

perspectives

A FRESH LOOK AT **ENTERPRISE**

The A-Z of the Digital Journey

experience. the difference.

7 THINGS



Costas Liassides, Senior Technology professional with over 25 years of experience, gives us a brief insight into his views on business and life in general.

What was your first job?

My first job was with Decca electronics as part of my industrial training during my degree in computer science. My first real job after graduating was with Burroughs Machines, I joined them to do research on RDMS products (database products were still relatively new in those days!).

What is your favourite movie?

I have diverse tastes when it comes to films... I would say that my favourite movies are probably One Flew Over The Cuckoo's Nest, Dr Zhivago and The Good, The Bad & The Ugly.

What advice would you give to your 21 year old self?

I was always very career-centric and spent little quality time with family... I would advise myself to spend more time on hobbies and family.

Who would your ultimate dinner party guests be? (can be dead or alive)

I would love to have dinner with Winston Churchill, Margaret Thatcher, Socrates and John Kennedy. I would ask my wife to cook the meal, as she is the best cook I have ever known.

What is the most valuable lesson you have learnt in business?

Know your topic very well and know your client's business intimately. This is the only way that they will allow you to partner with them; if you want to join the top table, particularly in Tier 1 financial institutions, you must be able to add value and influence the bottom line. As IT is still perceived as a cost base, CIOs/CTOs need to elevate themselves to the next step up the value chain, by living and breathing the business issues and challenges. When IT was a mere enabler, as a CIO you had to be business aware – but things are changing now. IT often drives business strategy, so the skills of senior IT professionals are more diverse, with entrepreneurialism and market awareness being key attributes.

What emerging technology are you most excited about?

Technology has been influencing peoples' lives for years. We have now reached a watershed where the impact is more obvious and more life changing. Like almost everyone else, I am used to technology innovations and expect technology to be present in everything we do. I look forward to being chauffeured around by a 'robot'... scary, but very exciting.



Does artificial intelligence represent a threat to humanity?

Artificial intelligence is another form of technological advancement – albeit slightly scary, as it impinges on areas traditionally reserved for human beings. Some people have images of machines taking over the world, but I don't think that this would ever happen, as machines lack instinct, feelings and most of all intuition. Besides, humans are too smart to ever let that happen – I hope!



contents

7 THINGS

Costas Liassides

INTRODUCTION

A HISTORY OF ARTIFICIAL INTELLIGENCE

DIGITAL. BY DESIGN

BUSINESS: Better with Bots

RISE OF THE MACHINES

C-SUITE CHIT CHAT

Krishna Kumar

CLIC SARGENT

toriglobal.com

For more information about the content of this publication please contact us at:

perspectives@toriglobal.com

TORI Perspectives is copyright of TORI Global and all rights are reserved. The contents of this publication may not be reproduced without prior permission.

Welcome back to Perspectives!

This edition will be diving into the exciting world of Artificial Intelligence.

We kick off by looking back into the history of Artificial Intelligence: how it has progressed from theoretical 'Engines', to code breaking in WWII and Google's self-driving cars.

Then we move on to examining AI from a business perspective – what it can achieve, but also the challenges that can arise when trying to implement it within an existing IT infrastructure. With customers now expecting their services to be delivered on-demand and 24/7, how can companies ensure their underlying Operations and IT are able to keep pace?

Next is an in-depth look at what Artificial Intelligence actually is. The difference between robotics and machine learning may seem small, but it is fast becoming central to ensuring that clients and employees are able to get the most out of the solutions and systems companies provide.

We then delve into Machine Learning to a deeper level of detail – how do Artificial Intelligence systems learn, how do we teach them, and what can they figure out on their own?

For this issue's C-suite Chit Chat, we sat down with Krishna Kumar, CEO and Founder of App Orchid, a Silicon Valley-based software developer specializing in the science of Artificial Intelligence and Cognitive Computing. Krishna and his team are right on the cutting edge, and he'll be sharing his experience and predictions for what's coming just around the corner.

Finally, we have some information about our charity partners CLIC Sargent, whose mission is to change what it means to be diagnosed with cancer when you're young. We're delighted to be supporting such a noble and worthwhile cause.

