

THE PRACTITIONER



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Greetings Practitioners! Fall is here, we are in a new fiscal year, and change is the one-constant we can count on. Speaking of change, the "IP2M METRR Facilitator Certification Workshop 2025", scheduled for November 19 and 20 at the ASU Barrett and O'Connor Washington Center in Washington, D.C., has been canceled. This includes the pre-workshop online sessions for November 10 and 12. That said, let's dive into this month's *Practitioner*!

Yep ... You Read That Right ... 'CD-4A'

In mid-September, Office of Project Management issued a memorandum for the Deputy Secretary through the Acting Assistant Secretary, Office of Environmental Management, approving Critical Decision-4A, approving "Approve Start of Operations or Project Completion, for the Direct-Feed Low-Activity Waste Portion of the Waste Treatment and Immobilization Plant Project.

For some, CD-4A may have been a surprise, given there is only a single mention of the approach in DOE O 413.3B Chg 7 (LtdChg), Program and Project Management for the Acquisition of Capital Assets, which:

"Provides DOE Elements, including NNSA, with program and project management direction for the acquisition of capital assets with the goal of delivering projects within the original performance baseline (PB), cost and schedule, and fully capable of meeting mission performance, safeguards and security, and environmental, safety, and health requirements unless impacted by a directed change."

The single instance of its use appears under:

"b. Phasing.

Example #4: Initial Budget Request for Construction (all projects with CD-2 approval):

Likewise, it may be appropriate to split CD-4. For example, "CD-4A" to designate beneficial occupancy of a facility in advance of operations start-up, particularly if there is a significant time lapse."

Because 413.3B was light on information outside the example shown above in the single instance of CD-4A, it was necessary to look elsewhere. A quick prompt using AI (Copilot) produced the following:

"CD-4A is a milestone within the U.S. Department of Energy's (DOE) project management framework defined by DOE Order 413.3B, which governs the acquisition of capital assets. Here's how it fits into the broader structure:

What is CD-4A?

CD-4A stands for Critical Decision-4A, a sub-phase of CD-4 (Project Completion). It represents partial project completion—typically when a portion of the asset is ready for beneficial use, even though the full scope isn't yet delivered.

CD-4A vs. CD-4 Milestone/Description/Purpose

CD-4A Partial Completion /Authorizes beneficial use of a portion of the asset/May allow occupancy, operations, or turnover of a subsystem.

CD-4 Full Completion /Marks the end of the project/All scope is delivered, and performance baseline is met."

Sources: DOE Order 413.3B overview, Fermilab CD framework

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CD-4A

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Why CD-4A Matters

- Enables phased turnover of facilities or systems.
- Supports mission needs without waiting for full completion.
- Often used in large, complex projects (e.g., labs, infrastructure) where early access to parts of the project accelerates research or operations.

If you're navigating a DOE project or capital asset acquisition, CD-4A can be a strategic tool to unlock partial functionality while maintaining compliance with 413.3B."

10 AI Terms Everyone Should Know

By Susanna Ray - Story published on Nov. 6, 2023 ([Microsoft Source](#))

The term "AI" has been used in computer science since the 1950s, but most people outside the industry didn't start talking about it until the end of 2022. That's because recent advances in machine learning led to big breakthroughs that are beginning to have a profound impact on nearly every aspect of our lives. We're here to help break down some of the buzzwords so you can better understand AI terms and be part of the global conversation.

1. Artificial intelligence - Artificial intelligence is basically a super-smart computer system that can imitate humans in some ways, like comprehending what people say, making decisions, translating between languages, analyzing if something is negative or positive, and even learning from experience. It's artificial in that its intellect was created by humans using technology. Sometimes people say AI systems have digital brains, but they're not physical machines or robots — they're programs that run on computers. They work by putting a vast collection of data through algorithms, which are sets of instructions, to create models that can automate tasks that typically require human intelligence and time. Sometimes people specifically engage with an AI system — like asking Bing Chat for help with something — but more often the AI is happening in the background all around us, suggesting words as we type, recommending songs in playlists and providing more relevant information based on our preferences.

