BUILDING INTELLIGENT CAPABILITIES FOR SUSTAINABLE ADVANTAGE

Abstract

Enterprises need to make clear choices and investments in Artificial Intelligence (AI) technologies to gain short-term to long-term business benefits. However, the challenge for both business and technology executives is to look beyond the maze of products in the current market and develop AI enabled technology capabilities aligned with the long-term business strategies. We provide insights into emerging patterns in AI adoption, discuss various patterns for better competitive position and recommend an approach to build intelligent capabilities, through strategic architecture, to gain sustainable advantage.

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Introduction

After several decades of efforts, Artificial Intelligence (AI) is becoming a mainstream technology. The adoption of AI technologies by industry sectors such as supply chain, retail and finance has been gathering momentum. According to CIO (Lake, 2017), the revenue generated by AI companies during the next three years is expected to be five times the estimated current revenue, $8 billion in 2016. The ability to capture and store large amounts of data, better computing power, easy access to AI packages and advancement of Machine Learning algorithms are significant contributors to the introduction of a large wave of new products over the last five years. The term Artificial Intelligence includes a plethora of technologies from Robotic Process Automation to Deep Learning, Speech-to-text to Computer Vision, and Bigdata to Analytics. Currently, Google (Deep Mind), IBM (Watson), Microsoft (AzureML) and Amazon (AmazonAI) are the leading vendors of AI products and platforms. These vendors also provide a wide range of products and services. For example, Google has at least three offerings: AI plugins, Application Programming Interface (API) based and AI and Deep Learning platform as a service. These and several other vendors also offer broad-based and domain-specific product offerings. Significant investments are being made by organisations to build capabilities either by developing internally or through acquisitions. McKinsey (Jacques Bughin, 2017) estimates current investment in AI technologies is between $26 billion and $39 billion in 2016, a threefold increase in the last three years.

While most of the above technologies offer benefits, enterprises need to make clear choices and investments in relevant technologies to gain short-term to long-term business benefits. However, the challenge here for both business and technology executives is to look beyond the maze of products and develop AI enabled technology capabilities aligned with the long term business strategies.

This article describes emerging patterns in AI adoption, discusses various patterns for better competitive position and recommends an approach to build intelligent capabilities, through strategic architecture, to gain sustainable advantage.

Approaches to AI adoption in an organisation

It is evident that AI can be embedded into several business capabilities of an organisation and can deliver various benefits ranging from user experience enhancements, productivity improvements to value generation. Senior leaders must make right investments in AI-enabled business capabilities to prepare the organisation for the future, without getting caught in the recent hype surrounding Artificial Intelligence. These leaders should ensure these capabilities offer a better competitive position and pay continuous dividends in the long run. Building the capabilities hosted by an appropriate Enterprise Architecture foundation is an ideal way to make sure that AI will be organic to the organization and will further its aims, not simply be an add-on in reaction to a current popular technology wave.

Based on the current AI product and service offerings in the industry and the way organisations are adapting AI capabilities, four possible patterns have emerged for AI adoption. Implementing each pattern offers some benefits and paves the path towards building better business capabilities. Figure 1 depicts the four patterns with the intended capabilities and varied levels of benefits.

Productivity enablers: Existing mundane and simple business processes are automated using Robotic Process Automation (RPA) to minimise human intervention and improve cycle time. Some of the examples include: automating the IT service ticket management process in an IT organisation; or automating the process of sending emails across the pre-delivery and post-delivery phases of the value chain in

a logistics organisation. These capabilities are geared to deliver productivity gains.

User experience enhancers: Several AI products exist in the market that can be deployed in organisations to enhance user experience for both internal users and external customers. These products can assist with adding a new user interface (UI) to an existing channel or improving the experience of an existing channel. A user interface using a Chatbot or voice-to-text tool can enable users to interact online at their convenience to get their queries answered by the backend systems. Similarly, a police officer on the road can pull out the history of a car and the driver by pointing a hand held rugged device at a car number plate. A bank can provide an audible report to a customer of his financial summary using text-to-speech tools. There are several examples of enhancing the user experience using AI and Machine Learning.

