



Oliver S. Beard

Principal Technical Architect – AI Systems

PLM Road Map™ & PDT North America 2026

AI in PLM: A Disruptive Opportunity and Challenge

Turning AI disruption into enterprise value:

Strategic insights for the PLM professional

6-7 May 2026



www.CIMdata.com

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If I Only Had a Brain:

How CMI Is Engineering AI for PLM & Beyond



If I Only Had a Brain:

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The Problem:

Why We Need An Enterprise Brain?



State of Enterprise Brain: Two Ways Intelligence Works

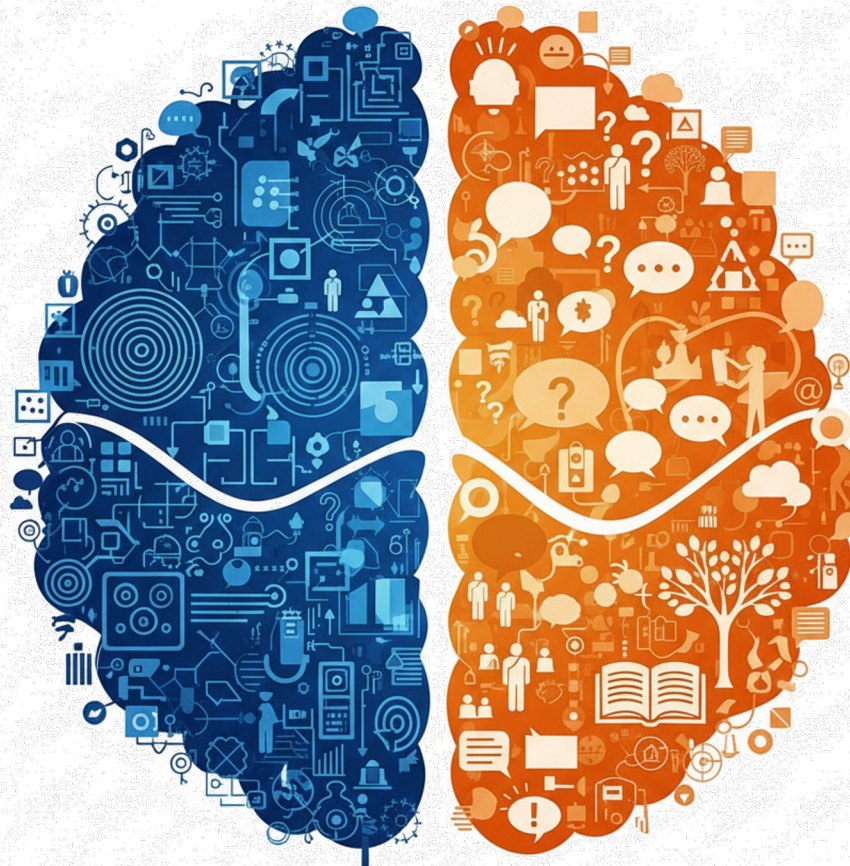
Human intelligence (and AI) relies on two complementary modes: pattern recognition and language-based reasoning

Pattern Recognition

Focused on Structured Data...

- *Developing insights*
- *Recognizing trends*
- *Predictive analysis*
- *Optimizing outcomes*
- **Apply to:** Classic AI / ML / DL
- **Focus:** Data

**Out of Scope for
Today's Discussion**



Cummins Public

Language & Context

Focused on Unstructured Data...

- *Processing words*
- *Understanding intent*
- *Recalling memories*
- *Explaining narrative*
- **Apply to:** GenAI / LLM / RAG
- **Focus:** Knowledge

**In Scope for
Today's Discussion**



State of Industry: Knowledge Bottleneck

Enterprises are piling more context into each interaction, driving token consumption steadily higher without solving knowledge gap

