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TECHNOLOGY

Artificial intelligence - Can Watson save IBM?

By Richard Waters

Developers of smart machines have often struggled to turn party tricks into practical applications. IBM is pinning its hopes - and wider strategy - on developing its system into powerful and profitable services.

The history of artificial intelligence has been marked by seemingly revolutionary moments - breakthroughs that promised to bring what had until then been regarded as human-like capabilities to machines.

The AI highlights reel includes the "expert systems" of the 1980s and Deep Blue, IBM's world champion-defeating chess computer of the 1990s, as well as more recent feats like the Google system that taught itself what cats look like by watching YouTube videos.

But turning these clever party tricks into practical systems has never been easy. Most were developed to showcase a new computing technique by tackling only a very narrow set of problems, says Oren Etzioni, head of the AI lab set up by Microsoft co-founder Paul Allen. Putting them to work on a broader set of issues presents a much deeper set of challenges.

Few technologies have attracted the sort of claims that IBM has made for Watson, the computer system on which it has pinned its hopes for carrying AI into the general business world. Named after Thomas Watson Sr, the chief executive who built the modern IBM, the system first saw the light of day five years ago, when it beat two human champions on an American question-and-answer TV game show, "Jeopardy!"

But turning Watson into a practical tool in business has not been straightforward. After setting out to use it to solve hard problems beyond the scope of other computers, IBM in 2014 adapted its approach.

Rather than just selling Watson as a single system,

> ❝ **Turning Watson into a practical tool in business has not been straightforward**

its capabilities were broken down into different components: each of these can now be rented to solve a particular business problem, a set of 40 different products such as language-recognition services that amount to a less ambitious but more pragmatic application of an expanding set of technologies.

Though it does not disclose the performance of Watson separately, IBM says the idea has caught fire. John Kelly, an IBM senior vice-president and head of research, says the system has become "the biggest, most important thing I've seen in my career" and is IBM's fastest growing new business in terms of revenues.

But critics say that what

IBM now sells under the Watson name has little to do with the original Jeopardy!-playing computer, and that the brand is being used to create a halo effect for a set of technologies that are not as revolutionary as claimed.

"Their approach is bound to backfire," says Mr Etzioni. "A more responsible approach is to be upfront about what a system can and can't do, rather than surround it with a cloud of hype."

Nothing that IBM has done in the past five years shows it has succeeded in using the core technology behind the original Watson demonstration to crack real-world problems, he says.

The debate over Watson's capabilities is more than just

an academic exercise. With much of IBM's traditional IT business shrinking as customers move to newer cloud technologies, Watson has come to play an outsized role in the company's efforts to prove that it is still relevant in the modern business world. That has made it key to the survival of Ginni Rometty, the chief executive who, four years after taking over, is struggling to turn

> ❝ **The University of Texas's MD Anderson Cancer Center began trying to train the system three years ago to discern patients' symptoms**

round the company.

Watson's renown is still closely tied to its success on Jeopardy! "It's something

everybody thought was ridiculously impossible," says Kris Hammond, a computer science professor at Northwestern University. "What it's doing is counter to what we think of as machines. It's doing something that's remarkably human."

By divining the meaning of cryptically worded questions and finding answers in its general knowledge database, Watson showed an ability to understand natural language, one of the hardest problems for a computer to crack. The demonstration

seemed to point to a time when computers would "understand" complex information and converse with people about it, replicating and eventually surpassing most forms of human expertise.

The biggest challenge for IBM has been to apply this ability to complex bodies of information beyond the narrow confines of the game show and come up with meaningful answers. For some customers, this has turned out to be much harder than expected.

The University of Texas's MD Anderson Cancer Center began trying to train the system three years ago to discern patients' symptoms so that doctors could make better diagnoses and plan treatments.

"It's not where I thought it would go. We're nowhere near the end," says Lynda Chin, head of innovation at the University of Texas' medical system. "This is very, very difficult." Turning a word game-playing computer into an expert on

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Artificial intelligence - Can Watson save IBM? (continued)

oncology overnight is as unlikely as it sounds, she says.

Part of the problem lies in digesting real-world information: reading and understanding reams of doctors' notes that are hard for a computer to ingest and organize. But there is also a deeper epistemological problem. "On Jeopardy! there's a right answer to the question," says Ms Chin but, in the medical world, there are often just well-informed opinions.

