Cerebri

Cerebri AI Readiness Report 2017
Part One

The Current State of AI Thinking

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Executive Summary

Between September 2016 and January 2017, Cerebri AI surveyed over 250 professionals in decision-making roles across various industries. The goal was to understand the significance of Artificial Intelligence's (AI) role in large organizations from early stage to ramp up. We conducted an online survey and 30 in-depth interviews among C-Level executives (CIO, COO, and CTO). The AI Readiness Report 2017 summarizes the main findings from the survey and interviews.

Today, AI is a pervasive news topic. How it will interweave and embed itself into many aspects of business and society is a transformation in the making. Our report reveals the vast majority of decision makers agree with this claim of transformation. At the same time, these same majority of decision makers are ill-prepared for the changes ahead and are in need of a starting point. The AI Readiness Report 2017 is an essential guide to understanding current perceptions of AI from the C-suite perspective, their expectations of business impact, the barriers they face and how to overcome them.

Introduction

Artificial Intelligence (AI) covers a broad spectrum of economic and societal activities. Periodically it has climbed the hype cycle only to fade again from view. AI is increasingly becoming mainstream. Some form of AI will manifest itself into all aspects of daily life within just a few years.

But is the typical enterprise AI ready?

Despite the recent emergence of AI, the path to effective implementation is wrought with potential pitfalls.

Cambridge Consultants

> *"With the ready availability of great Machine Learning frameworks, such as Torch (used by Facebook) and Google's Tensor Flow, the barrier to entry can seem deceptively low... It turns out that building useful AI is very challenging, with a mix of heavy duty data science, engineering, mathematics and infrastructure."*
>
> - James Cleamoes, ***Cambridge Consulting***

AI is not new and has morphed in various forms over the last 30 years. Its emergence is now becoming part of daily life, if only a relatively small part. It has revealed itself through mobile digital assistants like Siri, scheduling assistants like Amy@x.ai and autonomous driving vehicles.

Consumers who purchase goods through Amazon or Alibaba currently experience high levels of personalization. These exemplify the most visible aspects of AI.
Some form of machine intelligence and learning is already embedded in basic customer interactions (e.g., voice assistants and call center decision-making). These applications have rapidly rolled out across the supply chain and through data centers to help configure the optimal consumer shopping experience.

Considerable momentum appears to be building. In 2015 alone the tech giants (i.e., Google, Microsoft, Amazon, and Alibaba) spent over $8.5 billion in AI acquisitions. In April 2016, The Economist compared Silicon Valley AI salaries to those of sports stars. In the course of that year, large enterprise began recruiting talent from AI departments among notable post-secondary institutions.

AI spending toward infrastructure to support smarter customer interaction, more personalized retail and intelligent "things" such as vehicles and thermostats is primed to grow.
Among retailers, distributors and manufacturers, AI is often leveraged to keep pace with market expectations and build better customer experiences.

In a low interest, low growth environment, infrastructure providers with deep pockets are trying to change the game.

The expected spending, in its current state, will create eventual bottlenecks. Our current research indicates that many of the companies that produce, sell and distribute products and services are not yet ready for AI adoption.

There is a huge swath of organizations which have been slower to change. They are the

antithesis of the Googles, Amazons and Facebooks of the world. Systems, culture and practice have impeded these organizations' paths to agility. As university AI departments are depleted of talent, will there be enough talent to prepare for the race to adoption? Will AI be driven towards a kind of platform model, commoditized by experts and then sold as a service? How early do organizations need to get into this game and what adoption model can garner early benefits? To find answers to these questions, Cerebri AI interviewed a variety of senior executives from 30 of the world's largest organizations, currently implementing at least one form of AI in their organization. These participants include thought leaders and executives from American Express, Volvo, Ford, HSBC, Rolls-Royce, GE, AT&T, Sears and Unilever.

In-depth qualitative interviews were conducted, lasting between 40 and 80 minutes. For this first AI Readiness Report 2017, our objective was to retrieve insights from people dealing with adoption every day. That's exactly what we achieved.

The Top 10 Insights

One

AI Represents a Foundational Change for the Enterprise. The Tipping Point is Now.

Most organizations in our study agreed that AI is imperative to the future of how the modern enterprise will be run. Over 88% used some variation of the term "foundational" to describe their expectations. In addition, the need for rapid adoption is widely acknowledged because the tipping point for change is perceived as happening now.

Two

The Customer is the Main Focus; Improving Customer Experience is the Primary Short Term Goal.

