

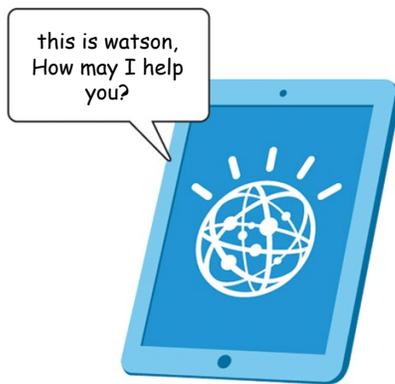
Inspired expertise: The rise of cognitive intelligence in Aerospace and Defense

Cognitive-driven expertise is driving real-world value to Aerospace and Defense (A&D) manufacturers



Introduction

“Hey Watson, I’m getting some deviations on exhaust gas temperatures off Bluebird’s left engine. The sensors and predictors are saying it’s going to cause serious grief in the next 100 hours of flight time. What do you think is going on?”



Watson iPad interface

Mike, a sustainment engineer at a major aerospace original equipment manufacturer (OEM) is monitoring his airline client’s fleet for engine trouble. Every time a plane unexpectedly needs to be serviced, it throws operations off balance. His client has to scramble to avoid frustrating customers, and the downtime can cost them hundreds of thousands of dollars in revenues. The “power-by-the-hour” relationship Mike has means those costs are passed on to him.

The IBM Watson™ swirling electronic iPad interface comes alive and says, *“Mike, there is a 98 percent probability that a compressor is in need of replacement. Would you like me to show it to you and provide the most proven method of repair from past incidents?”* Several images appear on Watson’s interface, showing the types and locations of the troubled compressor.

“Yea, let’s order the replacement part and schedule an ideal time for the repair that doesn’t disrupt operations,” says Mike. “Please send the best video of the repair being done along with the best manual to the local shop.”

Watson perks up, *“That part is currently out of stock. I’ve found five others that might work, ranked highest to lowest by probability. I’ll show them to you now.”*

Mike—happy to have skipped researching thousands of possible replacements—responds, *“Send the second one; I’ve personally had trouble with the first. Please take a note for future incidents and tag this swap so engineering can get a read on its outcome.”*

Watson obeys and makes note in his corpus that the first option wasn’t right based on the technician’s own expert opinion. The interaction saves hours of valuable time.

Science fiction? Hardly. This is a vision of how the aerospace world can operate with the power of cognitive computing integrated into a top-flight analytics environment. Cognitive computing is sophisticated analytics that draws real insight from the vast stores of unstructured data, providing expert answers never accessible before. From the cockpit, to aftermarket and sustainment, to manufacturing and supply chain, to engineering, to even program capture and sales, powerful opportunities exist to put cognitive-driven expertise into every aspect of the A&D operation.

We’re beyond imagination now. It’s the art of the possible. The workday of the future. And it’s happening now.

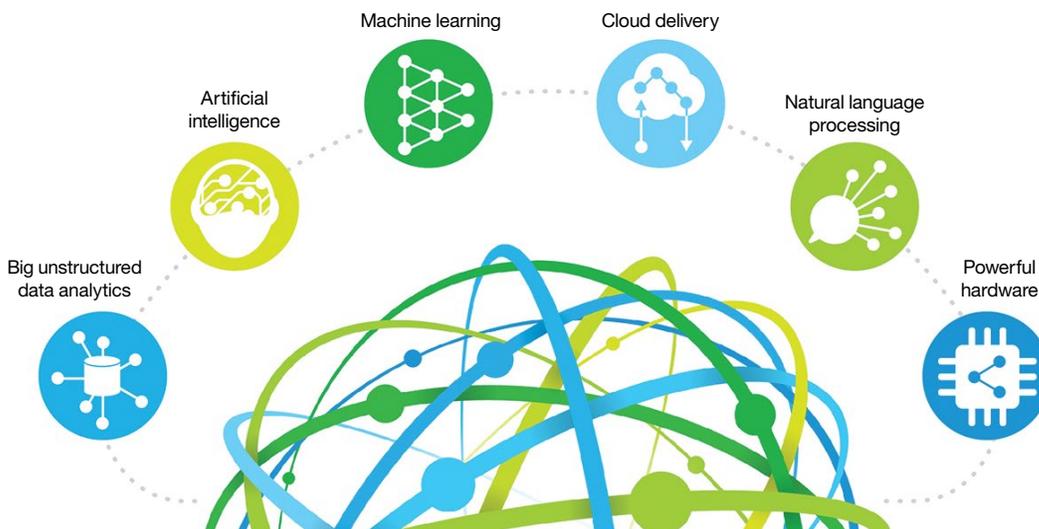
Imperative: Rise of the cognitive opportunity

Roughly 80 percent of the world's data is unstructured, and this 80 percent holds most of the world's expertise and content. Think articles, presentations, encyclopedias, service and trouble tickets, blogs, books, manuals, plans, dictionaries, catalogs, emails, discussion forums, PDFs, directories, knowledge management systems, audio, video and so forth. Until recently, this data could only be used one word at a time, and only if the right piece could be found by a human with a search engine in the first place. This essentially rendered most of it useless for many, and its vast collective power untapped.