Mr Kelly denies IBM underestimated how hard challenges like this would be and says a number of medical organizations are on the brink of bringing similar diagnostic systems online.

IBM's initial plan was to apply Watson to extremely hard problems, announcing in early press releases "moonshot" projects to "end cancer" and accelerate the development of Africa. Some of the promises evaporated almost as soon as the ink on the press releases had dried. For instance, a far-reaching partnership with Citibank to explore using Watson across a wide range of the bank's activities, quickly came to nothing.

Since adapting in 2014, IBM now sells some services under the Watson brand. Available through APIs, or programming "hooks" that make them available as individual computing components, they include sentiment analysis - trawling information like a collection of tweets to assess mood - and personality tracking, which measures a person's online output using 52 different characteristics to come up with a verdict.

At the back of their minds,
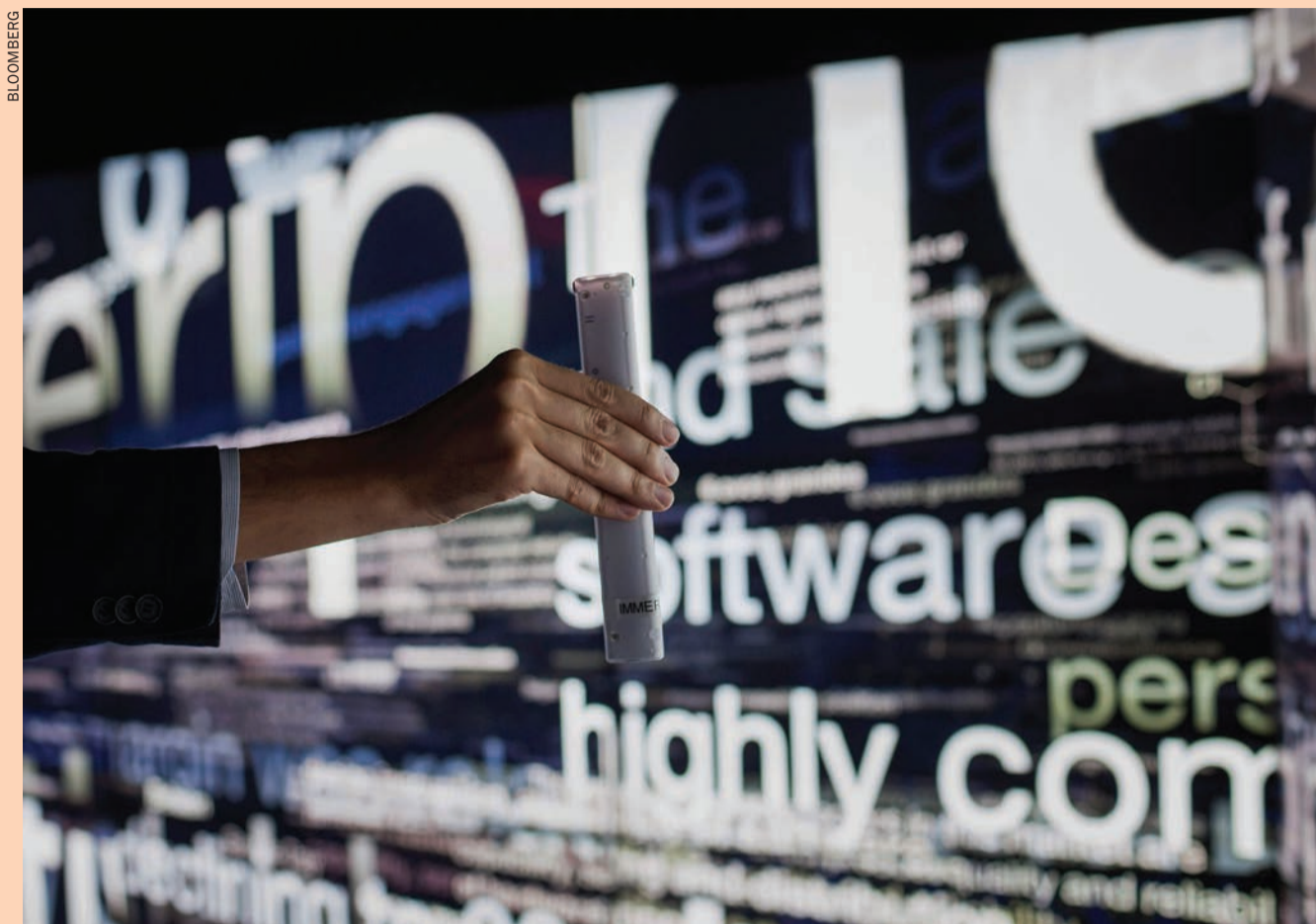
most customers still have some ambitious "moonshot" project they hope that the full power of Watson will

