**Prelude (SLIDE 2):**

Manufacturing companies generate tremendous amounts of documents throughout the design, construction, operation, and repair phases of their processes. These are a crucial source of knowledge for employees who spend much of their time every day searching for relevant information.

The documents are often siloed in different databases, file systems or document management systems. It is difficult to search across these repositories, and the searches can lack relevance and context for a particular task. Plus it can take significant efforts to manage the information. Another concern is that over the years, companies lose the tribal knowledge of employees with many years of experience as they retire and move into other roles.

Wouldn’t it be nice if there is an intelligent solution that gathers information by crawling through various systems, finds relevance between operating procedures, maintenance logs, drawings and training manuals and can provide responses to queries within seconds? And if this solution, with a little training, could capture the knowledge from experienced employees and continue to learn and improve so it keeps its knowledge up-to-date.

**GoTo Slide 3**

Well, IBM’s Cognitive Technical Assistant is an intelligent and integrated repository of contextualized engineering documents, knowledge discovered from operation logs, maintenance logs, repair history and captured tribal knowledge. Cognitive Technical Assistant crawls document repositories to extract key information and can also be trained by experts in the field to capture key experiential data. The system can provide responses to queries within seconds, greatly improving the efficiency and quality of responses.

**Demonstration (go to Slide 5)**

SETUP:

We used 4 documents similar to what you see here. The documents include an operations manual, a training guide, a maintenance manual, and an engineering drawing of the plant layout. Each of the manuals was about 30-40 pages long with information pertaining to water cooling towers, includes images and diagrams as well. Along with these documents we trained the system on some operational parameters to simulate the idea of an experienced employee that can add unwritten information into the system as well.

**Go to Browser/CTA UI**

Now let’s jump into our Cognitive Technical Assistant application and ask a few questions to see what it can tell us.

As you can see, it’s a simple interface intended to be used on a mobile device. You can see at the top it tells us what types of questions it can answer.

Let’s assume we are a Technician working at a water cooling tower, and we are taking a water quality measurement and need to verify that it is normal. We have the CTA available on an ipad and will use that to get the information we need.

First, we’ll just say Hi and see that it’s available:

* [you] Hi!
  + [CTA] Why hello there! Do you have a question for me?
* [you] What should the chloride concentration be for cooling tower TK-209?
  + [CTA] What temperature do you need to know the chloride ion concentration for?
* [you] 22 degrees (or 27 or 30)
  + [CTA] At 22 degrees the concentration should be 180 ppm.
* [you] Show me a drawing of tower TK-209
  + [CTA] Great question. Here’s what I found: (3 documents should come up)

Now Click on “Read the full document here” for the first document returned is the P&ID drawing for the cooling tower of TK-2019. Zoom in on the bottom left corner, and we can see that TK-209 label

Now Click on “Read the full document here” for the second document. We see that this is the operations manual for the TK-209 cooling water tower. You can scroll to show there are several drawings in the document.

NOTE: We are using box as our repository here – but documents can be maintained in place, in content management systems, databases, etc.

We saw how that Technician searched for information, got instant-relevant responses, while interacting naturally, leading to potentially lower cost and optimized operations. One of IBM’s customers, Woodside, ingested close to 1 million engineering documents from over 30 years, and using CTA in its operation of offshore oil platforms.

Now – let’s see how the Cognitive Assistant can help a new trainee Operator at this plant. This person has more general questions about overall operations and procedures. For example:

* [you] Tell me about cooling water towers…
  + [CTA] Great question. Here’s what I found: (3 documents should come up)

One thing that is important to understand is what types of laws/regulations come into play for operating these cooling towers. Our trainee wants to learn more about that.