But now it's different. Now we have IBM Watson cognitive computing.

In 2004, IBM began pursuing this opportunity. By 2011, Watson was born and was obliterating three top champions playing the quiz show "Jeopardy!" on national television, answering questions thought impossible for a computer. Watson had consumed the Internet to make it happen, and it worked. In 2013, Watson turned from showman to businessman, and began tackling medicine. It's now time to launch Watson and cognitive computing in the A&D industry.

Converging and emergent technologies create cognitive computing



Emerging technologies that comprise cognitive computing

What is cognitive computing?

Cognitive computing is a confluence, combination and realization of several emerging technologies that enable people to get answers and expertise out of their vast stores of unstructured information. These technologies include:

- **Big unstructured data analytics:** The ability to consume and synthesize massive amounts of unstructured data such as manuals, service tickets, intranets, articles, catalogs, knowledge management systems, audio, video, the Internet and so on.
- **Artificial intelligence (AI):** A composition of software, rules, algorithms, processes and methods where software and hardware mimics “cognitive” functions associated with human minds, such as “learning” and “problem solving.”
- **Machine learning:** The algorithms that enable the machine to learn on its own without being explicitly programmed to do so, usually through recognizing patterns in data.
- **Deep learning:** A computational technique that uses neural networks and is based on the human brain’s decision-making process. By building multiple layers of abstraction, deep learning technology can solve complex semantic problems.
- **Cloud delivery:** A model whereby cognitive insights are delivered via the cloud so that the cognitive processing doesn’t happen at the point of the interface (for example, the website, mobile app, wearable device and so on). This model enables a single instance of Watson to be deployed to hundreds or thousands of user interfaces.
- **Natural language processing:** The ability to understand verbal commands (useful when your hands are full) and the ability to speak and write answers or responses.
- **Powerful hardware:** A workload-optimized system design that integrates massively parallel processors, built with proprietary technology. Watson can process 500 gigabytes, the equivalent of a million books per second.

Cognitive works with predictive analytics

Today’s top analytics platforms that analyze structured information have taken analysts to new heights in finding answers to questions like “what,” “when,” “where” and “why.” These analytics are descriptive (what happened) and predictive (what will happen), indicating what the true and quantitative state of reality is at any moment. They work best in a state-of-the-art “Internet of Things” ecosystem where there are ubiquitous sensors, connectivity and analytics working together in one connected environment. This means that every tool, machine, engine part, aircraft system (for example, avionics and landing), factory floor, and so on is constantly producing data. This data in turn is used to analyze past and present activity. Analytics are used to model and alert events that might happen in the future.

One use, for example, is condition monitoring and predictive maintenance, where individual parts or systems behavior is modeled to determine the likelihood of failure or need for repair. These practices have been growing over a decade or more and have matured over time. For example, a decade ago, we might have modeled likely maintenance cycles in the aggregate to plan for routine and general preventative maintenance on aircraft. As sophistication grew, we could monitor and predict events on individual parts or systems, given their individual situations, to create custom maintenance schedules. Now with “edge analytics” moved to the device or sensor level, we use real-time data to diagnose issues at the source within the moment, accelerating time to decision.

Cognitive computing becomes a marvel when paired with these types of analytics. Sometimes called prescriptive analytics, it explains what should be done next after a prediction is made.

Cognitive analytics provides the next set of answers, the ones like “What should I do about this mechanical problem I’ve identified? “What is the most probable repair solution from an infinite number of possibilities?” “What is the way forward to better manage our fuel?” Traditional analytics are *deterministic* in nature, providing a single, assured conclusion. Cognitive analytics gives us *probabilistic* answers (for example, a percentage confidence rate in multiple answers). Describing a quantitative past is a single certainty, while the future is a range of possibilities.

Transforming the speed and depth of expertise, unleashing the impossible expertise

Cognitive speeds the time and depth of expertise and can create insight where there is none. Speed of answers and expertise can vastly change the performance and economics of every activity. For example:

Fast-tracking human development time: Expertise in any given subject is usually gained after years of a person learning. Cognitive can provide expertise to people with only a fraction of the experience. This fast-track expertise is critical in the A&D industry, where there is attrition among senior employees and the maturation of younger employees is more difficult.

Accelerated answers and decisions: Cognitive speeds the acquisition of answers and information on a case-by-case basis. Consider, for example, the search for a repair solution or replacement part. In the old model, an employee might have spent days on a search engine or a knowledge management system searching and manually reviewing documents up to hundreds of pages or entries long. And the answer might not have been found for a lack of time and the inability to overturn every stone. Cognitive not only turns over every stone, it reads, processes and provides the information in an instant.