> ## " The way Amazon did for retail and shopping, it [Watson] will change what care delivery looks like.
>
> LYNDA CHIN
> HEAD OF INNOVATION AT THE UNIVERSITY OF TEXAS

one day be able to solve, says Mr Kelly; but they are motivated in the short term by making improvements to

their business, which he says can still be significant.

This more pragmatic formula, which puts off solving the really big problems to another day, is starting to pay dividends for IBM. Companies like Australian

energy group Woodside are using Watson's language capabilities as a form of advanced search engine to trawl their internal "knowledge bases". After feeding more than 20,000 documents from 30 years of projects into the system, the company's engineers can now use it to draw on past expertise, like calculating the maximum pressure that can be used in a particular pipeline.

To critics in the AI world, the new, componentized Watson has little to do with the original breakthrough and waters down the technology. "It feels like they're putting a lot of things under the Watson brand name - but it isn't Watson," says Mr Hammond.

Mr Etzioni goes further, claiming that IBM has done nothing to show that its original Jeopardy!-playing breakthrough can yield results in the real world. "We have no evidence that IBM is able to take that narrow success and replicate it in broader settings," he says. Of the box of tricks that is now sold under the Watson name, he adds: "I'm not aware of a single, super-exciting app."

To IBM, though, such complaints are beside the point. "Everything we brand Watson analytics is very high-end AI," says Mr Kelly, involving "machine learning and high-speed unstructured data". Five years after Jeopardy! the system has evolved far beyond its original set of tricks, adding capabilities such as image recognition to expand greatly the range of real-world information it can consume and process.

This argument may not matter much if the Watson brand lives up to its promise. It could be self-fulfilling if a number of early customers adopt the technology and put in the work to train the system to work in their industries, something that would progressively extend its capabilities.

"Once it's working, you want to be leading the adoption," says Shaun Gregory, head of technology and strategy at Woodside. "You're ahead in knowledge and learning. Machines never forget," he says.

Another challenge for early users of Watson has been knowing how much trust to put in the answers the sys-

tem produces. Its probabilistic approach makes it very human-like, says Ms Chin at MD Anderson. Having been trained by experts, it tends to make the kind of judgments that a human would, with the biases that implies.

In the business world, a brilliant machine that throws out an answer to a problem but cannot explain itself will be of little use, says Mr Hammond. "If you walk into a CEO's office and say we need to shut down three factories and sack people, the first thing the CEO will say is: 'Why?'" He adds: "Just producing a result isn't enough."

IBM's attempts to make the system more transparent, for instance by using a visualization tool called WatsonPaths to give a sense of how it reached a conclusion, have not gone far enough, he adds.

Mr Kelly says a full audit trail of Watson's decision-making is embedded in the system, even if it takes a sophisticated user to understand it. "We can go back and figure out what data points Watson connected" to reach its answer, he says.

He also contrasts IBM with other technology companies like Google and Facebook, which are using AI to enhance their own services or make their advertising systems more effective. IBM is alone in trying to make the technology more transparent to the business world, he argues: "We're probably the only ones to open up the black box."

Even after the frustrations of wrestling with Watson, customers like MD Anderson still believe it is better to be in at the beginning of a new technology.

"I am still convinced that the capability can be developed to what we thought," says Ms Chin. Using the technology to put the reasoning capabilities of the world's oncology experts into the hands of other doctors could be far-reaching: "The way Amazon did for retail and shopping, it will change what care delivery looks like."

Ms Chin adds that Watson will not be the only reasoning engine that is deployed in the transformation of healthcare information. Other technologies will be needed to complement it, she says.