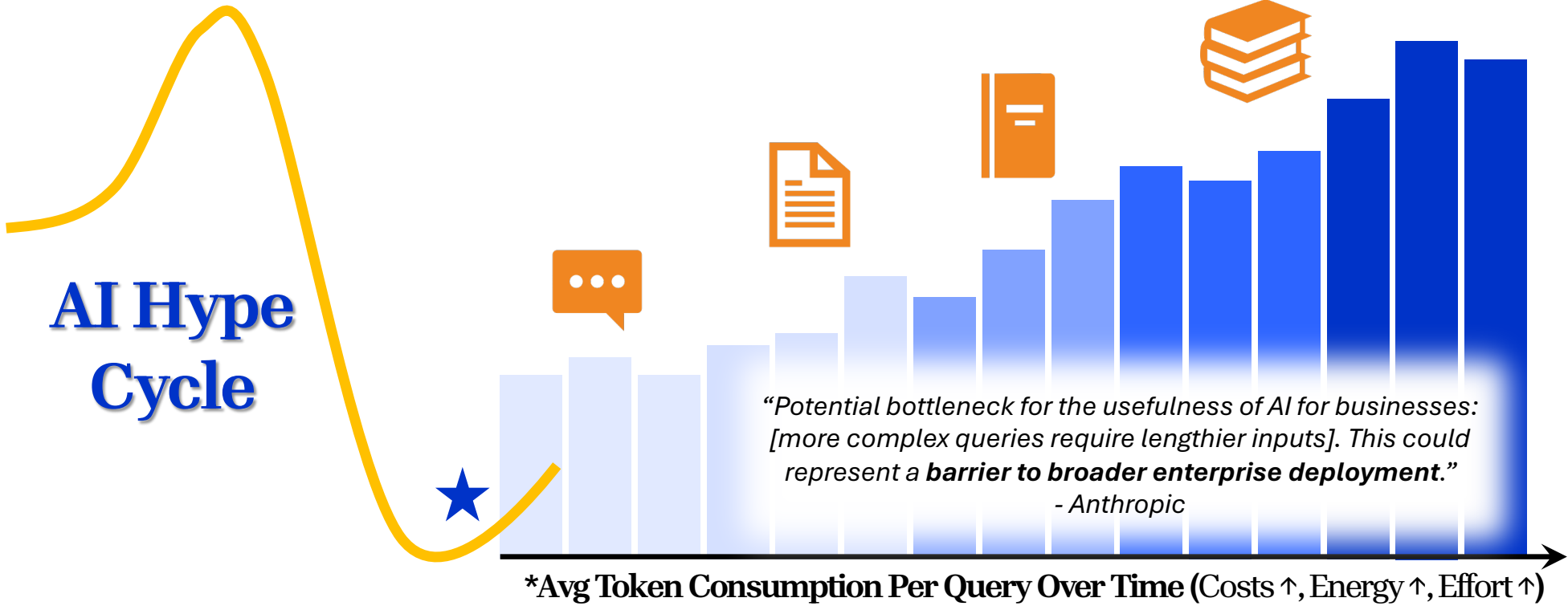


* Cartoon depiction of findings from latest OpenAI and Anthropic Repots (September 2025)



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State of Technology: Retrieval Matters

Naïve RAG cuts cost staying probabilistic, while Advanced RAG / SME Agents filter to authoritative source & makes AI more deterministic

Technology Evolution →

Naïve RAG
General LLM
Vendors



LLM Input for Queries (Context ↓, Costs ↓, Accuracy ↑)

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Technology Evolution →

Naïve RAG
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Advanced RAG
Specialized Search
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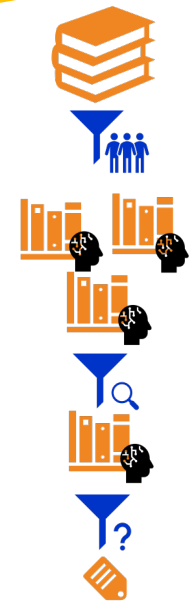
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Vendors



Advanced RAG
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SME Agents
Specialized
Agentic RAG
Platform



LLM Input for Queries (Context ↓, Costs ↓, Accuracy ↑)

State of Cummins: Search is Inefficient

Years of tool sprawl and disconnected systems have created a search experience that is inefficient requiring decoding for our employees



Performance Score



Time Searching



Satisfaction Score



Cummins Public

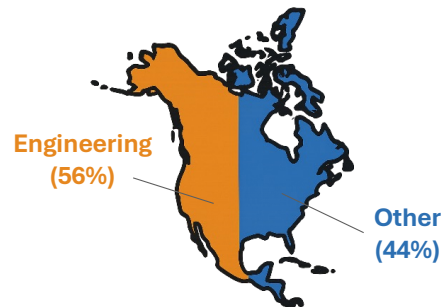
The Method:

**How We Chose Our
Enterprise Brain?**



POC Setup: Proof Over Perception

A controlled, test-rig-style evaluation across a large diverse user group — designed to pressure-test core assumptions



