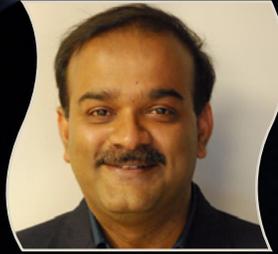


# MESSAGES 7

**‘ARTICULATES  
INTELLIGENCE’**





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**‘H**umans Loath Ignorance’! Interestingly, today standing at a doorstep of technologies been inexorable, we have kindred machines after our pets. Reasons have been obvious! Our dependence on ‘precise’-command accepting devices seems to have kept us gelled in an era of ascending leadership. Intelligence has always been scripted as character! At a churning phase of enterprising societies, technocrats seem to have incubated and articulated the cognitive feats of humans into machines. The big black screens in theatres showcasing machines co-leading a society seems virtually inevitable today, sparing no ‘mad scientists’ tyrannically trying to overrule the organizational apparatus of human sense. 2018, as a year shall be remembered not just because of the augmentation of perforating “Smart and Interactive Devices” but a much-talked headline wrapping social humanoid robot dubbed, ‘Sophia’. From ‘Date with the Humanoid’ to its controversial social intelligence, it extensively swayed global thought leaders. Enticed by the glorifying, ‘Sophia’ and Enterprises, Industries wooing digital transformation, I apparently jotted our last-leg story of 2018 on ‘Learning & Articulating Intelligence’.

I named it as the ‘Seven Sages of Tech Industry’ shall not be a foreword babble as it not just demystifies the Darwinism of Artificial Intelligence and Machine Learning but it also tries to lucid on the possibilities quantifying 2019 for this nascent technology.

## Pros and Cons of AI and ML

### Debasish Chatterjee

AI and what impact is AI going to have on our future - is one of the most strong and talked about debates that people in the tech space are increasingly having; and I think the debate itself and the intensity of the debate is for good. For us to get good grip to the topic, It's important to have the definitions right in order to look through the hype: Artificial intelligence is the science and engineering of making computers behave in ways that, until recently, we thought required human intelligence. Machine learning is the study of computer algorithms that improve automatically through experience." ML is one of the ways we expect to achieve AI & Deep Learning; it's a subfield of machine learning concerned with algorithms that is inspired by the structure and function of the brain called artificial neural networks.

On the positive side while AI appears to have all the answers, the benefits are determined by the business cases or the use cases. Domain knowledge brings the necessary focus to understand customer value and un-lock the potential. These latest technology innovations have enabled possibilities which earlier was difficult to achieve.

#### For Example:

Consider how AI is enhancing the product design process: A human engineer defines a part's materials, desired features, and various constraints, and provide inputs into an AI system which generates a number of simulations. Engineers then either choose one of the options, or refine their inputs and ask the AI to try again. An industrial-equipment maker will benefit from better predictions about product failure so it can schedule maintenance in advance. Likewise, better predictions will help a mobile operator cut the time it takes to resolve network congestion and isolate instability.

However, what's the right way to build it – this is the area that needs extensive deliberations.

### Anand Thirunagari

Artificial Intelligence (AI) is a 'catch phrase' being used to describe many and is being used interchangeably with most things related to 'Machine Learning' (ML) however they are not the same thing. In most cases AI is used to denote broader technology concepts related to making computers "smart" or creating a functional artificial 'brain' that can make human-like decisions. The reality of AI is that we are many years from fully realizing this vision.

For specifically defined industries and applied problem sets, Machine Learning is being applied today to provide end-users with insights to help in decision making based on analysis and correlation of large sets of data. Machine Learning is here to 'aid' us in combing through millions of pieces of structured and unstructured data sets and imagery to provide deeper insights, to uncover associations that might be difficult for people to see in large sets of information and in the end, to help us make better and faster decisions.

### Andy Patel

A lot of positives have come out of the current wave of progress in the field of machine learning. Most notably, from the public's point of view, are improvements in language translation, speech recognition, and computer vision.

On the negative side, machine learning models are sometimes misused, implemented badly, trained on biased data or used in places where they shouldn't. Additionally, some machine learning based systems are somewhat easy to attack, and not-at-all easy to defend - such as review and ratings sites, comments sections, and social network recommendation systems.

### Rohit Maheshwari

AI has the potential of deeply impacting every sector. AI will usher an era where risk as we know today, will cease to exist. Imagine a future where outcome of every decision as well as all future events, could be known with 100% certainty. In the immediate future though, AI will take over repetitive and mundane jobs liberating us to focus on the creative. And eventually our biggest existential challenges of food security, ecology and diseases will be overcome - thanks to AI.