Five years after Watson's game show gimmick, IBM has finally succeeded in stirring up hopes of an AI revolution in business. Now, it just has to live up to the promises.

Systems depend on diverse data flows

There is a secret weapon in the race between leading tech companies to create the most effective forms of artificial intelligence: access to large amounts of data. For IBM, as it tries to make Watson a new standard for AI in the business world, this could turn out to be an under-appreciated advantage, according to some experts.

At the heart of intelligent machines are algorithms that search through large volumes of data to identify patterns and make surmises. Machine learning - the basic technique behind many of the recent advances in AI - relies on using large amounts of data to train systems in this way.

"A lot of what is now emerging with AI technologies has to do with data," says Kris Hammond, a computer science professor at Northwestern University.

One of the biggest reasons for recent advances in AI has been the availability of large amounts of data online with

which to train systems. Google has perfected its search systems by harnessing the abundant data it collects about the online behavior of its users. While IBM cannot match the massive trove of information Google has at its disposal, what it lacks in volume it hopes to make up for in industry-specific detail.

"Google has one kind of data - consumer sentiment data. We have a vast amount of [more diverse] data," says John Kelly, head of research at IBM.

The more industry-specific data it is fed, the smarter it will become at solving business problems. As customers pour their own corporate information into Watson in order to train it, IBM stands to be a beneficiary.

Watson's "expanding corpus of information in many domains" could turn out to be one of IBM's main assets in the AI race, says Mr Hammond.

Last year, IBM turned to acquisitions

to boost its reserves of data. These included the USD1bn it spent to buy Merge Healthcare, a company that handles large amounts of medical images. It has been folded into Watson Health, the first industry-specific business unit to be spun out of the Watson division.

It also spent $2bn to buy the digital assets of the Weather Company, with the aim of feeding its weather data into forecasting systems geared to understanding weather-related business risks, among other functions.

"Between our customers and what we've acquired, we're amassing quite a data set," says Mr Kelly.

Spinning this basic raw material into computing gold still requires serious technical skills. But if it can persuade customers to contribute their own data to the task of making Watson smarter, it could deliver the sort of head start that will make it hard for rivals to catch up.

By John Lippert and Dawn McCarty

BLOOMBERG

Baha Mar Resort

The ghosts of Baha Mar: How a USD3.5b paradise went bust

BEYOND the tropical waters, across palm-fringed sands and behind locked gates, looms Baha Mar - the largest and, at USD3.5 billion, priciest resort in the Caribbean.

Here, no one frolics pool-side, pina colada in hand, or hits irons on the Jack Nicklaus golf course. No slot machines jingle-jangle in the casino. The Flamingo Bar, the Brasserie des Arts and the Cartier boutique lie dark. On this bright October morning in the Bahamas, all 2,200 guest rooms are empty.

The quiet is almost spooky here on the outskirts of Nassau, where the waterscape frills of nearby Paradise Island give way to the vast ghost-resort that is Baha Mar.

Just how the place ended up like this - in a bankruptcy so colossal that it's jeopardizing the Bahamas's credit rating - is the biggest business story to hit this Caribbean nation for as long as anyone here can remember. It stretches far beyond the white beaches and across time zones, to none other than the State Council of China.

Turns out that even in paradise, local aspirations can collide with China's global ambitions. Baha Mar may have been dreamed up in the vacationland of the Bahamas, but the central government in Beijing controls the development bank and construction giant that will determine its fate. And China, some Bahamians say, is playing tough as its state-run enterprises project money and influence around the world, including to this small island 180 miles off the coast of Miami.

"Their attitude is, 'We're the big boys in the room, we've got the money – so you do what we say,'" says Dionisio D'Aguilar, a prominent businessman and former Baha Mar Ltd. director.

Time is short. Bahamian officials have been counting on Baha Mar to invigorate the tourist economy. The developers claimed the resort could single-handedly generate 12 percent of the country's gross domestic product – provided it ever opens.

Understanding the island's predicament requires going back more than a decade to 2005 when Prime Minister Perry Christie reached an agreement with a local businessman named Sarkis Izmirlian to help revitalize Cable Beach, the most popular beachfront destination on New Providence Island.