Whether you're reading this on the tube, or in the office, we hope you enjoy a little perspective...

Best Wishes
Katie Lawton
Editor

We would love to hear your thoughts so please contact us with us with any feedback at:

perspectives@toriglobal.com



A History of Artificial Intelligence

There is nothing extraordinary about someone talking to their personal assistant, except perhaps, when that assistant is not a human, but their phone. Indeed, it is becoming increasingly common to see people walking around seemingly talking to themselves. But how did we reach this new level of soliloquising to inanimate objects? To understand and appreciate AI today, it is worth considering the fascinating journey the subject has taken.

1840s - Babbage & Lovelace

In the early 1840s British mathematician Charles Babbage began correspondence with Ada Lovelace, the daughter of the Poet Lord Byron, on the subject of the Analytical Engine. The machine was to mechanically calculate complex mathematical sequences (called Bernoulli Numbers) using a punch-card system. Lovelace supplied Babbage with an algorithm which would allow the machine to calculate these complex numbers; she is therefore seen as the first computer programmer. Although the machine was never built, her algorithm has subsequently been proven correct.

Whilst Lovelace, with Babbage, broke new ground in computer science, she under-estimated the potential of computers. She wrote to Babbage "[The Analytical Engine] can do whatever we know how to order it to perform. It can follow analysis; but it has no power of anticipating any analytical relations or truths." Alan Turing would challenge that statement a century later.

1940s - Alan Turing

Under the spectre of war, Alan Turing and the men and women of Bletchley Park, England were busy trying to crack Nazi codes. Turing was instrumental in decoding the German Enigma machine: in doing so he not only helped the war effort but took computer science to the next level. He did so by creating the 'Bombe', which could decode cyphers in ten minutes, something that would take the brightest human minds weeks or months to do.

After the war Turing worked on the Automatic Computing Engine or ACE (its name being an homage to Babbage's Engines). It ran its first programme in 1950, and soon after he changed his focus to what we would call AI today. He went on to establish a test he called 'The Imitation Game' (subsequently known as the 'Turing Test'). The test establishes whether a computer can trick a human into thinking that it is human. He predicted that by 2000 a computer could fool human judges 30% of the time. In 2014, a Russian chatbot called Eugene Goostan tricked 33% of an audience into thinking it was human and was said to have passed the Turing test.

1950/60s - Science Fiction

Science fiction novels and films have also influenced the field of artificial intelligence. For example, Russian/American author Issac Asimov wrote a series called I, Robot. In it he makes a number of predictions about the future of artificial intelligence, and establishes the 'Three Laws of Robotics' - which appeared in the movie starring Will Smith.

2001: A Space Odyssey featured an intelligent computer named HAL 6000. The MIT computer scientist, Marvin Minsky, advised the makers of Space Odyssey, and it's possible to see elements of his views on AI in the film. Minsky favoured a top-down approach to AI, which meant focussing on pre-programming computers with rules rather than mimicking the brain's neural networks.

1990s - AI Philosophy

Artificial Intelligence had a quiet period over the 70s; it hadn't lived up to the hype and expectations. But Rodney Brooks took the post at MIT that Minsky once held and in doing so shifted the philosophy of AI from top-down to bottom-up.

In 1997 IBM's supercomputer 'Deep Blue' took on chess champion Gary Kasparov and won. Deep Blue was more of a top-down form of AI but it still was seen as a watershed moment by many. IBM would go on to create 'Watson', a supercomputer built with more of a bottom-up approach that set out to mimic the way in which the brain works.

2000s - Rise of the Robots

In the mid-2000s robots begin to rise. 2005 saw the first driverless car (by Stanford University) successfully complete the DARPA Challenge. The race involved driverless cars navigating a desert racetrack with time penalties for crashing into objects. Robots found their way into the home with Roomba, the autonomous domestic Hoover, and the garden with autonomous lawn mowers

2016 - Today

AI has come on in leaps and bounds. Robotics helps businesses perform repetitive tasks that previously kept armies of human employees busy, cutting costs in the process. Google's driverless cars have covered over 1.5 million miles. Personal assistants like Apple's Siri and Microsoft's Cortana chat to us about the weather. Facebook have launched a chat bot platform which will allow customers to order pizzas, transfer money and book hotels.