A better customer experience is, by far, the most important advantage companies gain from AI. This desire reflects the rapidly growing focus on the customer as the main competitive battleground. Although many companies quoted a range of top priorities, almost 90% included customer experience as one of them.

Three

Great Customer Experience Remains an Unknown.

There is recognition that companies fail to explore customer problems adequately. Instead, they have staffed innovation departments to test technologies and build use-cases. In AI, companies are unaware of how to make use of their data assets, let alone understand the extent of their data assets. The data, itself, and understanding the potential benefits is a challenge, especially in organizations within traditional industries which rely on physical world products such as automotive, shipping, manufacturing and construction. A better understanding of the customer remains a challenge.

Four

AI Readiness is Surprisingly Low.

For companies that do not already monetize their data in some form, the desire for top-level executives to drive and adopt AI tends to be low. Not surprisingly, among their workforce, the willingness to trust AI is also low. Less than 25% of companies believe they are AI ready, meaning they have a track record of experience and adoption over time. Within these organizations, data innovation and a culture of transformation are taking place as the AI adoption rate accelerates. No company has claimed (yet) to have experienced revenue benefits from AI, although 3% cited achieving cost savings.

Five

The Outliers.

A number of important outliers were highlighted in passing by the participants. These outliers convey the disruptive power of AI:

+ **Moving the enterprise to real-time.** AI is part of a sequence of innovations, such as agile IT and automation that will force enterprises to make more decisions quicker.
+ **Forcing simplicity into larger organizations.** In order to achieve the great benefits of AI, such as creating frictionless engagement with customers, established business processes may have to be changed and simplified greatly.
+ **AI as invisible competitiveness.** Competitors don't see what enterprises are doing with AI, making it an even more compelling asset.

Six

The Barriers.

The biggest barrier to AI adoption is attracting attention at the highest levels of the organization. Senior management does not have AI in its list of top five priorities. There are few, if any, specific AI output KPIs, benchmarks or success factors available to decision makers. 30% of respondents who highlighted some form of success metric, spoke generally, referencing

"better customer experiences" or "more efficiency". However, companies are investing in Proofs of Concept (PoCs) with AI vendors and developing innovation labs, sensing the danger of complacency. It's clear there is a need for clearer adoption models and metrics to move from PoC or lab to implementation.

Seven

Adoption Resistance.

Companies that adopt AI can experience problems that negate the benefits, for a variety of reasons:

i) AI is perceived as a **black box** solution, mistrusted by professionals who are accustomed to seeing the numbers and understanding the model, especially those in the Finance function.

ii) Field staff cling to the belief that intuition with respect to relationships is a stronger indicator of sales compared to data that informs relationships.

iii) The financial step from PoC to implementation becomes a difficult case to make.

Eight

The Platform Model.

Interviewees were roughly split over whether AI would or should eventually be purchased on a platform basis. Most respondents see AI as imperative, however 50% were prepared to buy the service as an application or SaaS. The other half felt the data and outputs were too important to rest on the shoulders of external agencies.

Nine

The Need for a Broader Learning and Adoption Model.

AI is exposing the lack of learning capability in many organizations. Though a small number of participants spoke about iterative innovation cycles or general learning cultures, the lack of KPIs or detailed success metrics left AI consigned to the lab or PoC stage.

Ten

The Doomsday Scenario.

Most interviewees (97%) recounted a systemic or social risk with AI, challenging the need to debate it more widely. The threat to employment was the most referenced societal consequence of AI.

Understanding the Enterprise Mindset

Although AI is generally perceived as being foundational to the future of business, relatively few firms believe they have mastered it or are likely to do so anytime soon.

Thus the majority of executives are conflicted with AI. They understand they need to ramp up capabilities quickly, but they are searching for the right ways to do so.

The problem comes down to a basic divide in how companies perceive AI.
Three distinct groups surfaced in this study:

Group 1

Incrementalists

These companies think of AI as incremental because they have a long track record of leveraging data. However, they also know AI is revolutionary. It finally has real momentum and, for the first time, all the elements are aligning: data availability, processing power and connectedness. They are confident they will drive long term competitive advantage from the benefits AI will bring.

The proportion of companies in this category is approximately 16% with some just marginally making the cut.

Group 2

Tacticians

This group bears some similarities to the Incrementalists, however it lacks the long track record of leveraging large data sets, AI algorithms or related technologies. Senior executives in this group, however, have the confidence in their ability to learn. Their culture of experimentation gives them the ability to control the cost of trial, error and scale. They have also nurtured a start-up mentality within their culture which they can draw upon.

The proportion of companies here is the same, 16%.