Game-changing economic impact: The time wasted looking for expertise isn’t just a matter of that employee’s time or salary. It can directly affect the amount of time an aircraft is in the air, and how much time it spends down in repair. How many hours or days (or weeks) can a repair be delayed because a tech advisor is spending that time researching a solution? It can radically change the amount of time it takes for inventory to be found and replenished. Having answers fast can shorten the engineer’s design tasks, or the time needed to contribute to an RFP. Vastly faster expertise means considerably faster decisions, which, in turn, means huge economic and performance enhancements.

Success with Watson in Healthcare

Deployment of Watson in the Healthcare industry, called Phytel, has already given previously unavailable expertise to medical professionals who need to predict which patient will likely need care, even when monitoring thousands of different patients. Medical information is often kept in unstructured reports, so finding the next likely people for treatment across thousands of records is impossible to do manually. Watson reads the records, finds the people most likely in need of proactive treatment and alerts healthcare practitioners to act on it before a future medical condition causes a problem.

At Northeast Georgia Physicians Group, they are finding new answers from data they couldn’t use before Watson:

“The greatest thing about Phytel [solutions] is that it gives us easy access to the data that we knew we always had,” says Marlene McIntyre, Director of Quality and Patient Safety for NGPG, “I can get data on hundreds of patients and risk-stratify it in literally three clicks, versus submitting a report request to our IT team and working with an analyst for months, by which time the data is too old and doesn’t have the level of detail that we get with Phytel [solutions]. If you don’t have a system that does that automatically, those patients may fall through the cracks.”

Disrupting your disruptions: When the operations plan is set, cognitive is an essential part of managing the erosion of the plan's value resulting from contingencies. Quicker recovery from maintenance, logistics, weather, air traffic and other impactful disruptions can be led by cognitive solutions mining the wealth of buried expertise found in the combination of available historical and real-time data sets. The measure of better data will be in its ability to drive better decisions in the face of challenging scenarios, not just in the merits of its construction. Cognitive unleashes data's decision capacity.

Finding the undiscoverable expertise: Cognitive also makes expertise available that would be impossible to compile otherwise, especially at such a massive scale of analysis and in such instant timeframes. With the ability to process a million books in a second, there are likely connections and findings made that would take a human millennia to discover. Although a human might be able to come up with a single (maybe inferior) answer, cognitive might present answers previously undiscoverable.

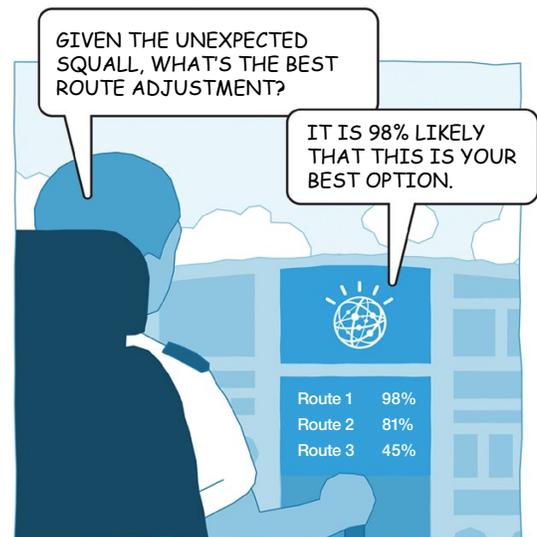
The cognitive experience: Transforming how people interact with their environment and their business activities

While a top-level description of cognitive technology breakthrough provides an understanding of what it is, the true business value comes from understanding how day-to-day business is going to be transformed. Here, think in terms of experiences: imagine technicians having natural conversations with a virtual service agent via tablet about finding the perfect and proven repair solution while their hands are covered in grease. Imagine the procurement officer being presented with the exact items he needs in a moment and never searching a thousand-SKU catalog again. Imagine an airline operations manager receiving recommended courses of action for inclement weather based on past performance. Imagine the environmental health & safety (EHS) inspector ensuring regulatory compliance and safety on the factory floor by talking to an AI expert inside of her smart watch. This is just the beginning of opportunities.

Here are some areas where, in the future, cognitive can vastly improve performance, speed, quality, revenue and insight:

Flight operations and the cockpit

OEMs looking to provide new value-added, revenue-generating, customer-experience-enhancing services to airline and military customers can add cognitive capabilities to help in the cockpit and flight operations, including in-flight services. Whether managing changes in a mission, optimizing a route or dealing with an unexpected situation, the pilot can ask for suggestions and have decisions recommended to them by accessing the entire archive of procedural instructions, the entire knowledge management base, sophisticated weather and atmospheric information, histories of similar events, mechanical specifications and more. Instead of pilots using only their personal memory and intuition to make decisions, they are presented with solutions built on a mountain of facts and bound by the company's efficiency and safety criteria.