2. Machine learning - If artificial intelligence is the goal, machine learning is how we get there. It's a field of computer science, under the umbrella of AI, where people teach a computer system how to do something by training it to identify patterns and make predictions based on them. Data is run through algorithms over and over, with different input and feedback each time to help the system learn and improve during the training process — like practicing piano scales 10 million times in order to sight-read music going forward. It's especially helpful with problems that would otherwise be difficult or impossible to solve using traditional programming techniques, such as recognizing images and translating languages. It takes a huge amount of data, and that's something we've only been able to harness in recent years as more information has been digitized and as computer hardware has become faster, smaller, more powerful and better able to process all that information. That's why large language models that use machine learning — such as Bing Chat and ChatGPT — have suddenly arrived on the scene.

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Published monthly for the EFCOG's
Project Delivery Working Group by:

Craig Hewitt
(writer/editor)
(509) 308-2277

Craig_T.Hewitt@rl.gov

Adam Russell
(writer/publisher)
(509) 376-5742

Adam.Russell@rl.gov

Tony Spillman
(managing editor)
(509) 372-9986

Anthony_W.Spillman@rl.gov

For questions, comments,
story ideas or other
correspondence, call or
e-mail Craig Hewitt.

10 AI Terms

Continued from previous page

3. Large language models - Large language models, or LLMs, use machine learning techniques to help them process language so they can mimic the way humans communicate. They're based on neural networks, or NNs, which are computing systems inspired by the human brain — sort of like a bunch of nodes and connections that simulate neurons and synapses. They are trained on a massive amount of text to learn patterns and relationships in language that help them use human words. Their problem-solving capabilities can be used to translate languages, answer questions in the form of a chatbot, summarize text and even write stories, poems and computer code. They don't have thoughts or feelings, but sometimes they sound like they do, because they've learned patterns that help them respond the way a human might. They're often fine-tuned by developers using a process called reinforcement learning from human feedback (RLHF) to help them sound more conversational.

4. Generative AI - Generative AI leverages the power of large language models to make new things, not just regurgitate or provide information about existing things. It learns patterns and structures and then generates something that's similar but new. It can make things like pictures, music, text, videos and code. It can be used to create art, write stories, design products and even help doctors with administrative tasks. But it can also be used by bad actors to create fake news or pictures that look like photographs but aren't real, so tech companies are working on ways to clearly identify AI-generated content.

5. Hallucinations - Generative AI systems can create stories, poems and songs, but sometimes we want results to be based in truth. Since these systems can't tell the difference between what's real and fake, they can give inaccurate responses that developers refer to as hallucinations, or the more accurate term, fabrications — much like if someone saw what looked like the outlines of a face on the moon and began saying there was an actual man in the moon. Developers try to resolve these issues through "grounding," which is when they provide an AI system with additional information from a trusted source to improve accuracy about a specific topic. Sometimes a system's predictions are wrong, too, if a model doesn't have current information after it's trained.

6. Responsible AI - Responsible AI guides people as they try to design systems that are safe and fair — at every level, including the machine learning model, the software, the user interface and the rules and restrictions put in place to access an application. It's a crucial element because these systems are often tasked with helping make important decisions about people, such as in education and healthcare, but since they're created by humans and trained on data from an imperfect world, they can reflect any inherent biases. A big part of responsible AI involves understanding the data that was used to train the systems and finding ways to mitigate any shortcomings to help better reflect society at large, not just certain groups of people.

7. Multimodal models - A multimodal model can work with different types, or modes, of data simultaneously. It can look at pictures, listen to sounds and read words. It's the ultimate multitasker! It can combine all of this information to do things like answer questions about images.

8. Prompts - A prompt is an instruction entered into a system in language, images or code that tells the AI what task to perform. Engineers — and really all of us who interact with AI systems — must carefully design prompts to get the desired outcome from the large language models. It's like placing your order at a deli counter: You don't just ask for a sandwich, but you specify which bread you want and the type and amounts of condiments, vegetables, cheese and meat to get a lunch that you'll find delicious and nutritious.