Artificial Intelligence has come along way and shows no signs of letting up yet. The past decade has been particularly fruitful and you don't need to search long to find some way in which it is impacting your life already. The benefits of AI are already being seen; whether reducing costs for business operations, saving lives through driverless cars or improving the customer journey experience. Concerns remain, however, about the existential risk we may be running by harnessing the power of artificial intelligence. It doesn't seem long before more chat bots are passing the Turing test and the line between human and computer blurs.

Digital. By Design

With a tool as flexible as AI, having a clear strategy is critical to ensure successful adoption and performance

For a business that is well progressed digitally, the question of *'what business are you in?'* can probably be replaced by *'what do you use IT to do?'* However, technology evolves so quickly that businesses now need to constantly revisit and reevaluate their solutions, to ensure that they are secure, effective and efficient.

Before beginning on such a digital journey, a clear strategy - or digital direction - defining what 'digital' means to the business needs to be established. Next, a robust and pragmatic governance must be stipulated. This digital assurance will drive clarity, communication and ongoing alignment to the strategy.

Then comes execution, with two aspects to consider:

- The overall digital experience of customers or staff: customers are less 'sticky' than ever – and their initial attraction and subsequent retention is more dependent than ever on end-to-end experience. Similarly, suboptimal internal systems can be major inhibitors to staff productivity and motivation
- Enabling informed decisions by leveraging the potential in the masses of readily available data. Any new architecture must be able to connect with rich data sources in legacy IT systems

So what does AI mean? It can be broken down into two categories: robotics and machine learning.

- Robotics automate human tasks. Typically, they are repetitive, work from human-configured rules and can help overcome scalability and consistency issues while driving down costs. They are known as Artificial Narrow Intelligence (ANI) or 'weak AI'

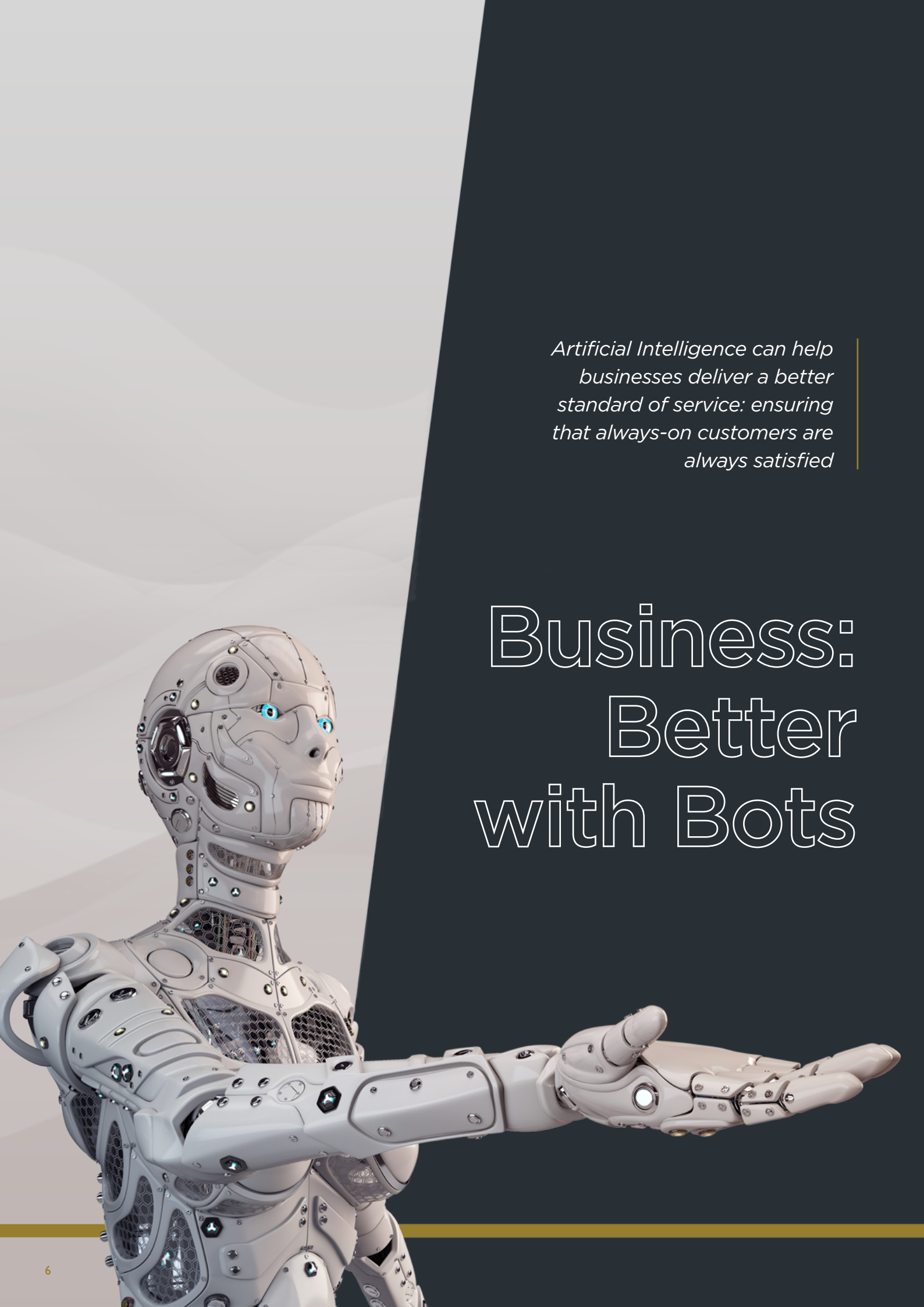
- Machine learning mimics the experience-based evolution of the human brain. It can optimise previously human-performed tasks and identify undiscovered relationships. This is known as Artificial General Intelligence (AGI) or 'strong AI'