Cognitive analytics enhancing in-flight operations

Deep learning analytics can be used for in-flight visual pattern recognition and sensor recognition to assist in sense-and-avoid functionality. In areas such as reconnaissance, intelligence gathering or search and rescue mission, video and image data can be analyzed by cognitive to interpret data and discover probabilistic findings that were previously limited only to manual interpretations of data.

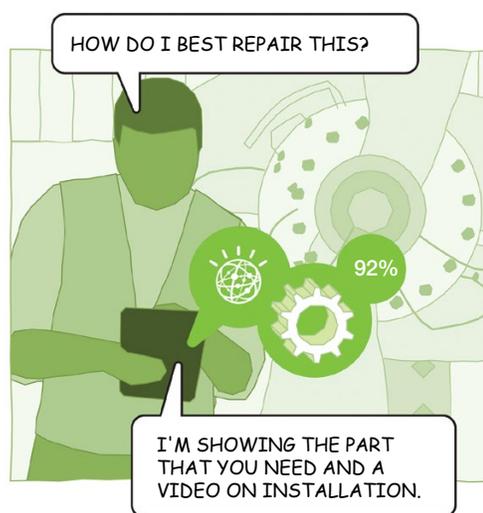
Similar improvements can be had for ground crew, schedulers and other flight operation crew. When something unexpected happens, no longer do they turn to guesswork, paper manuals and trial-and-error to find answers. Instead, they consult with their cognitive agent to present probable solutions from the entirety of past cases, manuals, specifications and even the entire “status of the sky” as Watson breathes in information on weather, flight progress, airspace and airport congestion.

Aftermarket, service provision and technical support services

Most A&D OEMs have reinvented their business models to be service organizations, making recurring service revenue long after the aircraft is delivered. Cognitive capabilities can vastly improve the performance of these relationships. The key to making these “power-by-the-hour” relationships profitable is to keep the aircraft in the air as much as possible, avoid service disruptions fleet-wide, and provide impeccable, value-driving experiences to customers. OEMs’ aftermarket and sustainment services can also help airline resources be more productive and more cost effective. Cognitive can do this in many ways:

- **Provide virtual service agents** at the point of repair to offer solutions to repair problems by accessing the entire wealth of manuals, specifications, past service tickets, portions of the Internet, past video data and so on to find the ideal solution at superspeeds.
- **Increase the productivity of workers** as they spend less time researching and troubleshooting and more time solving and moving on to the next problem. Improved productivity should also provide opportunities to reduce the number of repair personnel needed.

- **Use expert advisors** for operators can enhance their personnel’s expertise, which reduces the need for large populations of senior and experienced workers, and enables OEMs to use techs even when they’ve only been on the job for months.
- **Improve fuel management** to optimize usage, reduce costs, manage supplies and better negotiate buys through using cognitive analytics techniques on fuel data.
- **Increase decision consistency** to preserve the safety and efficiency profile of a critical operation. Analysis of the business conduct, risks and consequences provides reference and guidance for cognitive recommendations that are most reliable and proven effective.
- **Use cognitive training engines** to fill gaps in training programs and provide training on demand at the worksite.
- **Move research, search and analysis to the place of work** (instead of the office)—be it on the factory floor, in the repair shop, on the runway and so forth—by delivering cognitive intelligence and expertise wherever and whenever needed (for example, on the computer, on the tablet, on the smartphone, on the wearable and so on).



Cognitive providing repair solutions

- **Analyze the condition and the future condition of the entire fleet** so that utilization of aircraft assets is optimized across the fleet, ensuring fewer flights are canceled, fewer planes are left idle, and the repair shop is in perfect sync and perfect utilization with the operation's needs and capacities. Fleet planners and schedulers can simply ask Watson questions about their complex fleets instead of compiling and analyzing data themselves.
- **Strategically manage inventory, replenishment and reuse** through a combination of predictive, Internet of Things and cognitive analytics. Predictive analytics can keep quantitative track of inventory, while cognitive analytics can help quicken research and procurement decisions by inventory managers, ensuring the right part (or a suitable replacement) is always available while reducing the amount of overall inventory on hand.

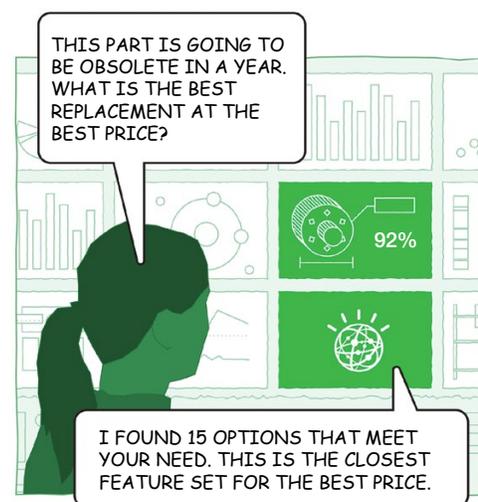
One solution in use takes aircraft sensor data and scores the health of the subsystems and determines the probabilistic chance of failure at a specific set of cycles. (A cycle is a complete flight.) This information provides what will likely go wrong and when. At the same time, the system analyzes every repair order in history (over 500,000 in this example) and predicts what specific repair will likely fix the problem by probabilistics listings and rankings. This data then provides the specific attributes needed to fix the problem; for example, parts, skills, durations, logical location and so on. For the flights operations team, it brings together everything required to make a decision.