9. Copilots - A copilot is like a personal assistant that works alongside you in all sorts of digital applications, helping with things like writing, coding, summarizing and searching. It can also help you make decisions and understand lots

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10 AI Terms

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of data. The recent development of large language models made copilots possible, allowing them to comprehend natural human language and provide answers, create content or take action as you work within different computer programs. Copilots are built with Responsible AI guardrails to make sure they're safe and secure and are used in a good way. Just like a copilot in an airplane, it's not in charge — you are — but it's a tool that can help you be more productive and efficient.

10. Plugins - Plugins are a bit like when you add apps to your smart phone: They step in to fill specific needs that might pop up, enabling AI applications to do more things without having to modify the underlying model. They are what allow copilots to interact with other software and services, for example. They can help AI systems access new information, do complicated math or talk to other programs. They make AI systems more powerful by connecting them to the rest of the digital world.

It Is Not One World

The Circus Maximus Stadium Collapse

In this issue of the *Practitioner*, we continue our ongoing series of catastrophic construction failures to raise awareness of the relationship between critical thinking and identification of potential technical, policy, procedural, process, and execution weaknesses that if recognized early, could avert disaster. Construction disasters are not isolated to modern times. This month's *Practitioner* travels back to 140 AD to look at Rome's Circus Maximus stadium disaster. (from [Google Search](#))

How many died at Circus Maximus?

In ancient times, another terrible stadium disaster occurred in the Circus Maximus resulting in the death of 1,112 people in 140 AD. The incident is mentioned in the *Historia Augusta* but as with the Fidenae disaster, and most incidents in the ancient era, sources are scant.

Is there anything left of Circus Maximus?

Little is left of the old stadium; you will find a large field in which the shape is still recognizable and a few small ruins. The Circus Maximus was in use until 549 AD.

What happened at the Circus Maximus?

At the Circus Maximus, ancient Romans gathered for spectacular entertainment, most famously the dangerous and popular chariot races and other events like wild animal hunts and gladiator combats. It served as a socio-political tool, a venue for emperors to connect with the masses and for citizens to voice demands through chants. Beyond these events, it was also the site for triumphal processions and other large-scale celebrations.

Why did Circus Maximus collapse?

In the 6th century AD the circus fell into disuse. This was largely because there were other venues like the Colosseum for gladiator and animal fights, and the Stadium of Domitian for chariot and horse races. The last chariot race in Circus Maximus was held in 549 AD, after which the site was abandoned.

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Circus Maximus Collapse

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Circus Maximus seating capacity and size

The Circus Maximus was a massive entertainment venue in ancient Rome, primarily used for chariot races and other public games.

Seating Capacity

Estimates: The Circus Maximus could accommodate between 150,000 to 300,000 spectators. "The Circus Maximus, approximately 600 meters long and 150 meters wide, could accommodate, according to estimates by Pliny the Elder, around 250,000 spectators—about a quarter or a fifth of the city's population during the imperial era." Historical Records: Some sources suggest even higher numbers. "According to official records of Roman Regional Catalogues from the 4th century, it holds 85,000 people".

Size and Dimensions

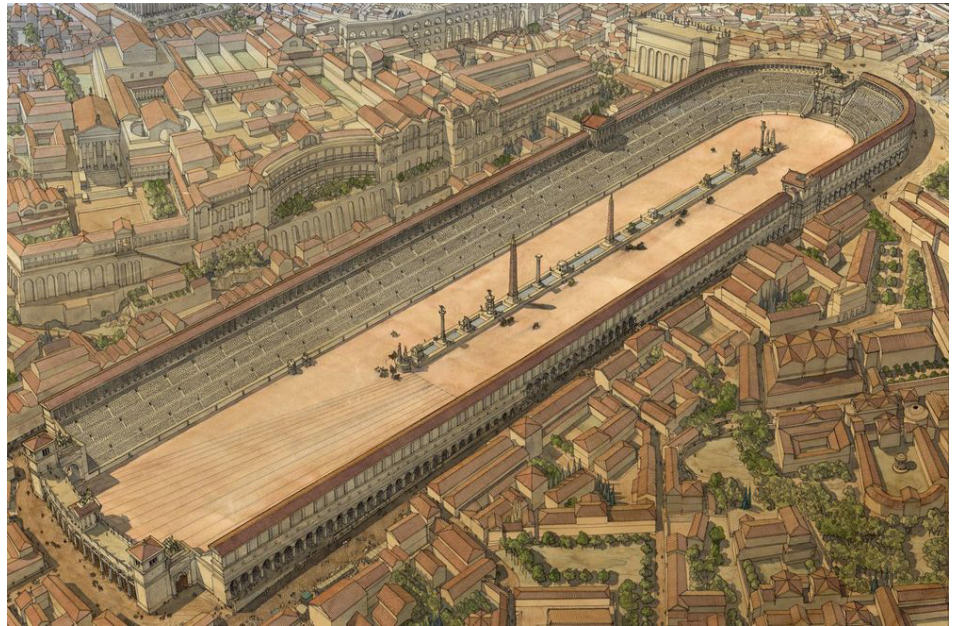
Length: Approximately 621 meters (2,037 feet). "Measuring 621 m (2,037 ft) in length"