Essentially, machine learning is where AI meets Big Data. The systems are inherently general, can operate across a wide range of tasks and as a result, are widely used in gaming and insurance. In the latter, for instance, it can improve cross-selling tools available to customer care teams. In contact centre-based financial services sales teams, AGI can create predictive 'next best offer' models that learn and update as customers accept or reject different offers.

“Essentially, machine learning is where AI meets Big Data”

The two types of AI can seem to be analogies for contrasting views on business and IT relationships. In the traditional robotics world, AI functions as a support to business requirements. In machine learning, the business rather becomes a specific way in which IT is used. In this new world, IT is the business.

Considered a new science, AGI is both exciting and scary. But when used appropriately, it can realise many business' digital aspirations.



*Artificial Intelligence can help
businesses deliver a better
standard of service: ensuring
that always-on customers are
always satisfied*

Business: Better with Bots



Investment in technology is critical for companies today: customers expect access to their products and services around the clock.

If that digital promise is not kept, negative perception can flourish through social media and press channels – potentially even leading to regulatory scrutiny. Establishing an error-free customer service system that can lift revenue and cut costs while managing production and workforce may seem an impossible dream, but robotics-based, digital options can make it a reality.

Many of us have seen manual operations become overloaded. As an example, the overwhelming customer response to the launch of mobile payments led to many sleepless nights for Banks' Ops and IT managers, as their legacy systems came under increased pressure. Sophisticated robotics systems could have provided an alternative to this stress and strain – with the right Business Process Management and workflows in place, intelligent automation and AI can be used to build powerful error-free digital frameworks for a variety of purposes.

However, the world of digital is fast-paced and ever-evolving, and businesses can struggle to find the right solution. As always, it's important to adopt the right approach for every business' specific challenges – one size will not fit all.