Business (siloed) capabilities: From time to time, organisations are keen to build business solutions specific to solve a particular business problem or related to a specific Business Unit. For example, supply chain organisations may use analytics to predict the delivery time as part of last mile delivery within the range of half-an-hour to minimise missed deliveries (returns); banks may deliver capabilities to handle credit card fraud and identify credit card transaction anomalies. These capabilities can improve the way the business is being conducted and minimise inefficiencies within a business function. However, these critical business capabilities are often built in isolation and lack enterprise wide perspective and usage. These initiatives are usually funded by individual business units within their allocated budget. Hence the usage and wider benefits are often overlooked by the enterprise.
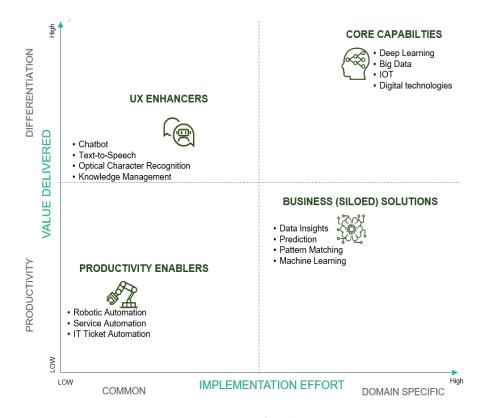

Figure 1 Four patterns of AI adaption

Core capabilities: Organisations need to identify core capabilities, aligned with the broader business strategy. These capabilities are specific to the organisation and can deliver enterprise-wide benefits. Organisations can deliver the capabilities by identifying, developing and deploying a combination of machine learning, automation and deep learning systems, using a structured approach. The effectiveness of the enterprise AI systems depends on using right datasets for training and decision making. Therefore, it is critical to understand and articulate what data is required, how data is captured, pooled and shared, and how it is utilised to train the AI systems supporting the enterprise core capabilities. Building core capabilities requires strategic thinking and is both resource intensive and time consuming. At the same time, the intended benefits are significant in the long run. A structured enterprise-wide approach based on core capabilities, i.e., an Enterprise Architecture-based analysis, has the potential to create competitive advantage for organisations.

Organisations like Amazon and Google are the great examples of building enterprise core capabilities. However, not every organisation has a similar need nor the necessary financial appetite to build such capabilities. Nonetheless, every organisation should think of building core capabilities based on its business strategy.

Sources of sustainable advantage

Based on the nature of benefits, the patterns referenced previously are broadly divided into two categories: capabilities that deliver Operational Effectiveness (OE) and capabilities that offer Strategic Position against the competition. Figure 2 depicts the four patterns mapped into the two categories.
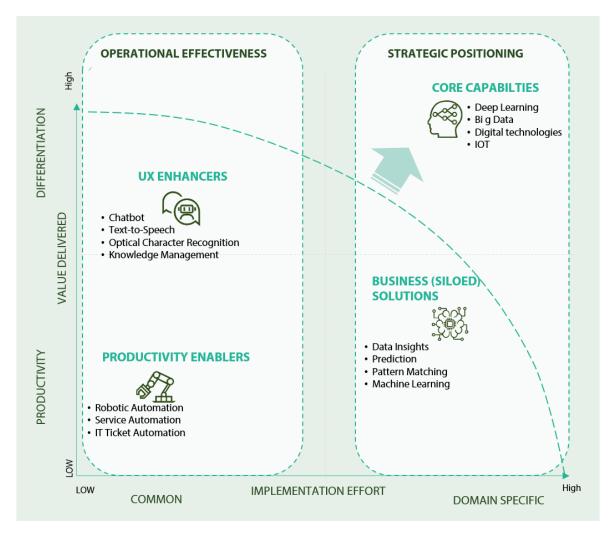

Figure 2 Sources of strategic position

Operational Effectiveness (Porter, 1996) assists an organisation by providing better value at a lower cost. OE is critical for organisations, however, OE can be achieved by implementing best practices, hence it is easier to imitate for other organisations. Whereas, Strategic Positioning is about conducting activities differently or conducting different activities. Strategic Positioning will be the source of the competitive advantage.