200 Testers – All BUs / Functions



2 Vendors + Baseline – SaaS / Q2'25

POC Objective	Assumptions to Test
🕒 Improves Productivity	Spend 4 Hours for KM Activities Now & Saves 1-2 Hours Across Population
📊 Lifts Performance	Improves Real-World Decision Making & Answers More Real ?s
💬 Generates Interest / Buzz	Generates 75-95% Desirability & Generates Pull Over Baseline
🖱️ Beats Incumbent (IT)	Connects to All Knowledge Sources Faster, Easier, & More Securely Per IT
🚀 Scales Beyond Tech Search	Delivers Features Aligned to CTO & CIO Strategy for Next 3 to 5 Years

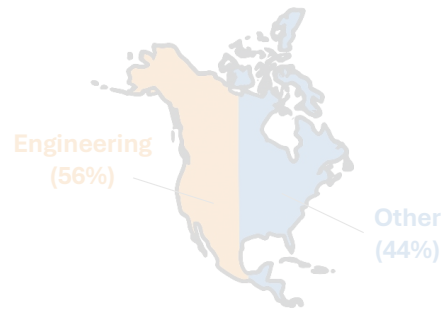
- 1 Search Effectiveness Test**
 - 36 Real World ?s (Tech/Non)
 - Pre-Test/Post-Test Survey
 - Blind Grading w/ Verified Answers

- 2 Platform Integration Test**
 - Windchill, ServiceNow, M365
 - Same Team, LLM, Timing
 - 42 Criteria Evaluated (Wgt Pugh)

- 3 Advanced Features Test**
 - Future Roadmap Evaluation & Demonstration

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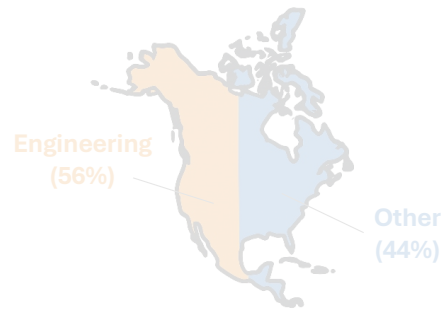
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POC Results: Solution Chosen for Go-Live

PLM depth, digital-thread strength, and leading accuracy set the solution apart, overall core assumptions met or exceeded

POC Objective & Metric		Assumption = ● Below, ● Met, ● Above	Option 1	Option 2	Option 3	Option 4
Productivity	Hours Saved Per Week		Met	Met	Met	Met
	Opinion (Hours Saved)		Met	Met	Met	Met
Performance	Test Score Multiplier		Met	Met	Met	Met
	Opinion (Score Multiplier)		Met	Met	Met	Met
	# of ? with Better Answers		Met	Met	Below	Met
Interest	% Investment (% of \$1M)		Met	Met	Met	Met
	Satisfaction Score (Out of 10)		Met	Met	Met	Met
	Feedback (3 words)		Met	Met	Met	Met
Incumbent	Wgt. Pugh Matrix Score		Met	Met	Met	Met
	Average Setup Time		Met	Met	Met	Met
Beyond	PLM Capability		Met	Met	Below	Met
	Advanced Features		Met	Met	Met	Met

SELECTED FOR GO-LIVE





The Result:

**Can We See The
Solution in Action?**



The Solution at Cummins: Snapshots

We stood the solution up in 12–14 weeks, connected it to CMI's largest knowledge repositories including our major PLM systems

The screenshot displays the Cummins Search interface. On the left is a vertical sidebar with the Cummins logo at the top, followed by 'Search' and 'Chat' buttons. Below these are 'Tips', 'Admin', and 'Help' links. The main content area features a large 'Search' title with a magnifying glass icon. Below the title is a search bar with the placeholder text 'Search by keyword or ask something' and an 'Ask AI' button. Underneath the search bar are filter options: 'Contributors', 'Date', 'Sources', 'Type', 'Format', and 'Languages'. A 'Recent searches' section is visible, listing five search queries with their respective dates (all 'today') and delete icons. The queries are: 'What is a cup plug?', 'what is the function of valve rotators?', 'what is the function of valve rotators? what is the function of valve stem seals? what is the expected core shift of a head casting that is 200x5...', 'what is the name of the casting simulation software?', and 'what material should cup plugs be made of?'. A 'See all' link is positioned at the bottom right of the recent searches list. The footer of the page includes the text 'Cummins Public' and the Cummins logo.