Supply chain and manufacturing

The power of cognitive can be applied to many of A&D companies' complex supply chain operations, including procurement, inventory management and manufacturing. Watson can consume every spec, design, catalog, Internet resource, knowledge

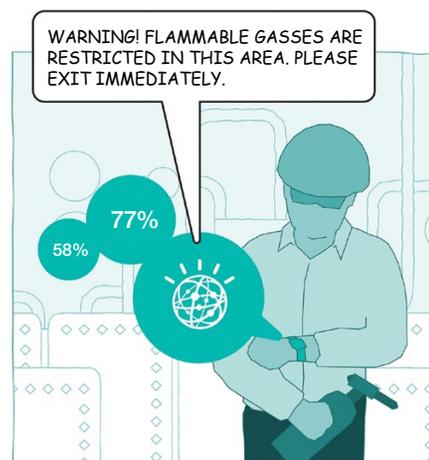
management system, PDF, and vendor database and knowledge store to provide answers and improvements across the value chain. Some of these capabilities are as follows:

- **Procurement cognitive agents** can help procurement officers do their research on possible parts and equipment. The totality of parts available, from the lowly washer to complete sub-assemblies and systems, can range in the millions. Finding a specific part based on a few requirements may take hours or days of tedious research using search tools and having a human review the specs. The cognitive agent can do this grueling work, providing a list of probable best parts for any purchase, simply by asking.
- **Obsolescence planning and solutioning** is a major challenge for many A&D engineers and manufacturing personnel as new products are constantly coming onto market and older ones are being discontinued, especially given the lifetime of an aircraft. For example, semiconductors are constantly being upgraded and need to be replaced. Cognitive's digestive capability can analyze deep specs, trends and catalogs from everywhere, giving the right next move without the onerous research and reading.



The power of cognitive in obsolescence planning and procurement

- **Manufacturing optimization** can occur as cognitive consumes the specs, designs, relationships and connections between every part of the aircraft and every machine and tool used to put it together. Engineers and assemblers can quickly ask questions about the parts in real-time during assembly. “What’s the maximum temperature threshold for this part?” “What lubricant is ideal for this joint?” “What’s the ideal wiring configuration?” and so forth. Watson gives the answers, avoiding the need for encyclopedic human expertise or referring to the manual.
- **Labor-on/labor-off allocation** can be improved as cognitive learns about individual people. By reviewing emails, service tickets, trouble reports, blogs, voice data and more, cognitive can help staffing and scheduling practitioners field the right mix of workers at the right time. Optimally, fewer employees can achieve more as answers are found more quickly.
- **Human expertise can be advanced** by giving answers and expertise to less experienced workers on-demand. Cognitive training engines can also speed the development of newer employees as the mix of senior and junior staff fluctuates—a major concern for A&D these days. The use of cognitive can also transform what knowledge is trained or acquired. For example, in the cognitive future, workers will focus more on learning creative problem solving than on researching or memorizing technical specs.
- **Environmental Health and Safety (EHS) performance and safety improvement** can be enhanced through cognitive. Virtual safety agents can review past accident history and incorporate it with past and present video surveillance to warn people of incidents before they happen. Watson can digest the vast body of safety and environmental regulation so violations (or near violations) can be delivered to the safety inspector, or even proactively delivered to warn workers from their wearable devices. Imagine a combination of location data and video being used to identify someone’s risky behavior and having their iWatch snap “stop doing that!” at the spot of trouble.

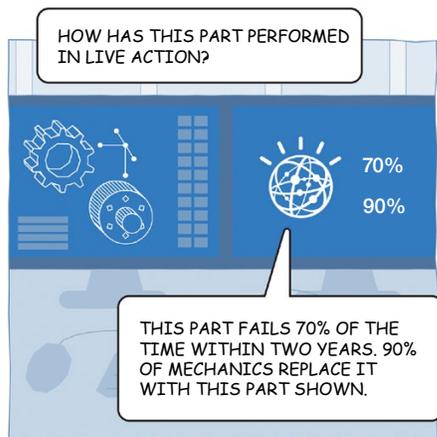


Improved worker safety with cognitive capabilities

- **Material quality inspection** automation uses deep learning capabilities to leverage image and video data from x-ray images and other quality inspection techniques to identify material defects. Automating a typically manual process as part of incoming inspection and the manufacturing process, deep learning techniques can be applied to “learn” from previous inspection techniques to identify material defects that human inspection might miss.