Izmirlian, then just 32, seemed a natural choice. He's from a wealthy family - his father is Armenian peanut tycoon Dikran Izmirlian - and lives on nearby Lyford Cay, a billionaire enclave. Izmirlian sank nearly $900 million into Baha Mar and recruited marquee-name partners like a Caesars Resort hotel.

Then the 2008 financial cri-

sis hit, and would-be partners balked. When China State Construction Engineering Corp., the world's second-largest contractor, approached Izmirlian about stepping in, he said yes. The company directed him to Export-Import Bank of China, or Exim, which promotes trade and investment under the direction of Beijing.

Seeing a way into U.S. markets, China State Construction promptly invested $150 million. Exim kicked in $2.45 billion in construction loans – with the proviso that Izmirlian could never fire the Chinese builder, no matter what, and that workers from China would do the job. Flush with Chinese money, Izmirlian declared four Baha Mar hotels would open by 2014.

All this was documented in court filings, and supported by interviews with Christie and other Bahamians. The Chinese and Izmirlian declined interview requests.

Endless haggling complicated by language barriers ensued – about payments, invoices, workmanship, on and on. Deadlines were set and promptly broken. Emails flew back and forth to Beijing.

In May 2014, Izmirlian appealed to an independent mediation service based in Washington, D.C., but the troubles multiplied. Pipes burst when inspectors tested the fire sprinklers and faulty balcony railings had to be reinforced, people with knowledge of the construction said. When Izmirlian complained, China delayed its money, one said.

As construction dragged on, Izmirlian and Christie flew to Beijing. There, officials assured them the resort would be ready to open on March 27. Upon his return, the developer hired 2,070 hotel workers, ran a global ad campaign and stocked the casino with $4.5 million in cash.

For Izmirlian the affair was becoming the ultimate contractor nightmare. He was spending an additional $4 million a month to pay staff for a hotel with no

> ### The bankruptcy is so colossal that it's jeopardizing the Bahamas's credit rating

guests. Concerned that China State Construction might gain a tactical advantage by filing first, he secretly planned to have Baha Mar declare bankruptcy in the U.S. rather than the Bahamas, whose laws would make liquidation all but inevitable.

He didn't even alert the prime minister for fear he would tip off the Chinese, says D'Aguilar, the former resort director.

Baha Mar Ltd. filed for bankruptcy in Delaware on June 29 – and all hell broke loose. China State Construction accused Izmirlian of disrupting the project with endless design changes.

"Baha Mar Ltd.'s decision to

file for bankruptcy is the direct result of its failure to secure adequate financing and its mismanagement," the Chinese company told the court.

Christie's foreign minister, Fred Mitchell, spoke out in an August speech celebrating the end of slavery on the island, saying "the attempt to keep us bondsmen and slaves does not and has not stopped."

At the Emancipation Day Service, Mitchell continued, saying: "It is therefore no surprise then that an investor – because he has the word billionaire behind his name – would think, would have the temerity to believe, that he can challenge the leader of our country."

As the dispute dragged into September, a Delaware judge dismissed the U.S. bankruptcy and a Bahamian judge put provisional liquidators in charge, rendering Izmirlian's $900 million investment nearly worthless. In October, they hosted negotiations at a nearby hotel. It was a bizarre scene, with Bahamian dancers gyrating in hot pants in the lobby as Chinese men in black suits hunched over laptops.

In November, Izmirlian said he was still negotiating with Exim and hoped to remain involved. Failing that, he's also sued in the U.K., claiming about $192 million in damages for a breach of contract, a figure that could grow as another winter tourist season passes with the resort still in limbo.

How it'll end is anyone's guess. Fernando Menendez, a senior fellow at Washington think tank

Center for a Secure Free Society, says the episode says less about the Bahamas or Izmirlian than it does about China and its state-owned enterprises.

China Exim wielded billions to guarantee work for one of its biggest customers, China State Construction. How and when that work got done didn't really matter: Exim made sure the state-run company could never be fired.

"State-owned enterprises don't function as competitive entities," Menendez says. "They're protected from failure."