However, there are cons. Firstly, executives will need to cut through the hype around AI and carefully choose projects, vendors and people they need to invest into, to further business goals. AI also has the potential of increasing the divide between countries which have rapidly invested in AI deep research such as US and China on one side and the rest of the world on the other. And as artificial general intelligence reaches and goes beyond human intelligence AI has the potential of either making us immortal or extinct.

### Arun Balasubramanian

The positives of the ever-increasing technological integration into the business landscape are quite apparent. Cutting-edge technologies such as AI and machine learning are making it possible for organisations to optimise business operations across the board, swiftly capitalise on emerging market trends, and improve their profitability. They are creating high-value business opportunities where none hitherto existed.

Unfortunately, the downside of our constant dependence on technology is not that visible, mostly because it conforms to our cognitive biases. The way AI and machine learning works at present can create subjective blind spots. There is also a lack of understanding on how the technology works, and the importance of accurate data feeding into the system. You can't expect fresh fruit juice with a rotten apple in the mixer. This situation obviously needs to be addressed urgently, but the solution is not to enforce more stringent data regulations. Instead, we need to completely democratise data and make it available and accessible to everyone – on a governed basis obviously. All of the information must be presented to the end-users at a granular level, in a format that allows for in-depth exploration, discovery, and questioning – freely and in all directions. This approach allows users to overcome their

inherent biases and uncover various possibilities within datasets that might not even have otherwise crossed their minds.

### Suman Reddy, MD, Pegasystems

A survey done in 2017 on consumers perception of AI showed only 34% of respondents thought they interacted with AI technologies. But when probed further into their device or service usage habits, it found that 84% actually used AI in one form or the other – albeit most didn't realize it. In 2018, AI is now available in very visible forms, either through a chatbot or an Alexa device, and consumers feel its tangible benefits – most in the form of more personalized service and recommendations that enhance the brand experience. Now high level personalization is the norm rather than the exception both online and in person.

However, enterprises must err on the side of caution today, as data management protocols are now in favour of consumers. Moreover, as new regulations like GDPR mandate a level of 'explainability' into automated business models, enterprises must be cognizant of the potential consequences of non-compliance. Enterprises must be sure to manage the transparency levels of their AI implementations to enable visibility into the reasoning behind how AI models arriving at decisions.

### Nagarjun Kandukuru

In common with many digital technologies, ML holds the promise of significantly improving the lives of billions. Whether that happens or not depends on how society chooses to implement it - the incentive structures around it, regulation etc.

#### POTENTIAL POSITIVES

- **For everyone:** AI and ML promise improved outcomes across a whole range of vital areas from cancer diagnosis to personalised lesson plans to preventing credit card theft. Additionally, the tech will enable a more joyful computing experience.
- **For people at work:** AI and ML will replace routine, repetitive tasks and ensure less drudgery at work. Employees will have more time to indulge in creative, thinking work, and to apply their uniquely human traits like judgement and empathy when designing solutions and products.
- **For companies:** AI and ML when accurately implemented allow for faster, better and cheaper decision-making, that are powered by predictions that are data-backed.

#### POTENTIAL NEGATIVES

- **Industrial-scale bias:** If we aren't careful, ML can turn into a very discriminatory tech at a mass scale. Algorithms aren't value-neutral; they encode the biases that humans introduce in to the training data. Instances could arise where job applicants could be turned away for arbitrary criteria (like pincodes), loan applicants could be denied for non-transparent reasons. A recent book on the subject, 'Automating Inequality' by Virginia Eubanks is a good summary.

- **Redistribution of manpower - Routine-Job losses:** Every

technology causes some jobs to disappear and some new ones to be created. So also, AI will certainly take away some jobs, but create new ones like model trainers. Technologies like the internal combustion engine created far more jobs than they took away. Will AI be similar? The answer depends on what scaffolding (e.g. regulation, corporate behaviour) we choose as a society. Also, what of the people whose jobs AI will cannibalise? Can we find the will to retrain them?

- **Loss of sovereignty over self:** A brilliant example of this is the infamous story of Target figuring out a teen was pregnant before her own father did. AI has the potential to tip into the grey areas of privacy and propriety in its eagerness to customize and predict services to suit individuals.