Smarter product development: Engineering and R&D

Engineering and R&D often has the problem that as designed doesn’t necessarily mean as *built* and probably almost never means as *maintained*. As the designs leave the engineer’s desk and manufacturing begins, different parts might be used and different configurations put in place than what was initially designed. When the aircraft is in the field, its maintenance might not happen as engineering imagined. This is useful information for the engineer to have, but too often, they get this information only through manual interaction and hearsay. Cognitive can change this by taking every service log and flight report and putting the answers into the hands of engineers.



Deep product research delivered through cognitive insight

To some degree, engineers are also scientists and creatives, and their imaginative output and creative solution design is often a product of their expertise. Cognitive can put their brain power on overdrive, allowing engineers to spend less time researching and absorbing experiences from previous programs and lessons learned to spending more time creating and solving. Engineers rely on the vast product catalogs of vendors, advancements in best practice and scientific journals, tomes of other designs, engineering and science texts, manuals, industry blogs, video and countless sources that drive innovation. With cognitive, they can ask questions of this giant amalgamation of data and potentially drive innovation faster than ever before while finding fast lanes to more successful and cost-effective designs.

Sales, RFPs, program capture and program execution

The overall business development and business management functions are another area in A&D companies heavily reliant on information and expertise. Putting together extremely complicated and content-rich RFP responses can be a months- or years-long process involving dozens of people across different disciplines. Any task requiring this much expertise is a candidate for cognitive. Imagine a cognitive Bid Response and

Configurator. Cognitive can vastly speed the RFP research process. In addition to processing unstructured data in previous areas such as manuals, service tickets, video and so on, the cognitive data store (called a corpus) can also digest past proposals and presentations. Getting answers on engineering questions, for example, can speed the process and vastly minimize the time engineers are required to work on RFPs. Pulling information such specs, features, sub-assemblies, systems and so on can be done faster. The tedious process of compiling price data can also be streamlined. Win rates can rise due to better informed, faster, more complete RFPs. Plus, the sales team can respond to more opportunities.

Anything else cognitive?

Essentially every area within the enterprise can benefit from better expertise. For example, HR can feed in training, resume and candidate info, performance review, emails, certifications and other data to get answers about their workforce. Regulatory oversight and legal personnel can load contracts, regulation, laws, past audits, past court decisions and so on to drive value to their business. Finance, IT, government relations, marketing and even executive leadership can find value in cognitive.

Where to start?

The smart move is to pick the first area to adopt cognitive by asking “What provides the biggest benefit?” and “Which area will it be most easy to win?” Aftermarket service provision can be one of the best areas to start due to its direct connection to big revenue and its reliance on quick expertise across the biggest population of operators and users. It is also the best place to find big cost-take-out opportunities.

After the value is realized here, the case for expanding it to other areas, such as supply chain and engineering, becomes more compelling, while the lessons learned in implementing it make the transformations easier. After success is realized and the investments are made, then the case to move into other areas (for example, HR or legal) becomes easier as incremental costs will be lower and adoption rates faster.

Overall, the A&D industry is starting to lag behind other industries in cognitive adoption. Most A&D companies are cautious and conservative when it comes to change as a means to achieve high degrees of safety and reliability, but IBM believes cognitive is an accelerant without sacrifice to the industry imperatives. Cognitive is no longer just a vision or near-term science fiction. It's real, and it's in the field in many other industries. Figuring out where to start and how to proceed can be a major challenge for most organizations. But, it's time to get started and be a fast follower in this space. Competitive advantage will come to those who act first.

Cognitive focus areas: Use cases for the A&D industry

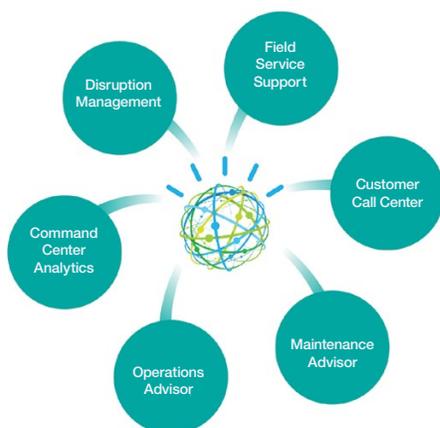
IBM has grouped cognitive capabilities across various use cases or categories of activity, divided into the engineering and supply side, and the aftermarket service provision side. These applications often draw from the same corpus. The corpus is the central database that can digest massive and diverse amounts of unstructured data and content. IBM has developed a separate set of cognitive use cases specifically for defense OEMs and their military clients.