Christie says he's still optimistic the resort can open. In December, Exim said a number of potential investors had expressed interest. These include Guo Guangchang, chairman of a non-state Chinese conglomerate called Fosun Group, people familiar with the situation say. Fosun already owns stakes in Club Mediterranee SA and Cirque Du Soleil Group.

Back in Nassau, people worry that even with new investors, the promised economic boost will take time. It could be 2018 before Baha Mar makes a meaningful contribution to the economy, according to Standard & Poor's, which lowered its Bahamas rating to BBB- and warned it could be heading for junk.

For now, Baha Mar faces mold and corrosion as it bakes in the tropical heat. Its pink and cream towers are ringed by a chain-link fence and blue tarps cover unused supplies. At night, lights pop on in several rooms – a move the Bahamians hope will ward of the desolate air of this Caribbean ghost. **Bloomberg**

Mozambique park sees wildlife numbers grow in wake of war

LIONS are getting pregnant and the waterbuck population is soaring at one of Mozambique's main national parks, once the scene of fighting during a civil war which virtually wiped out the park's lions, elephants and many other species.

The 15-year conflict that killed up to 1 million people ended in 1992, and some former battlefield foes are now working together as rangers at Gorongosa National Park, where foreign donors and conservationists helped launch a turnaround on a continent accustomed to bad news about wildlife welfare.

Still, the park remains vulnerable to poachers and other problems. Tourism dropped in 2013 and 2014 during sporadic violence linked to the rivalry between Renamo, Mozambique's main opposition group, and its former adversary during the civil war, the ruling Frelimo party. The park is also in Sofala province, an opposition stronghold in central Mozambique.

Gorongosa became a national park under Portuguese
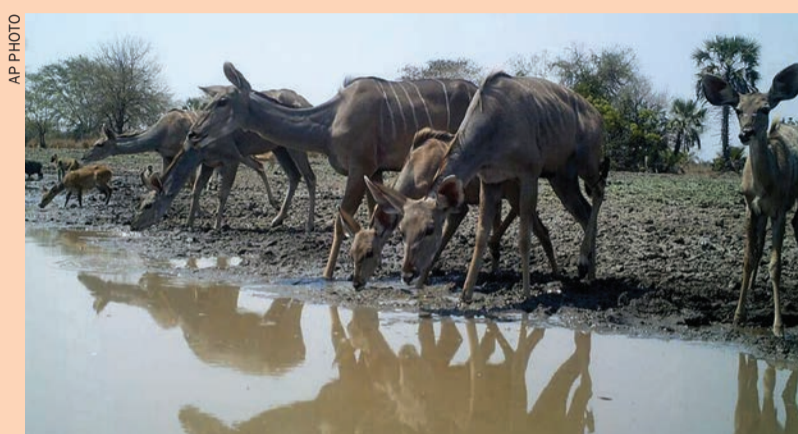
Buck drink at a watering hole in the Gorongosa National Park

colonizers in 1960. The decade that followed is considered the park's heyday; actors John Wayne and Gregory Peck and author James Michener went on safari there, according to the park's website.

The civil war began in 1977 after Portugal's exit from Mozambique. Fighters killed Gorongosa's elephants for their ivory and slaughtered other animals, emptying a once-teeming landscape. Widespread poaching continued after a peace deal.

Today, there is a lot to see,

thanks largely to a 2008 deal in which a non-profit group founded by American philanthropist Greg Carr pledged at least USD1.2 million annually to the restoration of Gorongosa for 20 years. More funding came from European governments, the United States Agency for International Development and other donors.

Workers have built tourism facilities, planted trees and relocated buffalos, hippos and elephants from neighboring South Africa into Gorongosa; money has flowed to poor local

■ Workers have built tourism facilities, planted trees and relocated buffalos, hippos and elephants

communities whose support for the park is seen as indispensable.

"Things are really starting to go quite fast," said Marc Stalmans, director of scientific services at Gorongosa, which encompasses 1,570 square miles (4,070 square kilometers) and was expanded to include the mountain of the same name in 2010.

The numbers tell a remarkable story of recovery, particularly at a time when populations of threatened species are under pressure from poachers and human encroachment elsewhere in Mozambique and in much of the rest of Africa. Even so,

the counts in Gorongosa are generally far below what they were before the war.