Group 3

Newbies

This is the largest group, making up more than two-thirds of interviewees. Executives believe AI could be revolutionary, however they either regard themselves as laggards or believe AI has yet to make inroads into their business. They have a sense that one or two obvious applications of AI will work for them and may even have AI applications in place, such as virtual assistants. However, they have not created a corporate vision for transformation through machine intelligence and learning. At the same time, individuals have expressed concern about their capacity for more innovation or more learning, noting they feel already burdened by too much innovation despite having experienced successes in their lines of business. They may also be failing to convince senior management of the need.

The difference between Incrementalists and Tacticians is that the former has figured out adoption, which is often the case when a business is already attuned to enterprise experimentation. Tacticians, on the other hand, have figured out how to learn new skills but may not have the experimental environment and the aligned culture that internal adoption of new technologies requires.

The difference between Tacticians and Newbies is that the latter, which comprises the majority, lacks the confidence in its ability to learn and adopt. It also worries about its inability to make the argument in favor of investment.

In addition, there is recognition that AI takes a full complement of skills, content know-how (i.e., understanding of corporate data mines), infrastructure for continuous learning and knowledge of the payoff.

Few of the interviewee companies were able to check off each of these boxes, which raises some key issues:

1. In the race to adoption, where are the best use cases?
2. How can a company build this payoff knowledge with limited economic and opportunity cost?
3. How can a company acquire the proper skill sets in a competitive market for talent?
4. How can a company develop continuous learning capabilities to leverage AI for success sooner than later?

Perceptions of AI's Importance

There is a universal acceptance that the time has come for AI. Almost all of the respondents referred to AI as a "foundational" change, imperative to providing a new foundation for the enterprise or being a catalyst to transform business process.

There is skepticism about some AI implementations; one respondent referred to chatbots as merely "smart FAQs".

Most respondents agree, however, while proponents of AI may have over-promised in the past, the time is right for AI. One breakthrough is the recognition that enterprises already own and can generate the data they require for good AI.

> *"Five years ago, we were building data models for each country where we operate and for every type of transaction. Now we have one global model".*
>
> - ***American Express***

For Incrementalist companies, AI's new promise is the result of decades of work.

> *"At AT&T we have been working on AI since the 1980s. It doesn't feel sudden now. The data is better, the ecosystem has grown up, and the SOA tools that allow for a high degree of experimentation are there. It's all these things."*
>
> *- **AT&T***

Where there is apprehension, AI is perceived as implicitly transformational since it contributes to change across all business processes and functions. However, experts are beginning to caution against the idea that AI is easy.

The quantity and disparity of data can certainly enable an organization to be AI ready, but two significant barriers remain:

1. The willingness to allow predictive analytics to automate decision-making
2. The willingness to transform the organization around this type of automation

In the survey, we uncovered profound reluctance to cross the line into predictive analytics and a real fear of an AI capability deficit. According to GE's AI thought leader, Beena Ammanath,

"We are still trying to figure out how to incrementally improve today's enterprise performance rather than forging a vision for a different type of world."

On the other hand, companies, such as enterprise security expert F-Secure, have already automated ingestion of large tranches of their data and integrated the data into their decision-making processes. For F-Secure, AI is just an incremental step.

Overall, the sources of AI empowerment were seen as (in order of popularity):

1. Computing power's continuous decrease in cost
2. The availability of data in vast quantities
3. The maturity of technologies such as speech recognition, after decades of incremental progress
4. The capacity for experimentation
5. The desire to solve real problems
6. The capacity to create more usable interfaces
7. The connectivity among people in digital networks that creates wholly new dynamics among employees and with customers

The Most Important Focal Point for AI

Customer engagement, better segmentation and more relevant selling were the most critical quoted applications of AI within the study, and areas where near term gains could be won. Innovation expert, Neal Cross, Head of Innovation at DBS Bank in Singapore, believes improving processes is a vital prerequisite for doing better customer-facing AI.

digibank by DBS

> *"In India 92% of customer requests are dealt with by robots because the bank was designed not to have complex operations."*
>
> *- **Digibank***

Mr. Cross believes most organizations need to automate process handovers before customer-facing AI will truly deliver the speed and quality customers demand. That belief suggests process mining or workflow discovery is a vital step in AI planning.

The banking and retail investment services sectors have rapidly adopted virtual assistants for account opening and similar routine tasks.

These are easy wins, or low-hanging fruit, that can secure investment budget because they represent dual opportunities in cost savings and improved experiences.
Yet, there are bigger wins that are possible.

sears

"At Sears Holdings, for example, AI and data-centric sweepstakes and gamification projects make opt-in data and insights available to all parts of the organization and act as a bridge among the different silos."