Older rules-based robotics have proven particularly useful in error-prone processes like account switching, where extensive customer data is repetitively recalled and distributed. For example, simply changing the address of a customer who has a mortgage, current account, savings account and credit card requires repetitive keying in. Employing rules-based robotics in this scenario simultaneously removes error risk and the need for costly numbers of human staff. The reasoning side of artificial intelligence – or cognitive learning automation – is more sophisticated. These systems can leverage predictive analytics to get smarter and adapt – proving particularly invaluable in tackling fraud, specifically in terms of establishing effective detection systems. With robotics, your service is always on – they are never taking a tea break or off for the weekend. They also allow legacy infrastructures to be re-engineered and evolved piece by piece rather than replacing a whole platform.

While these possibilities are exciting, it is a new and expensive space – but artificial intelligence provides a business with better insight born from a clearer understanding of risk appetite and control points.

Establishing scalable robotics can transform business operations by providing a powerful framework of excellent service, enormous cost reduction and a dramatic uplift in revenue.



RISE OF THE MACHINES

With all the different models of machine learning, the key to success is adopting the right approach for each business' specific objectives

Many organisations are grappling with the digital challenge of leaving legacy systems behind to make way for the new. Emerging machine learning technology can drive transformative organisation development, but more importantly, it can facilitate the friendly co-existence of the old and new during migration.

Machine learning technology derives patterns from data by itself. It can process large volumes of raw data in real time, using it simultaneously to learn and improve its performance.

The system will be highly accurate as the full picture of market nuances will be processed. Ironically, it is the way these new algorithms mimic the human brain that sets them apart from older human-input systems. They work like the brain's complex neuron networks, instantly recognising patterns with an ever-evolving knowledge.

The real-world applications are compelling. Machine learning can extract sentiment from social media conversations, or adapt online user interfaces according to users' actual behavior. And crucially, it can turn noisy, unstructured data (from Point of Sale for example) into structured, actionable insight, which can in turn feed in to activities such as marketing campaigns or product development – even corporate strategy.

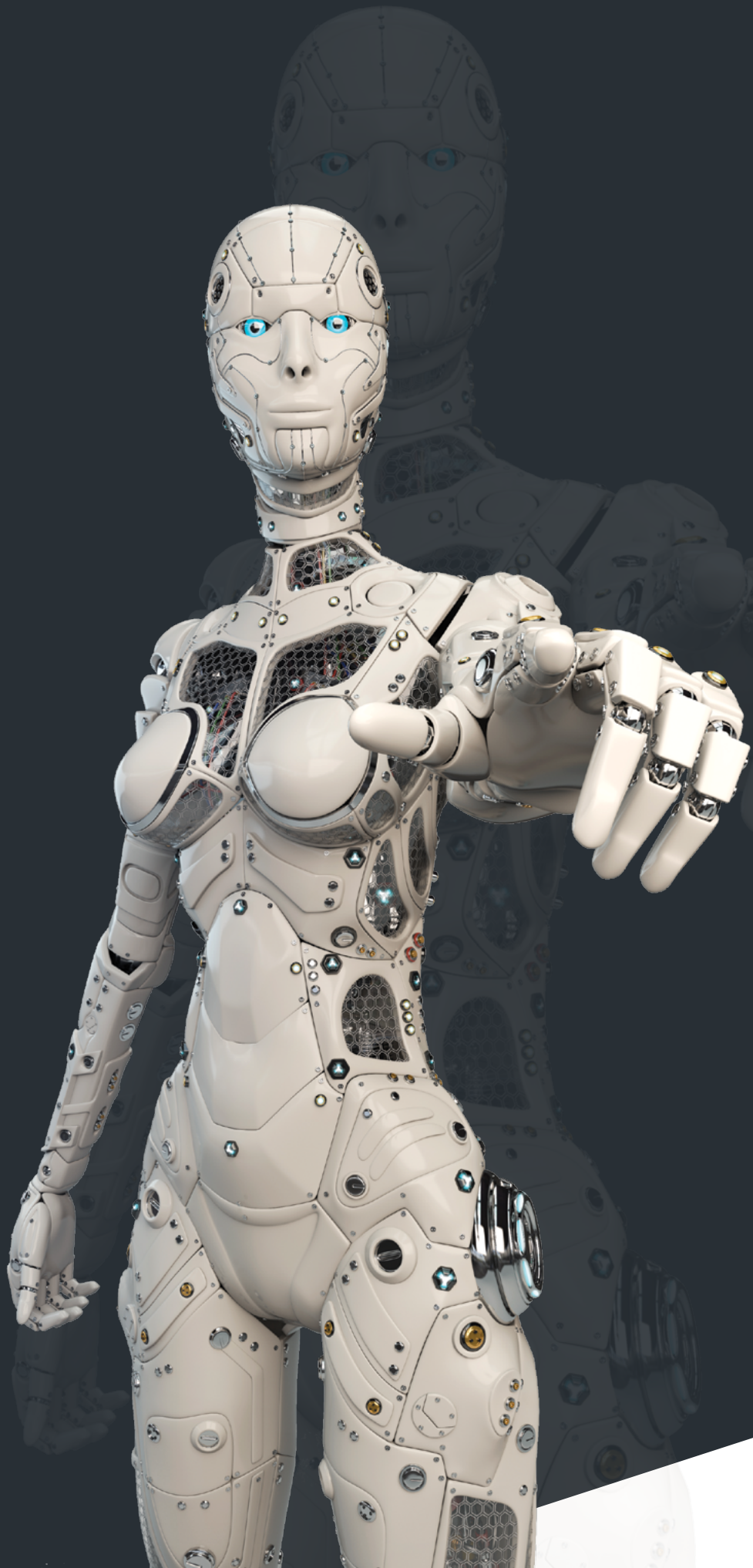
Machine learning is a new and exciting technology. As organisations are evolving beyond the dusty limitations of conventional systems, these emerging options can fulfil multi-faceted development aspirations and address weighty migration issues all at the same time.