The estimated elephant population went from 2,500 in the early 1970s, to fewer than 200 in 2000, and more than 500 in 2014. Similarly, researchers have counted nearly 60 lions, double the number a few years ago, but below the estimated 200 in 1972.

Four lions were pregnant in December, and at least one of them has produced a litter, Stalmans wrote in an email to The Associated Press.

"The biggest cause of mortality is lions becoming 'by-catch' in snares and traps set for antelopes by the poachers," Stalmans said. "A significant percentage of our lions have lost toes or part of a paw to snares and traps but managed to break loose. Some unfortunately die."

The waterbuck population is more than 34,000, 10 times the figure recorded 40 years ago. It is likely the single largest group of waterbuck in Africa, according to park managers.

Jen Guyton, an ecologist working in Gorongosa, believes one reason that waterbucks have bred so fast is because, unlike other antelope, they like eating weeds that replaced grasses on floodplains, a change in vegetation possibly related to the massive loss of wildlife during the war. **AP**

ASK THE VET
by Dr Ruan Du Toit Bester

CANINE DRY EYE EXPLAINED: ALL ABOUT KERATOCONJUNCTIVITIS SICCA

CANINE dry eye, or keratoconjunctivitis sicca (KCS), is a common eye ailment in dogs. Dry eye is a reduction in natural tear production causing drying and inflammation of the cornea. If left untreated, chronic dry eye can lead to ulceration of the cornea, infection and potentially the loss of vision.

CAUSES OF DRY EYE

There is any number of causes of dry eye. The majority of cases are caused by deterioration of the tear ducts. Other causes include:
• Hypothyroidism
• Drug toxicity
• Reaction to medication
• Systemic disease
• Chronic conjunctivitis
• Congenital disease
• Breed predisposition

In some cases the cause is never identified, but the condition is still treatable.

While any breed of dog can be subject to dry eye, there are several breeds that have inherited a greater probability of contracting the condition. These breeds include American Cocker Spaniel, Bulldog, Lhasa Apso, Pekingese, Pug, Shih tzu and West Highland White Terrier.

Symptoms of Keratoconjunctivitis Sicca

Symptoms that present themselves will vary depending upon how long the eyes have been impacted by dry eye. Common symptoms include:
• Redness and swelling of the area around the eye (the conjunctiva)
• Squinting and excessive blinking
• Thick, yellowish discharge from the eye
• Ulceration or cloudiness of the cornea
• Secondary bacterial infections
• Prominent third eyelid
• Impaired vision

DIAGNOSIS OF DRY EYE

Although there are many causes of dry eye, the diagnosis can be confirmed with a Schirmer Tear Test (STT). Small strips of an absorbent paper are inserted between the eyelid and the eye, absorbing tears and indicating the level of tear production. Based upon the results of the test, the veterinarian can confirm KCS and prescribe appropriate treatment.

TREATMENT OF CANINE DRY EYE

Once diagnosed, treatment is a matter of cleaning the eyes and administering medication. The dog owner should make sure that any discharge is cleaned away

with a warm, moist cloth. This is especially important prior to administering the medication. The most common treatment for dry eye is administering Cyclosporine ointment, promoting an increase in tear production. The ointment may be supplemented by tear replacement products such as lubricating ointment or artificial tear eye drops.

Depending upon the extent of the condition, additional treatment may be necessary. If a secondarybacterial infection has set in or a corneal ulcer has developed, antibiotic drops will be required to treat or prevent infection. If the thick discharge is persistent, additional medication may be necessary to decrease the mucous production. In some cases where medicinal treatment isn't successful, surgery may be an option in order to reroute a duct from the salivary glands.

Any dog with dry eye should be examined and a Schirmer tear test conducted on a regular basis to ensure that the treatment continues to be effective.

Canine dry eye is a condition that impacts many dogs. Depending upon the

cause, KCS can be temporary or a lifelong condition. Left untreated, dry eye can become progressively uncomfortable, causing infections and potentially irreparable damage. Corneal ulcerations and corneal scarring can ultimately lead to loss of visual acuity and blindness. The best course of action is to seek veterinary advice and to begin treatment immediately. Once treatment has begun, your dog should see improvement and move on to a life with healthy, comfortable eyes.

Hope this info explains KCS and the treatment options available well
Till next week
Dr Ruan