Combined with nefarious uses of behavioural science, AI can make consumers do things that are bad for them - e.g. buy products of dubious value. We're already seeing the damaging effect of fake news on citizens; if we aren't careful, AI could further turbocharge fake news to further polarize society.

Foreseeing AI and ML Trends for 2019

### Arun Balasubramanian

In 2019, I foresee some of the current hype around AI and machine learning give way to a more level-headed approach. I feel people will finally come to terms with the fact that, as powerful and impactful as these technologies are, they cannot be considered a one-stop solution to all business requirements. AI and machine learning excel at accomplishing specific tasks within a controlled environment, but struggle to justify the ROI when implemented without a specific objective in mind. I expect this realisation to pave the way for large-scale adoption of augmented intelligence, which is essentially an amplification of human expertise and skillsets through machine capabilities.

### Suman Reddy

The focus of AI will shift from intelligence to empathy: We're getting past a point where basic intelligence will be adequate for consumer-facing AI. Customers expect to be viewed as individuals and not as records in customer databases. 2019 will see vendors focus on improving humanizing AI with empathy. If you break this down, it means identifying clues on customer motivation, gauging their current moods, or being aware of happenings around them.

The future of work: AI will heavily influence the imminent workplace in enterprises globally. In fact, 69% of senior executives from a recent study felt the term 'workforce' will encompass both human employees and smart machines in the near future. A realignment of work roles will ensue as organizations will operate in a highly agile environment that is underpinned by modern technologies working in tandem with humans.

### Rohit Maheswari

If you measure the impact of AI in terms of business value, some of the leading industries set to benefit the most are retail, healthcare, travel/transport/logistics, and banking/

fintech. These industries have been subject to intense digital transformation and as I mentioned before, it is the supply of this digital fuel which is firing the AI engine.

In terms of business processes AI will have a profound impact on sales and marketing, supply chain and manufacturing followed by risk management and innovation. It is these business process areas where trillions of dollars of value will be unlocked.

### Andy Patel

I expect we'll continue to see research advances in most areas of machine learning. Some areas, where the exploration space is still large, such as reinforcement learning, will likely see more advances than others.

Public services are available (and commonplace) that can create, train, and deploy machine learning models for anyone who pays. As such, it is expected that machine learning models will appear in more and more places in the coming years. Innovation around the application of existing machine learning techniques will continue as startups compete over the vast amounts of VC capital currently being thrown at AI.

### Anand Thirunagari

The focus in 2019 will be on more specific use of machine learning to help automate specific tasks or operational issues. This will help make business more efficient and allow the workforce to be more effective eliminating human time dedicated to review and correlation of data allowing for review of dashboards-based insights automatically generated to allow for greater strategic decision making.

In 2019 we will see ML playing a pivotal role in Indian security and surveillance industry. ML and analytics when deployed as part of a physical security solution, can greatly empower security operations, law enforcement and first responders. This will help authorities in incorporating data and correlating information in their day-to-day work in new ways which in turn will provide actionable insights to develop data driven decisions.

Examples of areas where ML can be beneficial for the Indian market is Government's smart city initiative which will focus on public safety, public transit system and security of critical infrastructure. ML learning as part of video surveillance, traffic systems and strategic operations centres will support cities and organizations in protecting their communities, citizens and assets.

### Debasish Chatterjee

We are witnessing the next wave of effort by firms in converging digital and data to render significant 'Intelligence led' capability. Data consumption patterns have evolved dramatically over the last decade & analytics is being applied for better customer experience, personalization, acquisition and retention - to enhance business capabilities leveraging AI & ML techniques. As adoption of Analytics

becomes mainstream, organizations have started integrating the AI & ML capabilities as part of their product offerings, with tight integration across the data spectrum. Companies have started using search, natural language and intelligent analytics powered by AI to derive insights which was never thought of earlier.

Additionally, real time data enablement of analytics, at the point of action, is propelling the adoption of analytics at a much faster pace. 2019 and beyond will see large scale digital transformations being shaped up by an Intelligence first strategy by many organizations globally – thanks to the advancements in AI and mainstream adoption of ML and Deep learning techniques for developing intelligent apps.