The three models of machine learning are:

1. SUPERVISED LEARNING, where labels are manually inputted alongside the data. As the system learns what a pattern looks like, it becomes better at identifying it in different contexts
2. UNSUPERVISED LEARNING, where data is divided by the algorithm into groups based on similarities, enabling the system to make conclusions based on that knowledge
3. REINFORCEMENT, where human input judges the algorithm's performance. Simply put, the system works on trial and error. It will, for example, remember the failure of the way it did something and alter its performance accordingly

In general, machine learning is used in four categories:

1. CLASSIFICATION, where the system assigns labels such as 'fraud' and 'not fraud'
2. REGRESSION, where numbers are assigned to a pattern, like pricing
3. CLUSTERING, where large numbers of experiences are divided into groups based on similarity
4. RULE EXTRACTION, where the system finds relationships between different data elements





Krishna Kumar is an entrepreneur, innovator, visionary and architect with proven expertise in taking a concept to a market-leading industry recognized commercial product. Within a short period, he has commercialized AppOrchid's product, secured beachhead customers and made the company profitable with 300% Quarter over Quarter growth.

CC: Hi Krishna, thanks for taking the time to talk to Chit Chat. You're the CEO and Founder of App Orchid: can you tell us a bit about your journey and background?

I started my career over 20 years ago as a SAP consultant at enterprises like Siemens, SAP and Hitachi. Then I founded my first startup, Space-Time Insight, and in 10 years I built the product, acquired customers and hired and coached the management team, including the CEO, resulting in a 200-person company with over £50 million in venture capital. We pioneered situational intelligence, with applications in the control rooms of some of the largest energy companies in North America.

I started App Orchid to be an industry leader in IoT (Internet of Things) and AI. In three years, we have acquired several customers, have presence in three continents, and triple-digit quarter-over-quarter growth. We are currently serving three markets - Energy, Insurance and Healthcare.

CC: What's the biggest lesson you've learned since founding App Orchid?

As a startup you deal with challenges ranging from optimizing usage or team resources, to managing financials while acquiring customers and priming the pipeline. You need a first, well-known customer who will pilot your product, ideally for a price - ours was a large national grid.

We had a visionary solution so we could piggyback existing budgets and systems to promote our analytical offerings. We couldn't have done that with just a product. I had five very smart consultants who were with me - I would go there twice a week to get things going and then would use the other consultants to implement what had been sold. That way, I could build revenue while building the platform.