* [you] What regulations do I need to know?
  + [CTA] Great question. Here’s what I found: (3 documents should come up)

Notice the first thing that pops up is about Legionnaire’s Disease, which is probably a little unexpected? Now Click on the title text “Legionnaires Disease” and scroll down to the 4th paragraph (purple bar in the left margin). Note there are rules and regulations listed in bold related to health and safety to prevent a serious bacterial disease. Also, the last paragraph mentions a course that is recommended for anyone to work on the cooling water tower. This is an example of how Watson Discovery found something in a general operations manual that’s a bit hidden otherwise (if you look at the full document it’s 34 pages of operation instructions)

These interactions can be more complex, and this is where the power of Watson Discovery comes in - we can correlate thousands of documents augmented with knowledge captured from domain experts. The system ranks and retrieves the documents that have the highest likelihood of being the correct context based on the questions submitted.

What you have seen so far are some of the core capabilities of the Cognitive Technical Assistant. Everything is available with open APIs so this can easily be extended to provide alerts to managers, leverage speech-to-text so searches can be performed with vocal commands, we could integrate with MRP/ERP systems and even auto-create work orders for technicians.

**RETURN TO SLIDE SHOW – GO to SLIDE 8 (9 is backup information)**

Technical Part (How everything works to provide value to business):

Now let’s look at technical details of this solution – to help you understand how this works.

* Starting at 1 - The system combines information from documents, databases, drawings, etc. with tribal knowledge information gained from your most experienced employees (point to #2 on the diagram). We can ingest key information from drawings or diagrams, as well as information from databases – keeping the source in their current storage, we don’t need to copy or move them to the repository, CTA will index and store the key metadata for referencing the files.
* Additionally, information can be added from external sources (point to #3 on diagram) such as weather, regulatory changes, and compliance, anything that might be applicable.
* What we demonstrated today is ingested directly from drawings and operation manuals. We can curate data from large repositories such as ERP, DB, using the Data Crawler (point to #4) – an agent that resides on-prem to extract the key information – this might be paired with a light-weight app to orchestrate this.
* Once the information has been indexed and analyzed to create the technical repository (#5) and the conversation service has been trained (#6) we have the backend available for the Cognitive Technical Assistant.
* Move to #8 and show that the users would most likely be on the floor so we would use mobile devices to access the Cognitive Technical Assistant.
* Again, a light-weight application is available to orchestrate the communication between the services – essentially we first hit the conversation service/chat bot and attempt to answer the questions from that knowledge base. If we get to the point that the question is too complex (based on confidence scores conversation provides for the answers), the application will call to Discovery Services and query the technical repository and return results based on configuration options (e.g. top 3 scores for relevance, or using additional filters, etc.)
* A few additional enhancements would be to include Knowledge Studio (#7) which I very closely tied to discovery services to allow more fine-grained configuration of the document indexing based on the business domain. Also, we could integrate Watson Speech to Text so that the CTA is accessed by voice commands (e.g. like a Siri or Alexa).

**SLIDE 11**

The value proposition for the Cognitive Technical Assistant can be significant savings of time as well as improved response and work quality because employees can get contextually specific information they need more quickly. For example, if workers spend 30 minutes each time they need to search for information to properly respond to an outage or perform maintenance and they cover about 5 of these a day, that’s 2.5 hours just searching.

With Cognitive Technical Assistant this time was reduced to 5 minutes, saving over two hours per worker each day – if we consider that across 500 engineers, operators, and service technicians, that frees up over 1000 hours a day. This leads to being able to respond to more incidents more quickly, or use the time to address other high value work.

**SLIDE 12**

Here is a specific example of a customer that is seeing benefits using a cognitive technical assistant. They’ve seen a savings of over $7.5 million USD in employee expenses and a 75% reduction in time spent searching for data/information.

**FOR ANY DEMO FOLLOW UP - OTHER QUESTIONS YOU COULD SHOW**

* [you] What temperature should water be when leaving the cooling tower?
  + [CTA] Do you need to use the approach or range measure for temperature?
    - [you] Range *{or “Approach”}*
  + [CTA] The water temperature should be 8-10K difference from temperature of water at entry.
* [you] Bye!
  + [CTA] Goodbye. Speak to you again soon!
* [you] Tell me about filtration
* [you] Tell me about evaporation
* [you] How do I maximize the life of the cooling tower?