### Nagarjun Kandukuru

- **Intentional Data Mining Strategy:**

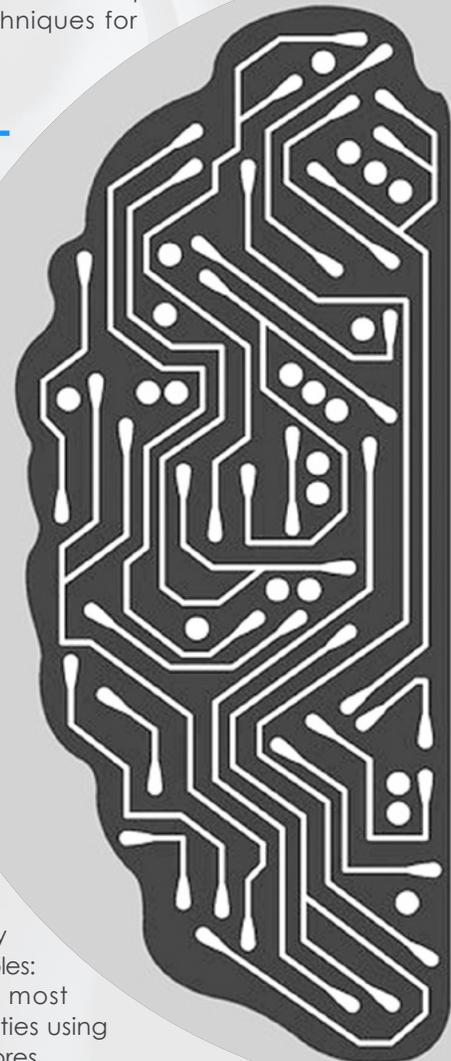
Given the inexhaustible potential of data, companies will become more strategic about their data mining, collection and storing investment and approaches. Some of the more progressive ones will even de-silo it (e.g. place both marketing and finance in one place) and make it available widely to developers in their organizations.

- **Prediction potential:**

More companies will realise that ML can predict outcomes based on past behaviour, and industries across the board will employ this idea. Here are a few examples:

- o Retailers will predict their most profitable customers' identities using buying habits and credit scores
- o Healthcare providers will predict with great accuracy which tumour is malignant.
- o Insurance companies will predict risks associated with each customer based on medical data, family health records and records at pharmacies

- **New workflows:** 2019 will see new workflows emerge and they will start us on the road to creating AI applications at scale. These workflows will include the likes of a head of product interact with an AI developer. A designer with a data specialist. Right now, AI development is a bit like the Wild West was. But in 2019, new workflows will emerge,



starting us on the long road to creating AI applications at scale in all industries.

- **Roles for humanities specialists:** This potential trend is a fond hope as much as it is a forecast. AI presents the tendency to work in the grey areas of ethical and poses issue when it comes to user adoption (e.g. people's reaction to a machine making hiring recommendations), and require people proficient in the academic discipline of humanities (e.g. behavioural scientists) to work closely with AI technologists.

## Sectors Impacted By AI and ML

### Arun Balasubramanian

Companies in domains such as IT/ITES, fintech, e-commerce, and digital services have been amongst the first-movers when it comes to adopting AI and machine learning, and are already using them extensively to optimise their operations.

What's interesting to note, however, is that this tech adoption is accelerating even in those industries which are not traditionally known to be very technologically-

forward. Sectors such as retail, manufacturing, BFSI, and healthcare generate massive volumes of data on a daily basis, and players in these segments are finally realising the need to tap into this unparalleled resource.

For instance, Philadelphia-based Jefferson Health managed to address a growing opioid crisis by deploying Qlik's data analytics platform to complement the operations of its recently-launched Electronic Health Record (HER), Epic. The integration allowed for a standardisation of opioid order and prescription workflows, which allowed for the detection of critical issues and bottlenecks. The insights generated by Qlik also helped the team at Jefferson Health to identify how to address the situation. By making a single change in the ER prescription process, the team was able to significantly

reduce the overall number of opioid prescriptions.

This example highlights how integrally analytics is tied into the unparalleled disruption that is redefining the global business landscape at present. Taking it a step further, embedding analytics into business processes helps make data more actionable and increasingly also real-time. All of this is being fueled by new technologies, like robotic process automation and process mining, which look at digital footprints and from that can further automate or re-shape business processes. For example, when a pharmacist places an order for a patient, it is possible to automate and re-shape sub-processes including receiving, fulfilling and invoicing the order.

### Rohit Maheshwari

If you measure the impact of AI in terms of business value, some of the leading industries set to benefit the most are retail, healthcare, travel/transport/logistics, and banking/fintech. These industries have been subject to intense digital transformation and as I mentioned before, it is the supply of this digital fuel which is firing the AI engine. In terms of business processes AI will have a profound impact on sales and marketing, supply chain and manufacturing followed by risk management and innovation. It is these business process areas where trillions of dollars of value will be unlocked.