CC: What challenges are your clients facing? What are their business needs?

Issues like aging workforces and aging assets have forced organizations to examine integrating employees' tribal knowledge with other structured and unstructured data. Blending and querying all this disparate data should be no more complicated than asking a question in Google, making the identification of patterns, risks and opportunities much easier than it has been using traditional analytical tools.

Additionally, utilities want to break the barriers between data silos such as SCADA EMS, DMS, CIS, etc., and integrate structured data with unstructured data - from the internet, social media, news and weather; as well as reports, emails, evaluations, presentations and observations.

CC: How do Machine Learning and Artificial Intelligence address those drivers?

Typically, structured data comes in the form of vast quantities of digital multi-dimensional sources. Converting structured data into actionable information requires the use of in-memory technology. A majority of the information in unstructured data is converted into "tribal knowledge" which is easily lost when people leave the workforce. Converting unstructured data into actionable information requires the use of cognitive computing. Integrating the information embedded in both structured and unstructured data sources has not been possible until now.

The failure to integrate information from both structured and unstructured data sources that typically reside across the Internet of Things (IoT) can lead to safety issues, compliance penalties, reduced profits and customer dissatisfaction. At best the failure to integrate results in inefficiencies, at worst catastrophic failures.

CC: What benefits and opportunities do these techniques unlock?

We're harnessing advances across in-memory processing, machine learning, artificial intelligence and natural language processing to blend millions of data points - from tribal knowledge, operational systems, and the Internet of Things - into a new generation of multi-device smart grid apps across the enterprise value chain. Analysts can now develop powerful business apps and solutions with minimum IT oversight and governance.

By combining unstructured data like emails, maintenance logs, memos and compliance regulations with IoT data from smart meters and EMS along with asset ledgers, utilities can now have a 360-degree view of all data points that influence the state of their assets, provide insight into risks and profit leaks that was previously thought impossible.

According to a Gartner Analyst who nominated us for 2016 Cool Vendor, "App Orchid is cool because the solution combines multiple cutting-edge technologies to produce accurate, non-obvious replies and recommendations to natural language queries. And these results can be informed by "dark data" such as source files that have not yet been normalized into EAM or other enterprise systems.

CC: What other new emerging technologies do you see on the horizon?

- Cloud Computing enables us to easily use software as well as processing platforms and computing infrastructure (that are not equipped on our computers and smartphones) from any location through Internet services.
- Big Data provides us with new intelligence from massive data sets, which can help in situation/condition/status analysis and decision making
- The field of artificial intelligence is advancing rapidly along a range of fronts. Recent years have seen dramatic improvements in AI applications like image and speech recognition, autonomous robotics, and game playing; these applications have been driven in turn by advances in areas such as neural networks.



CLIC Sargent is a leading cancer charity for children.

Their mission is to change what it means to be diagnosed with cancer when you're young.

They believe that young cancer patients deserve the best possible treatment, care, and support throughout their cancer journey and beyond. And they deserve the greatest chance to make the most of their lives once cancer treatment has ended.

CLIC Sargent provides vital emotional, practical and financial support to young cancer patients and families during and after treatment, and they take what they tell them about the impact of cancer on their lives to service providers and policy makers to help change things for the better.

TORI has a special connection to CLIC Sargent due to a close friend of the firm's, Nigel Crutchley. Nigel's son, Ben, sadly died of a brain tumour in 2012 at the

age of just 9. In 2013, Nigel pledged, with the support of CLIC Sargent, to raise £1m for children and young people with cancer, following the incredible support the Crutchleys received from the charity throughout their ordeal. From basic care to unerring support, the charity helped re-define the Crutchley's situation. Nigel has taken on a range of fundraising initiatives like bike rides, half marathons, triathlons and even a skydive! Nigel said *"Every day ten families are told that their child has cancer. I am committed to raising money for CLIC Sargent, which does such a fantastic job of supporting families like ours."*

TORI Global are honoured to be supporting Nigel and his family on this journey and will be fundraising for the 'Benny Boy Crutchley Fund' in 2016/17.

www.clicsargent.org.uk • 0300 330 0803