Aftermarket use cases include:

- **Field service support:** Cognitive analytics-enabled support to field service engineers to better respond to customers about their aircraft
- **Customer call center:** 24x7, social- and mobile-enabled support for various call centers to engage with the airlines or offer self-service across the enterprise's products and services
- **Maintenance advisor:** Mobile enablement of maintenance operations, policy and procedural adherence and decision support
- **Operations advisor:** Operations and maintenance collaboration through an automated dispatch manager to manage aircraft turns
- **Command center analytics:** Visualization, integration and retrieval of structured and unstructured data across the fleet
- **Disruption management:** Service to airlines to analyze and optimize response to flight disruptions with self-service across the operation's services

Engineering and supply-side uses cases include:

Aftermarket cognitive modules



A&D cognitive use cases: aftermarket applications

Connected enterprise cognitive modules: Engineering, supply chain and manufacturing



A&D cognitive use cases: engineering, supply chain and manufacturing applications

- **Supplier management:** Leverage structured and unstructured technical and social data to analyze opportunities to aggregate spend, validate supplier performance, identify potential quality issues and suggest appropriate action
- **Manufacturing quality management:** Provide guidance through interactive dialog about manufacturing quality issues and practices such as showing proper configurations, areas of likely defect, corrective measures and so on
- **EHS advisor:** Provide information through a question and answer dialog about the correct safety processes, procedures and equipment as well as flagging (if a risk exists) that high-incident rates have occurred and require action.
- **IT level 0 call center:** 24x7, cognitive, social and mobile-enabled IT support for employees to engage with and resolve their IT issues
- **Design engineer advisor:** Virtual chief engineer to analyze historical engineering data to provide engineering decision support and help fill the knowledge void created by the aging aerospace workforce
- **Requirements formalization:** Natural language analysis of multiple sourced of unstructured text requirements to support requirements formalization and creation of reusable semantic data sets

Defense OEM use cases include:

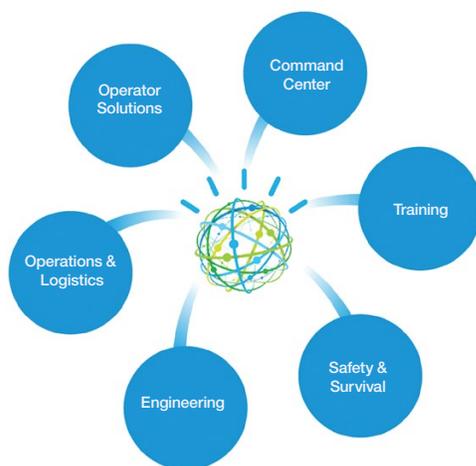
- **Command center:** Features such as cognitive threat and risk analysis; mission selection and configuration; command and response; and cognitive mission effectiveness and review
- **Training:** Features such as cognitive training advisor; knowledge management for trainers; and cognitive training coordination
- **Safety and survival:** Features such as a safety advisor; safety coordination; space survival advisor; and launch and mission planning advisor
- **Engineering:** Features such as voice of the war fighter or operator; ECN knowledge management and conflict identification for engineers; cognitive engineering advisor; and cognitive failure advisor
- **Operations and logistics:** Features such as operations advisor; procurement intelligence; logistics advisor; cognitive supply advisor; and service tech advisor
- **Operator solutions:** Features such as cognitive craft; operator advisor; configuration advisor; and mission advisor

Case study: Jabil's market intelligence procurement platform brings 360-degree views to users with the power of IBM Watson Explorer

As a global-leading contract manufacturer, Jabil Circuit Inc. saw huge value in using Watson to integrate its data environment to enhance decision making and accelerate speed of action in procurement activities. With multiple data sources from several different systems, users had to run multiple reports to get an overall view of procurement information. Routine tasks and information searches could be cumbersome, and cost-saving opportunities in component procurement were being missed. And its ad hoc approach to market analysis wasn't providing relevant news insights to take timely action.

Jabil developed a market intelligence procurement platform that united data from across the environment—for example, supplier information, industry news and spend data—in a single interface relevant to a user's role in the organization. The solution was

Cognitive force modules for defense OEMs



powered by the Watson Explorer cognitive computing platform, which discovered, analyzed and integrated big data. By indexing data together from structured, unstructured, internal and external sources, Watson delivered unified views across all data sources. Procurement analysis was enhanced by users commenting, tagging, rating and sharing content, which was fed back into Watson's relevance analytics to deliver the most valuable content to users.