### Debasish Chatterjee

AI is remarkably complex and advancing quickly. It's doing far more in some areas, and far less in others, than anyone would have guessed a decade ago. AI's impact, by its sheer potential, will free up time, enhance quality and enhance personalization. Currently though, limited industries are at the forefront of the adoption. These include Healthcare, Automotive, Financial Services and Retail industries which have been leading this space with faster adoption of these new technologies and techniques to solve various business problems, or to enhance existing processes.

### Suman Reddy

Every sector is being impacted by nimble startups operating on a business model heavily fused with nascent technologies and serving consumers who are increasingly using their services. Legacy enterprises realise the importance of going digital or face loss of market share. The BFSI and telecom sectors have been pioneers in experimenting with digital tools given the nature of their business models and rapid innovation impacting their industries. We have also noticed significant activity in the healthcare domain. Players in most sectors are experimenting with various digital technologies while rooting their core business processes in digital process automation to transform their organizational operations even faster and more efficiently.

## Anand Thirunagari

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ML has seen early adoption amongst law enforcement agencies and government projects. Cities and critical infrastructure like airports, operations and intelligence and public transit systems have started adopting machine learning based solutions. These sectors are leveraging this technology in their public safety and in areas related to operations to drive greater efficiencies, better protect citizens and to generally better serve communities.

## Andy Patel

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Machine learning techniques have been used across most verticals for decades already. Obvious examples include things like financial modeling, marketing and business analytics, and many areas of scientific research.

As far as the impact that machine learning will have on the way companies do business, the explosion in the amount of data businesses have to work with has spawned new types of analytic tools. Businesses across all verticals are using these tools to perform more complex analysis methods on the data they work with. The drive for businesses to become more data-driven will continue.

## Hush Security in Screaming AI and ML

### Arun Balasubramanian

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We live in a digital-first world, where interconnectivity and cross-functionality hold more sway than maintaining the rigid operational hierarchies of yesteryears. While this growing connectivity between users, devices, data, and networks has no doubt given way to more seamless operations, it has also completely obliterated the traditional enterprise security perimeter. Organisations need to treat every node within the larger IT framework as a point of defence.

Given how rapidly the threat landscape is evolving, I genuinely feel that not using AI and machine learning in cybersecurity is simply no longer an option. Human-only teams cannot maintain the 24x7 security vigil that modern-day enterprises require, making real-time threat detection and response a virtual impossibility. Integrating AI and machine learning takes the burden of processing the security data off the shoulders of human security experts by automating threat detection and triaging. This leaves human teams freer to respond to more critical threats and breaches.

### Rohit Maheswari

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- Security and cybersecurity risks have been the no.1 barrier to adoption of digital, IOT and indeed AI.
- Online digital services providers such as Google, Facebook have innovated due to their unbridled access to user data. However, they have started facing intense scrutiny over use of user data. Europe followed by several other countries have enacted strict data protection laws.

- I believe, business leaders should treat cyber risk as an existential threat and should have an enterprise wide perspective on handling it. Cybersecurity is not the responsibility of one department and every part of the organization is a stake holder. Controls to address cybersecurity must move closer and closer to the coal face for them to be effective.
- I also believe, building digital trust i.e. trust in data, processes and systems should become the focus of every CEO, CISO, CIO and CRO.

## Andy Patel

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Artificial Intelligence is being used to create tools and automation to aid experts in the cyber security field. Artificial Intelligence techniques allow cyber security researchers to efficiently process and visualize analyse large data sets, and high-volume streaming data, on-the-fly, in order to find anomalies and patterns indicative of malicious behaviour. Machine learning models, deployed on both clients and back end systems, are already being used to detect anomalies in computing infrastructure. By using of powerful artificial intelligence-based tools and techniques, cyber security researchers are able to free up their time to work on creative solutions to problems they're seeing in the field. That knowledge is then used to create even better tools and models for the future.

### Anand Thirunagari

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Machine learning applications analyze information to find patterns, correlations, and anomalies within the data. In the field of cyber security this means processing massive amounts of data and filtering it into more readable information sets for security teams, so they can find issues long before a human would normally be able to notice a pattern. This means that IT teams can leverage ML for quickly uncovering potential cyber threats on their networks. There is also the possibility of ML being used by hackers to identify weak points in cyber defence.