Width: Around 118 meters (387 feet). "and 118 m (387 ft) in width"

Comparisons:

Modern Venues: The Circus Maximus was significantly larger than modern stadiums. "The largest modern stadium, Rungrado 1st of May Stadium, holds a mere 150,000 spectators."

Other Roman Venues: It was also larger than the Colosseum, which could hold around 50,000 to 60,000 people. "The Colosseum is still standing."



The Circus Maximus remains the largest entertainment venue ever built by mankind

Current State

Excavations: Parts of the Circus Maximus have been excavated, but much of it is still buried. "Most of the ancient Circus Maximus is buried under sediment from the nearby river, which used to flood the area regularly."

Modern Use: Today, the site is a public park and occasionally hosts events. "Thousands of years later, Circus Maximus is now a public park."

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Repeatable, **A**uditable and **C**ompliant®?

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Just for Fun: October's Notable Events and Famous Birthdays

Notable Events

- 1 — Yosemite National Park was established (1890), the first World Series game was played (1903), the first Ford Model T was introduced (1908), the People's Republic of China was established (1949), American Express issued the first credit card in the U.S. (1958), Roger Maris broke Babe Ruth's single-season home run record with his 61st (1961), and 58 people were killed in a mass shooting in Las Vegas (2017).
- 2 — The Texas Revolution began (1835), Thurgood Marshall was sworn in as the first African-American Supreme Court justice (1967), Bob Gibson set the World Series single-game strikeout record with 17 (1968), and actor Rock Hudson died of AIDS (1985).
- 3 — Thanksgiving became an official holiday (1863), Iraq became an independent nation (1932), Britain successfully tested an atomic bomb (1952), **the Guinness Book of World Records made its debut** (1955), East and West Germany were reunited (1990), and O.J. Simpson was acquitted of murder (1995).
- 4 — Construction of Mount Rushmore began (1927), the Brooklyn Dodgers won their first and only World Series title (1955), the Soviet Union launched *Sputnik*, the first artificial satellite, into orbit (1957), and Pope Paul VI became the first pope to visit the U.S. (1965).
- 5 — President Harry Truman delivered the first televised presidential speech (1947), the New York Yankees won a record fifth consecutive World Series title (1953), the first NC-17 film rating was given for *Henry & June* (1990), and Apple founder Steve Jobs died (2011).
- 6 — The first train robbery in the U.S. was staged (1866), and the Yom Kippur War between Israel and Egypt/Syria began (1973).
- 7 — The assembly line made its debut in a Ford factory (1913), East Germany was established (1949), and Operation Enduring Freedom began in Afghanistan (2001).
- 8 — The Great Chicago Fire began (1871), **Don Larsen pitched the only perfect game in World Series history** (1956), and impeachment proceedings against President Bill Clinton began (1998).
- 9 — Hoover Dam began transmitting electricity (1936).