*- **Sears***

In more industrial domains, respondents perceived the value of AI to be reducing complexity and creating insights from data flows currently underutilized.

In the aircraft engines, shipping and manufacturing sectors, which generally lag behind in AI, respondents envisaged a new kind of world.

For example, the oceans could become a data map of tides, currents and weather influences to support better route planning for container vessels and to make sea-to-shore interaction more dynamic.

In manufacturing, the production line could become a self-healing environment where machines anticipate downtime and call on partner machines to print and install new parts in situ.

AI could support a new era of health and safety in construction by processing video images from sites in real-time, anticipating danger points and resolving them before they become critical. To put this into context, there is still uncertainty in these sectors. Is the concept of a fourth

industrial revolution overblown? Is the kind of data platform GE has developed really going to make a difference to "miles in the sky", the key metric for engine production?

Setting aside these complex discussions, the short to near term gains seem to be nested in improved customer experiences. There are two key reasons for this:

1. According to one industry expert, the work to improve voice recognition and other customer interaction routines never really ceased.
2. They are simple, relative to other deep learning tasks, and are now in the maturity phase.

> *"While there is huge potential, we are in a very risk-averse and highly regulated era. It will impact the consumer space first because social media and big data started there. Other sectors have the data but it is just easier to experiment in social."*
>
> *- Beena Ammanath,* ***GE***

Respondents, in particular, pointed to:

i) New market segmentation tools and better targeting
ii) Processing of call-center voice data to provide real-time analysis of customer issues
iii) Creating new price regimes
iv) Providing next best action information to virtual assistants

v) New customer interaction models and interfaces

vi) Churn prediction and retention strategies

vii) New ways to have conversations with customers

viii) Opt-in data insights through gamification

Other popular AI application use cases:

i) Robo advice

ii) Security in cloud-based systems

iii) Investment and M&A awareness

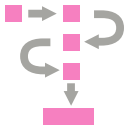
iv) Optimizing hiring practices

v) Ensuring document integrity

vi) Process improvements in fleet management and maintenance automation

vii) Credit risk management

The AI-Empowered Organization



There are still considerable reservations employing predictive analytics among enterprise interviewees. Even where automation is the main goal, as in the case of AT&T, the line where the machine begins to automate decision making is one which is tread carefully.

However, two-thirds of interviewees believe AI is going to make a significant difference in the way companies are run. This belief can be expressed in terms of automation and better information.

Companies need to also reduce the number of process handovers they manage. In IT, the development, testing and operations functions are often merged. The opportunity for a similar consolidation exists across other processes in large organizations.

The opportunity exists for intelligent agents to be deployed. It may start simply as virtual assistants providing better time management, however, what results are agents that may provide more timely information about the state of the organization.

Everyone should expect better information. Whether in sales, customer support, or the executive suite, the pace of business can only be managed efficiently and accurately if agents, who have learned their role, are deployed to collate and interpret data.

There are broader system changes that people envision arising from emerging capabilities with data. In the maritime ecosystem, shipping will become an autonomous process. Finland is sponsoring an autonomous shipping ecosystem as container shipping comes under increasing price pressure as a result of falling trade, global competition and the switch to package delivery.

This paradigm shift means providing data and intelligence from the intermodal transportation

systems that feed into and out of ports, activities from shore to sea and from patterns of tides, currents and weather in the oceans.

Where the scale of innovation is less ambitious, there is still a recognition that the enterprise must change in order to make AI effective.

Changes are perceived at three levels:

i) Customer centric - providing better experiences for the end users
ii) Enterprise - AI's role in changing the enterprise
iii) Systemic - creating new systems for service creation and delivery

There is a close link between AI and the internal process changes needed within enterprises.

"Learning alongside the machine doesn't actually allow you to retain your linear workflow. As an example, we are spotting changes in the data that tell us where new market opportunities lie. We find this before marketing does and we have to make decisions very quickly so it is not a traditional handover like in market research. The change is not roadmap-based. It is more hypothesis-based where you reduce the time it takes to find out if your bets are successful."

- Janne Jarvinen, **F-Secure**

At F-Secure, they are running business experiments in the business lines rather than in separate labs. The reaction against labs is seen elsewhere:

J.P.Morgan

> *"There's a significant governance problem now in innovation. [A lot] of work with use cases but success is always dependent on building good relationships with a business leader."*
>
> *- **JP Morgan***

Only one in seven organizations referred to their capacity for experimentation in the lines of business. In many cases the AI is being created elsewhere in the organization and then handed over, often with poor results.