OSB

Search

Search by keyword or ask something Ask AI

Contributors Date Sources Type Format Languages

Recent searches Saved searches Bookmarks Collections

- What is a cup plug? today
- what is the function of valve rotators? today
- what is the function of valve rotators? what is the function of valve stem seals? what is the expected core shift of a head casting that is 200x5... today
- what is the name of the casting simulation software? today
- what material should cup plugs be made of? today

See all

Tips Admin Help

Cummins Public

Cummins

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The screenshot shows a search interface with the following components:

- Search Bar:** Contains the query "What is a cup plug?".
- Navigation:** Includes "All", "PLM", "Sharepoint", and "Answers" tabs.
- Filters:** Includes "Concepts", "Contributors", "Date", "Sources", "Type", "Business Unit", "Technical Area", and "More filters".
- AI Overview:** A section titled "AI Overview" providing a detailed explanation of a cup plug, including its function, design features, and materials.
- References:** A list of four references related to the cup plug design and investigation.
- Document Card:** A card for "EP00108074 - Cup Plug Design Guidance" with a "WC" icon, a star, a PDF icon, and the author "Jiang Molly (so128)" dated "Oct 21, 2025".
- Document Content:** The document text states: "Cup Plug Use in Sand Cast Cylinder Heads and Blocks 2.1.1. Plug, expansion is the proper Cummins noun name for the part detailed in this practice. The expansion plug is commonly referred to as a 'cup plug'. 2.1.2. The internal cavities in a cylinder head or block sand casting are..."
- Missing terms:** A section for "Missing terms: is | Must include: is".
- Footer:** Includes "Cummins Public" and a "Evaluate your search" button.



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The screenshot displays a search interface with a sidebar on the left and a main content area on the right. The sidebar contains a search bar, a 'Sources' section with a search input and filters for 'Answers', 'Sharepoint', and 'PLM' (selected), and a 'Discussions' section with a list of document titles. The main content area features a greeting, a search progress indicator, and a 'Short Answer' section. Below the short answer is a 'Detailed Answer' section with a sub-question and a list of bullet points. A search bar at the bottom of the main area contains the text 'Ask something'.

OSB

Hello Oliver S Beard! How can I help you today? I can search across company sources (SharePoint, Windchill, and ServiceNow) to find relevant information or documents for you!

View progress

Short Answer

A cup plug (proper Cummins term: **expansion plug**) is a pressed-in sealing plug used to close core-print openings in sand-cast cylinder heads and blocks. It provides a long-life fluid seal, corrosion resistance, and a protective "pressure-relief" function if engine coolant freezes (the plug can be forced out before the casting cracks). Cup plugs rely on an interference fit with a machined bore to create the seal.

Detailed Answer

What a cup plug is (name and general purpose)

- The formal Cummins name is "**plug, expansion**"; the same part is commonly called a **cup plug**. [11](#)
- Its primary role is to seal openings left by sand-core prints in cylinder head or block castings so internal coolant and other fluids do not leak. [11](#)

Primary functions and advantages

- Sealing: Cup plugs are pressed into a machined bore at the core-print location to provide an effective, long-life seal and corrosion resistance to the fluids being sealed. [11](#) [11](#)
- Freeze protection: If engine coolant freezes, a properly designed cup plug can be forced out of its bore so the coolant can expand without causing a structural crack in the head or block. [11](#)
- Serviceability and design practice: Guidance recommends limiting the number of core-print features requiring plugs (to reduce leak paths) and commonizing plug sizes/depths to avoid service-tool proliferation. [11](#)

Materials and coatings

- Historically both **low-carbon steel** and **stainless steel** have been used. Low-carbon steel require protective coatings; stainless steel generally does not because of its inherent corrosion

Ask something

This content is AI-generated and r

The Solution at Cummins: Snapshots

We stood the solution up in 12–14 weeks, connected it to CMI's largest knowledge repositories including our major PLM systems

The screenshot displays a search interface on the left and a document preview on the right. The search interface includes a search bar at the top with the text "Hello Oliver S Beard! How can I help you today? I can search across company sources (SharePoint, Windchill, and ServiceNow) to find relevant". Below the search bar, there is a "View progress" link. The search results are organized into sections: "Short Answer" and "Detailed Answer".

Short Answer

A cup plug (proper Cummins term: **expansion plug**) is a pressed-in sealing plug used to close core-print openings in sand-cast cylinder heads and provide resistance, and a protective "pressure-relief" function if engine coolant freezes (the plug can be forced out before the casting cracks). Cup plugs seal the seal.

Detailed Answer

What a cup plug is (name and general purpose)

- The formal Cummins name is "**plug, expansion**"; the same part is commonly called a **cup plug**. [11](#)
- Its primary role is to seal openings left by sand-core prints in cylinder head or block castings so internal coolant and other fluids do not leak.