- 10 — The U.S. Naval Academy was established (1845), and the first major operation of the Vietnam War began (1965).
- 11 — The first manned Apollo mission launched (1968), and *Saturday Night Live* debuted (1975).
- 12 — Christopher Columbus reached the New World (1492).
- 13 — The Continental Navy was established (1775), the cornerstone of the White House was laid (1792), and Bill Mazeroski hit the first ever World Series-winning walkoff home run (1960).
- 14 — USAF Capt. Chuck Yeager broke the sound barrier (1947), and the Cuban Missile Crisis began (1962).
- 15 — Wayne Gretzky broke the NHL career scoring record with 1,851 points (1989).
- 16 — China successfully tested its first nuclear bomb (1964), "Baby Jessica" was rescued from a well on live TV (1987), and 84 people died in a stampede at a World Cup match in Guatemala (1996).
- 17 — OPEC enacted an oil embargo on the U.S. and other nations (1973), and a 7.1 magnitude earthquake hit the Bay Area, postponing Game 3 of the World Series for 10 days (1989).
- 18 — The Mason-Dixon Line was established (1767), and the U.S. took possession of Alaska (1867) and Puerto Rico (1898).
- 19 — The American Revolutionary War ended with the British surrender at Yorktown, Va. (1781), and Maurice Richard became the first NHL player to score 500 goals (1957).
- 20 — The Louisiana Purchase was ratified (1803), and three members of the rock band Lynyrd Skynyrd died in a plane crash (1977).
- 21 — About 100,000 antiwar protesters marched on the Pentagon (1967).
- 22 — The U.S. suffered its first casualties in Vietnam (1957), President John F. Kennedy ordered a blockade of Cuba (1962), and Lance Armstrong was stripped of his 7 Tour de France titles (2012).
- 23 — A car bomb exploded at the U.S. Marines barracks in Beirut, Lebanon, killing 241 (1983).
- 24 — The first transcontinental telegraph line was completed (1861), the United Nations was formally established (1945), Toronto won Canada its first World Series title (1992), and the supersonic Concorde jet made its last flight (2003).
- 25 — The U.S. invaded Grenada (1983).
- 26 — The Erie Canal opened (1825), the Shootout at the OK Corral occurred (1881), and President George W. Bush signed the Patriot Act (2001).
- 27 — **New York's subway system began operation** (1904), the Cuban Missile Crisis ended (1962), and the Boston Red Sox won their first World Series title in 86 years (2004).
- 28 — The Statue of Liberty was dedicated (1886), Congress overruled President Wilson's veto and enacted Prohibition (1919), and the Digital Millennium Copyright Act was signed (1998).
- 29 — The stock market crashed, touching off the Great Depression (1929), the Suez Crisis began when Israel invaded Egypt (1956), and guitarist Duane Allman died in a motorcycle crash (1971).
- 30 — "The War of the Worlds" was broadcast, causing a nationwide panic (1938), and Muhammad Ali beat George Foreman for the heavyweight title in the "Rumble in the Jungle" (1974).
- 31 — Nevada became a state (1864), magician/escape artist Harry Houdini died (1926), Earl Lloyd broke the color line in the NBA (1950), and Indian prime minister Indira Gandhi was assassinated (1984).