These organizations tend to be siloed and are hampered by the retention of traditional functional roles. Such a culture inhibits the ability to generate options or hypotheses and to learn quickly from different types of evidence (e.g., process change, cost, complexity or market traction).

Some of the more interesting solutions to this problem involve structures that do not attempt to break down organizational silos but attempt, instead, to provide a link between silos.

Sears

Within Sears, a new unit set up five years ago has developed a range of gamified interactions with customers, including sweepstakes and other competitions. The objective was to engage and secure opt-in data. According to team leader, Fred Skoler, the new interactions helped Sears understand attitudes such as what is success for a customer. The data is akin to a string that passes through each of the silos creating a more common basis for understanding what customers want.

Unilever

At Unilever, the Foundry is part startup accelerator and part innovation hub. Business lines can request new techniques from the Foundry and startups can propose solutions. The Foundry is a common hub for all of the brands to seek out the innovations they need from the startups most suited to their needs.

What Qualities Define “AI Empowered?”

+ More processes are merged, reducing handovers and creating digital sequences for agents to traverse.
+ Complexity increasing but data and AI can help simplify or, at least, improve confidence.
+ Generating insight from routine interactions.
+ Building bots or agents from routine interactions to automate more intelligence, information exchange and decision-making.
+ Real-time decision-making, creating a much faster pace of management activity.
+ Key profit-generating activity taking place outside of traditional workflows.
+ Experimenting in the business lines and utilizing hypothesis testing methods.
+ The need for speed leading to larger portfolio use cases and options that need to be maintained.
+ Despite the emphasis on lean iteration, an increasing appetite for bold investment.
+ Enterprises developing new models and processes to enhance and expedite organizational learning.
+ Increasing the amount of delegated decision making.
+ Increasing the number of systems in place to bridge silos.
+ Business culture adapting to the mandate of system-wide change.

Case Study

American Express has been using predictive models to identify fraud since the 1990s. The company processes transactions worth over $1 trillion per year on its network and has made significant investments in the last two decades to protect its card members from fraudulent activity.

American Express approached AI with the aggressive intent to provide better customer service, particularly in fraud detection and prevention.

Most AI algorithms were developed more than 10 years ago, but only recently, with improved computer processing speed, could these algorithms be leveraged to solve business problems. The company began its AI initiatives in 2014. One of their early observations was AI worked most effectively with larger data sets. With today's algorithms, it was possible to build a single global model to cover all transactions on their network in all countries around the world.

The fight against fraud gave American Express the perfect rationale to secure resources and apply AI to achieve improved fraud prevention. Having such a strong use case helped the project sponsors with getting AI implemented without resistance. American Express also gave the team a clear pathway to adoption. The impressive speed of adoption was a direct result of the company having a long history of big data initiatives.

Surprisingly, American Express was able to take advantage of an existing algorithm from the open source community and use it as the basis for its AI program. The algorithm was effective "out of the box" resulting in an immediate 15% lift in fraud discrimination.

Their model has over 10,000 decision trees and the company now has nearly one hundred data scientists who are, in one way or another, engaged in managing the company's fraud risk.

> *"Our role is to understand and prepare the data variables or features. It is amazing how much time we spend building variables. An effective machine learning model requires a huge amount of time looking at what we might have missed, understanding and enhancing data quality."*
>
> *- Vernon Marshall,* ***American Express***

Mr. Marshall (quoted above) is educated as a historian and believes that, in addition to analytics, having team members with backgrounds where they are trained to have strong attention to detail is critical.

Many of the challenges with building an effective model lie in understanding both the data and the workings of the model itself.

With respect to fraud identification, typical AI software does not provide diagnostics, so it's very important for their data scientists to understand why the model determines a transaction may be fraudulent. As a result, the team has built its own diagnostic capabilities.

On the data side, many of the elements are referenced from legacy systems. Point-of-sale machines at the merchant are supposed to transmit an accurate location in the authorization message to American Express, but, at times, may have been programmed erroneously. By harnessing AI, Marshall's team spends much of their time resolving the true location of merchants across the globe to help prevent fraud. Location is just one of thousands of variables analyzed by American Express' algorithm that can make a fraud decision in less than 10 milliseconds.

American Express has realized that good AI requires continuous attention to detail. It goes beyond the machine and the model; it's about interpreting the data and uncovering new insights to improve the capability. The result: American Express' fraud detection is industry leading in the finance sector.

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