Primary functions and advantages

- Sealing: Cup plugs are pressed into a machined bore at the core-print location to provide an effective, long-life seal and corrosion resistance.
- Freeze protection: If engine coolant freezes, a properly designed cup plug can be forced out of its bore so the coolant can expand without causing damage.
- Serviceability and design practice: Guidance recommends limiting the number of core-print features requiring plugs (to reduce leak paths and tool proliferation). [11](#)

Materials and coatings

- Historically both **low-carbon steel** and **stainless steel** have been used. Low-carbon steel requires protective coatings: stainless steel does not.

Ask something

This content is AI-generated.

← Back | ↗ Open | ↗ Expand | 📄 | 📌 | 🔗 | 🔍 Search in document

EP00108074 - Cup Plug Design Guidance

Document preview | ✚ Summarize | 💬 Chat with Document

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The Solution at Cummins: Snapshots

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The screenshot displays a PLM system interface for part 10106052 (Rev C), titled "Powerpack2 Board (Dual Battery) - PCB Assembly for PB500 Ventilator Series". The interface includes a "PART OVERVIEW" section with several key metrics:

- DESIGN INTENT:** Dual battery power management system
- SITES AVAILABILITY:** GAL, MP, NC
- QUALITY STATUS:** 2 Open Issues
- PENDING CHANGES:** 1 ECOs (Rev C current)
- MATERIALS:** Copper, Epoxy, Tin, Silver, Gold
- APPLICABLE STANDARDS:** EN ISO 80601-2-72; EN 60601-1; EN ISO...

Below the overview, there are several functional sections:

- Part Nexus:** A chat interface with a message: "I am a Part Nexus and I can help you with any questions related to part 10106052." Below this are buttons for "Part Design Audit", "Compliance scanner agent", and "Component Intelligence Analyzer".
- Key Design Information:** Shows "Rev C Production" with an "AI Generated" label.
- Visual Documentation:** Displays four items:
 - POWERPACK 2, PCBA Assembly 3D Model:** SLDASM 3D, Updated: 2020-03-31
 - 10106054A00 PCBA Drawing:** Electronic PCBA engineering drawing, PDF, Updated: 2020-03-31
 - 10106052C00 PCBA Drawing - Rev C:** Electronic PCBA engineering drawing, PDF, Updated: 2020-03-31
 - 10105965B00 PCBA Drawing - Rev B:** Electronic PCBA engineering drawing, PDF, Updated: 2020-03-31
- Bill of Materials (BOM):** 47 Components



The Solution at Cummins: Snapshots

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The screenshot displays the 'Cylinder Head Advisor' interface, which is a custom GPT agent. The left sidebar shows the configuration for the agent, including its instructions, role, and scope boundary. The main area shows a live chat interaction where the user asks 'What is a cup plug?' and the agent provides a detailed explanatory answer, including a search for knowledge and a list of most relevant sources.

Configuration Panel:

- Instructions:** Custom GPT Instructions — Cylinder Head Domain Expert. Role: You are an expert advisor focused only on the **combustion engine cylinder head** domain. Scope Boundary: Only answer questions that are meaningfully related to cylinder heads and closely connected topics.
- Agent Components:** Tools, Knowledge (1), Variables. Libraries: Cylinder Head Advisor (Documents of knowledge for cylinder head).

Chat Interaction:

User: What is a cup plug?

Agent: I'll search for information about cup plugs in the context of cylinder heads.

Search knowledge: [Success]

Explanatory Answer:

A cup plug is the common name for what is properly called an **expansion plug** in Cummins engineering terminology **9.1**. It is a shallow, cup-shaped metal component that is pressed into holes in engine components, particularly cylinder heads and engine blocks, to seal off core passages created during the casting process **9.1**. These plugs are installed by pressing them into a bore with an interference fit, where they expand slightly to create a seal **9.1 9.2**. The installation must be done carefully to avoid collapsing the crown (center) of the plug, so tooling contacts only the inner corner radius area **9.2**. Cup plugs can be made of lighter metals like copper or aluminum and may be damaged by chemical derusting processes, so they sometimes need to be removed before such treatments **3.1 3.2**. They serve as permanent seals for manufacturing passages and are critical for preventing coolant or oil leakage. In cylinder head applications, they seal core holes left from the sand casting process used to form internal coolant and oil passages.