From Jabil's managers to its frontline employees, users can now access all of the information they need in a single view of virtually integrated procurement data, regardless of format or where it is managed. The solution enabled:

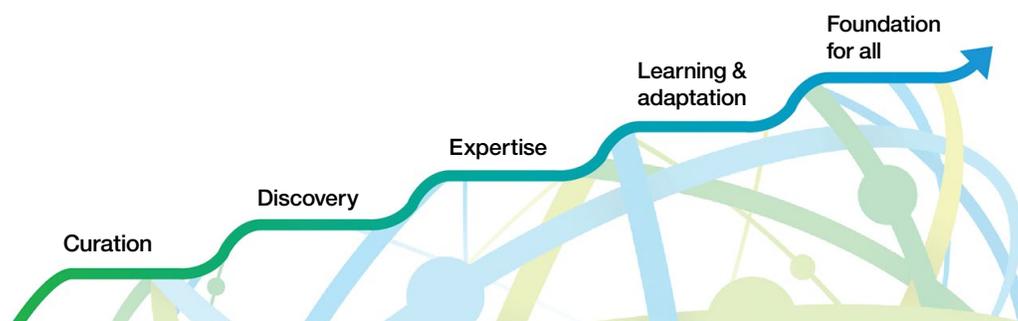
- **Faster production support** by reducing the time needed to identify alternate parts—from 15 - 20 minutes to 2 - 5 minutes
- **More cost-down opportunities** by easily identifying lower-cost part alternatives—from 6 - 7 opportunities to 25 - 30 opportunities a week

- **Faster engineering support** by identifying alternate parts to substitute end-of-life, discontinued and unavailable components—from 15 - 20 minutes to 2 - 5 minutes
- **Faster sales support** by providing pricing for key components in support of RFX responses for new business opportunities—from 15 - 20 minutes to 2 - 5 minutes
- **Enhanced knowledge base** with real-time commodity-level news, replacing ad hoc news with relevant news delivered to users in the right place and context

Making the journey: The progression to cognitive maturity

Cognitive capabilities are an adaptive and fluid process of creation. The system that is up the first day is not the same system that grows and matures over time as it consumes more information, discovers more connections and learns from interacting with humans and other machines. It also learns from answering questions. The maturing process can be thought of as follows:

Progression toward cognitive maturity



Curation

In this beginning phase, the system consumes documents, schematics, content and other data to enable learning and training. It is the establishment of the corpus, essentially the data pool it draws from. Here it may be connected to other systems that continually feed it, such as service support tickets or knowledge management systems. It may even be turned onto portions of the Internet. The Watson that won Jeopardy! for example consumed all of Wikipedia.

During this phase, the ideal data is:

- **Verbose:** Massive amounts of data should be the target for consumption. Rich text sources are good with complete descriptions of information, knowledge, opinions and classifications. If there is not enough data, then cognitive cannot be successfully deployed.
- **Valid:** Data is valid and relevant. Malformed information has been removed from the documentation.
- **Variety:** To move toward a 360-degree view of a subject, ensure that many sources about the same subject are available. Pull from many sources and formats, even image, video and audio.
- **Verified:** Make sure that the results of the cognitive tools have been verified to be correct by experts. Strive to achieve high cognitive accuracy. This is proven by how cognitive can answer in the same way an expert would answer.

Discovery

Knowledge is easily accessible from one convenient place with a process focus. In this phase, the system begins accessing knowledge and forging connections. Its use is limited to specific processes in limited domains.

Expertise

As it matures, the system behaves like human experts do in solving problems. Its sophistication rises in the domains it serves.

Learning and adaptation

Combining cognitive and advanced data techniques, its interactions with humans and machine-to-machine allows for continuous learning. New data is incorporated as it becomes available.

Foundation for all

The solution is offered to other areas of the enterprise and to provide expertise on many different subjects. It creates a foundational standard cognitive platform for all businesses to learn, benchmark and improve.

Ideal capabilities and competencies a cognitive partner should have

IBM believes that roughly 99.9 percent of even the world's leading IT departments couldn't build a cognitive capability on their own. This means they need a high-quality partner to assist in its delivery. When choosing a cognitive partner, the ideal one will likely have:

- A complete, pre-created, proprietary cognitive technology that is ready for action today
- The ability to integrate cognitive across the value chain (for example, procurement, manufacturing, distribution, service and so on)
- Deep A&D industry expertise
- A proven track record of delivering cognitive across industries
- Data scientists, experienced with all the techniques (text analysis, machine learning and so on)

- Extensive hardware and infrastructure resources and prowess, as cognitive requires some significant processing muscle
- Proven cloud-delivery infrastructure
- Extensive capital and resources to commit long term to developing and delivering cognitive solutions now and in the future

Conclusion

“Watson, I think we’re ready for takeoff. Show me the way!”

Cognitive is here, and it’s here for the A&D industry. The most critical, revenue-generating, value-intensive, efficiency-craving functions within the enterprise desperately need quick and accurate knowledge at every point of activity and interaction. Cognitive delivers this expertise, turning sometimes impossible research tasks into an intuitive and elegant conversation between human and machine. Those who act now will be the first to realize this powerful competitive advantage. The time is now. Let’s see what new heights cognitive can take you to.

For more information

To learn more about IBM Watson and cognitive business, please contact your IBM representative or IBM Business Partner, or visit the following websites:

- ibm.com/watson
- ibm.com/cognitive/

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