Today successful hackers leverage people as the weakest point of any network and use social engineering techniques to break into networks and/or to defraud individuals and businesses. Although these hackers may be able to use ML to identify the social engineering practices that result in the best penetration over time, the use of ML to identify exact weaknesses on a network are still very limited in scope. Therefore, the potential upside in increasing cyber security and resilience using ML cannot be overlooked. The use of ML to support cyber security and to create defences as a counter measure against malicious intent is a real benefit.

### Debasish Chatterjee

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Suspicious digital communications have made cybersecurity a top concern for business leaders across the globe. Organizations today are already beginning to use AI to bolster cyber security and offer more protection against

sophisticated hackers. AI helps by automating complex processes for detecting attacks and reacting to breaches. Artificial Intelligence and Machine Learning have already gained a foothold in cyber security, and will only become stronger as the two fields mature further. There are growing investments in this space; however, it will perhaps take a bit longer to have a perfect solution leveraging these new techniques to help reduce manual work and bring in automation to combat cybersecurity challenges.

## Mulling into AI and ML

### Suman Reddy

While conversations around AI and ML have recently gained momentum, Pega has been an early investor and developer of these technologies. Those bets are paying off today, even as we double down to identify AI trends that are going to shape digital transformation for organizations in the future. Our recently revamped software portfolio, Pega Infinity, offers a foundation of digital process automation and customer engagement software – all powered by real-time artificial intelligence. Through such architecture, our solutions for customer relationship management that transform front-end functions like customer service is equally complemented by digital process automation, which streamlines back-end business processes.

### Debasish Chatterjee

At ITC Infotech, we have been investing in this space for the last couple of years and have been able to turbo charge our ambitious project of developing a big data horizontal platform. The platform today has vision, NLP and deep learning capabilities built in. Our go forward vision is to develop a series of domain centric solutions on top of this platform, as well as, convert this as an automation platform for multiple business scenarios. We are engaging with prospects globally and are seeing multiple use cases being asked for, which can be solved by AI and ML/Deep learning techniques. A few examples: production quality measurement in real time leveraging vision technologies, NLP based semantic search capabilities, anomaly detection within large networks, infrastructure security vulnerability management, etc.

### Andy Patel

F-Secure has been using machine learning techniques for well over a decade. We have an entire organization (the Artificial Intelligence Center of Excellence) dedicated to researching and implementing better ways to apply machine learning techniques across the cyber security problem domain.

### Rohit Maheshwari

Subex has been a data analytics company for nearly two decades now. Our systems globally handle over 100 billion

transactions each day and these volumes continue to surge. AI, ML and Deep Learning are incredibly important for us to deliver value to our customers. We have a strong pool of AI talent within the company addressing challenges such as fraud risks and business assurance risks. In the last couple of years, we have heavily invested in building an AI powered IoT security solution which offers IoT cybersecurity coverage using a one-of-its-kind honeypot network combining physical devices and device emulations to generate IoT threat signatures. In Jan 2019 we will be launching an exciting new solution based on deep learning AI aimed at throwing the spotlight on hard to find business incidences. This solution will be available on cloud and will be targeted initially at telecom and e-retail before expanding to other digitally enabled industries. So yes from an AI perspective its exciting times for us at Subex.

### Arun Balasubramanian

At Qlik, we are building AI and machine learning into our products in a way that amplifies the power of human intuition. Our approach surfaces unforeseen insights based on both the data selected and the initial search undertaken by the user. We call this augmented intelligence, and when applied through analytics it can raise the data literacy of the entire workforce, enabling deeper insights and bolder discoveries.

### Anand Thirunagari

At Genetec, we have been looking at ways to apply methods of machine learning and data science to our products for improving efficiency and provide greater insight for many years. We are using both supervised and unsupervised ML techniques to improve the performance and value of our solutions for customers. For example:

- **Genetec Citigraf:** Unsupervised ML is being applied to help in prediction of crime. For example, it can be possible leveraging crime data sets to help users to predict the likelihood of incidents in a neighborhood based on historic trends and activity.
- **Genetec AutoVu:** Genetec is also using supervised ML. Supervised ML is when computers are “trained” to properly classify inputs via feeding the application with structured datasets that correlate thousands of possible inputs and then over time the application is able to apply an “understanding” to new inputs based on historic data or patterns. Leveraging this technique, the performance of Genetec AutoVu™ is being optimized to better read license plates.

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