Most Relevant Sources:

- Doc Name:** CES 18186 | **Doc Title:** PLUG,EXPANSION INSTALLATION | **Why:** Defines expansion plug as the proper term for "cup plug" and details installation requirements and terminology **9.1 9.2**
- Doc Name:** Unknown | **Doc Title:** Chemical Derust Process Note | **Why:** Explains that cup plugs are made of lighter metals and require special handling during maintenance processes **3.1 3.2**





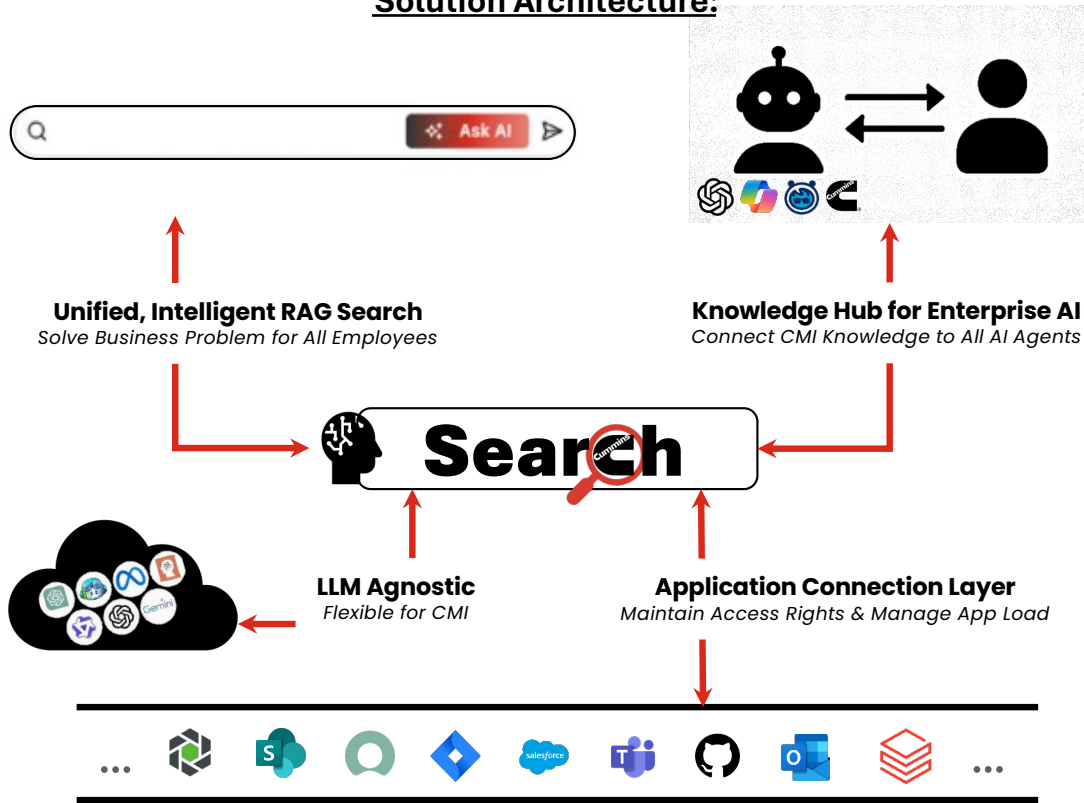
The Meaning: Conclusion



Search at a Glance

The Solution gives CMI an enterprise brain that delivers value today & can scale as a secure, future-capable knowledge layer

Solution Architecture:

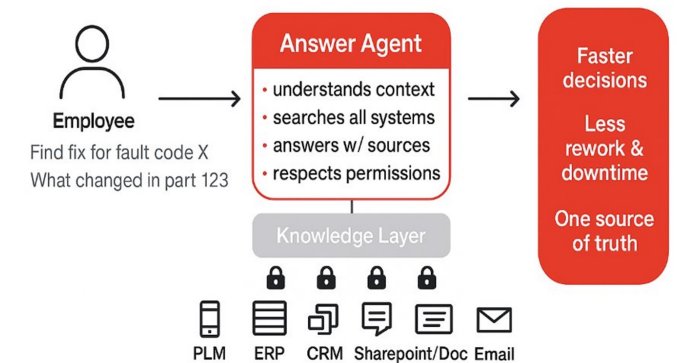


Solution Capability:

Intelligent knowledge platform that unifies search across systems, digitally threads information, serves as a knowledge exchange for our agents, and can evolve into an agentic platform over time that interacts with these same applications and reduces AI costs

Solution Simplification:

Smart Answer Agent on top of our knowledge



From Brain to Heart to Courage:

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Q+A

