuilder extracts maximum value from their CUI marking deployment and subsequent AirgapAI rollout.

Accelerating Adoption with Iternal AI Academy

The fastest path to ROI is workforce capability. Iternal enhances its technology with the AI Academy (edu.ternal.ai)—comprehensive AI fluency training that accelerates how quickly employees can leverage AI solutions:

- **610+ courses** spanning every major industry and job role
- **Three proficiency tiers** - Beginner, Advanced, and Expert tracks
- **Real-time AI feedback** - Prompts scored and critiqued for immediate improvement
- **Verified certificates** - Independently verifiable credentials demonstrating competency
- **Universal application** - Skills transfer to any AI platform

By combining foundational education with interactive practice, AI Academy ensures the Major Defense Shipbuilder's workforce can fully leverage their technology investment from day one.

What This Means for You: CMMC Compliance Achieved

By uniting Intel server infrastructure with Iternal Technologies' document marking and metadata tagging capabilities, defense contractors can transform CMMC compliance from an overwhelming manual effort into an automated, scalable operation.

Together, Intel and Iternal help Defense Contractors:

- **Automate Document Marking** - Apply visual CUI labels to Word, Excel, PowerPoint, PDF, and engineering files at scale
- **Enable DLP Enforcement** - NTFS ADS metadata injection allows Purview and other platforms to control document flow
- **Accelerate Compliance** - Process millions of legacy documents in days rather than months
- **Maintain Security Posture** - 100% on-premise operation ensures sensitive data never leaves organizational boundaries
- **Scale With Demand** - Queue-based architecture processes ~14,000+ files per hour with horizontal scaling

Key Capabilities Delivered:

Capability	Manual Approach	Iternal Solution
Document Marking	Hours per document	<1 second per document
Metadata Tagging	Not feasible manually	Automated via API
DLP Integration	Requires manual classification	Automatic via NTFS ADS
Legacy Remediation	Months to years	Days to weeks
Audit Evidence	Manual documentation	Automated Splunk logging



AI and automation have moved from conceptual to operational in defense contracting. Whether achieving CMMC compliance, controlling CUI flow, or expanding into AI-powered knowledge management, Intel and Iternal deliver the secure, accurate, and scalable framework defense shipbuilders need to maintain contract eligibility and mission advantage.