Birthdays

- 1 — Actor Walter Matthau (1920), 39th U.S. President Jimmy Carter (1924), actress/singer Julie Andrews (1935), and actors Randy Quaid (1950) and Zach Galifianakis (1969)
- 2 — Civil rights leader Mahatma Gandhi (1869), entertainer Groucho Marx (1890), rock star Sting (1951), and TV personality Kelly Ripa (1970)
- 3 — Singer Chubby Checker (1941), civil rights leader Rev. Al Sharpton and **guitar ace Stevie Ray Vaughan** (1954), and singer Gwen Stefani (1969)
- 4 — 19th U.S. President Rutherford B. Hayes (1822), actor Charlton Heston (1924), author Anne Rice (1941), and actresses Susan Sarandon (1946) and Alicia Silverstone (1976)
- 5 — 21st U.S. President Chester Arthur (1829), fast food entrepreneur Ray Kroc (1902), astronomer Neil deGrasse Tyson and actor/comedian Bernie Mac (1958), and actress Kate Winslet (1975)
- 6 — Actresses Carole Lombard (1942) and Elisabeth Shue (1963)
- 7 — Rock singer John Mellencamp (1951), Russian president Vladimir Putin (1952), cellist Yo-Yo Ma (1955), music judge Simon Cowell (1959), and actress Rachel McAdams (1976)
- 8 — Automobile inventor Frank Duryea (1869), civil rights leader Rev. Jesse Jackson (1941), actor Chevy Chase (1943), actress Sigourney Weaver (1949), and actor Matt Damon (1970)
- 9 — Musician John Lennon (1940), and actors Scott Bakula and John O'Hurley (1954)
- 10 — Rock singer David Lee Roth (1955), football Hall of Famer Brett Favre (1969), and stock car racer Dale Earnhardt Jr. (1974)
- 11 — First lady Eleanor Roosevelt (1884), singer Daryl Hall (1946), football Hall of Famer Steve Young (1961), and actress Joan Cusack (1962)
- 12 — Opera singer Luciano Pavarotti (1935), and actors Hugh Jackman (1968) and Kirk Cameron (1970)
- 13 — Jazz pianist Art Tatum (1909), comedian Lenny Bruce and British prime minister Margaret Thatcher (1925), singer/songwriter Paul Simon (1941), rocker Sammy Hagar (1949), singer Marie Osmond (1959), football Hall of Famer Jerry Rice (1962), and **actor/comedian Sacha Baron Cohen** (1971)
- 14 — General and 34th U.S. President Dwight Eisenhower (1890), actor Roger Moore (1927), fashion designer Ralph Lauren (1934), and rapper/singer Usher (1979)
- 15 — Philosopher Nietzsche (1844), and British royal Sarah Ferguson and TV chef Emeril Lagasse (1959)
- 16 — Dictionary author Noah Webster (1758), playwright Oscar Wilde (1854), and actresses Angela Lansbury (1925) and Suzanne Somers (1946)
- 17 — Actress Rita Hayworth (1918), **motorcycle daredevil Evel Knievel** (1938), actor George Wendt (1948), country singer Alan Jackson (1958), comedian Norm MacDonald (1963), and rapper Eminem (1972)
- 18 — Rocker Chuck Berry (1926), football Hall of Famer Mike Ditka and JFK assassin Lee Harvey Oswald (1939), tennis legend Martina Navratilova (1956), Olympic skier Lindsey Vonn (1984), and actor Zac Efron (1987)
- 19 — Actors John Lithgow (1945) and Jon Favreau (1966)
- 20 — Actor Bela Lugosi (1882), **baseball Hall of Famer Mickey Mantle** (1931), rocker Tom Petty (1953), and rapper Snoop Dogg (1972)
- 21 — Jazz trumpeter Dizzy Gillespie (1917), Israeli prime minister Benjamin Netanyahu (1949), actress Carrie Fisher (1956), and celebrity Kim Kardashian (1980)
- 22 — Actors Christopher Lloyd (1938) and Jeff Goldblum (1952)
- 23 — TV personality Johnny Carson (1925), soccer legend Pele (1940), singer Dwight Yoakam (1956), musical parodist Weird Al Yankovic (1959), and actor Ryan Reynolds (1976)
- 24 — Author Stephen Covey (1932)
- 25 — Artist Pablo Picasso (1881), Hall of Fame basketball coach Bobby Knight (1940), and singers Jon Anderson (1944) and Katy Perry (1984)
- 26 — TV game show host Pat Sajak and politician Hillary Clinton (1947), and actor Dylan McDermott (1962)
- 27 — **26th U.S. President Theodore Roosevelt** (1858)
- 28 — Musician Charlie Daniels (1936), Microsoft co-founder Bill Gates (1955), and actress Julia Roberts (1967)
- 29 — Actor Richard Dreyfuss (1947), actress Winona Ryder (1971)
- 30 — 2nd U.S. President John Adams (1735), singer Grace Slick (1939), and actor Henry Winkler (1945)
- 31 — Actor Michael Landon (1936), actor John Candy (1950), football coach Nick Saban (1951), actor Rob Schneider (1963), and **rapper Vanilla Ice** (1967)