Adopting AI through Productivity Enablers and User Experience Enhancers do not require much effort relative to Core

Capabilities, as they use components-of-the-shelf (CoTS) and generic or cross-industry solutions. Hence, rolling out these capabilities offer both productivity gains and user experience enhancements reasonably quickly with small budgets. However, building these capabilities will achieve Operational Effectiveness for the organisation. While operational effectiveness is necessary for organisations, as quoted by Michael Porter, it is not sufficient to achieve sustainable advantage. Established enterprises in mature industries should start AI adoption with achieving

Operational Effectiveness.

Investing in business (siloed) solutions, at least in the short term, improves productivity along with some level of differentiation. Building enterprise-wide core capabilities, which demand realignment of organisation's operating model, leadership commitment and continued investment, promises a higher level of differentiation over a longer period. Hence, these intelligent capabilities provide a sustainable strategic position against competition.

	Type	Capabilities	Benefits
OPERATIONAL EFFECTIVENESS	Productivity enablers	Order Processing (RPA), Help Desk Automation (Knowledge Management)	Low
	User Experience enhancers	Multi-channels (Chatbot, Voice-to-text), Pre-delivery Experience (Messaging Automation)	Medium
STRATEGIC POSITIONING	Business Capabilities	Supply Chain Event Management (Pattern Matching and Decision Making), Predictive Delivery (Prediction)	Medium
	Core Capabilities	A set of intelligent business capabilities, using AI in congruence with IoT, and Big Data, enabling seamless information sharing and effective decision making.	High (Long term)

Table 1. Example of operational and strategic business capabilities in a logistics organisation

Table 1 provides a typical list of operational and strategic business capabilities across four AI patterns that can be built within a matured logistics organisation. Embedding intelligence into core capabilities is critical for mature businesses. These businesses have already made significant investments into existing business capabilities and

currently, enjoy superior market position by delivering the expected value to their customers. However, these enterprises need to adopt changes to their operating model, leadership thinking and the existing system landscape to maintain their current market position into the future. The urgency to change is more important for larger, mature

businesses with a system landscape that is highly fragmented and marred with point solutions. Such businesses need to take drastic measures and build a necessary strategic foundation to compete with newer, smaller and agile enterprises that are well prepared for the AI enabled future.

Learning from the past

It is widely accepted that Artificial Intelligence is a major disruptive force since the introduction of internet and is expected to bring significant changes to the way we work in the future. Business leaders and IT executives were facing a similar situation in the early 2000s with the evolution of internet technologies. The challenge for the executives at that time was to adapt to new business models by investing in appropriate evolving technical

capabilities. That required significant new investments and realignment of the existing business models by embedding internet technologies.

Some early adopters within the financial industry, such as banks, rolled out basic content management systems to provide product information and marketing material to customers. They have also provided some level of self-service functionality such as updating customer details through forms. These capabilities

delivered the organisations with improved productivity and an overall user experience. These capabilities delivered Operational Effectiveness.

Whereas other financial institutions with multiple business units took a holistic approach by implementing enterprise-wide customer centric and/or product centric strategies. They have implemented core capabilities such as master data, data and process integration, customer self-service and security. These capabilities

successfully delivered a 360 degree customer view, boundary less information flows and seamless access to information. These capabilities enabled excellent customer self-service functionality to their wide variety of products and services from multiple business units and also faster on-boarding of new products and services. Core capabilities built by the organisations have prepared them to enjoy long term benefits due to a better strategic position over their competition.

Organisations providing similar functions without building customer master data and integrating core systems together ran the risk of siloed systems with poor customer experience, disparate and complex IT landscape and ineffective use of customer data.

Therefore, it is imperative for business leaders to define a strategic architecture with an enterprise wide approach if they want to use AI as an enabler and build the required core capabilities progressively

Developing strategic architecture

In coming years, artificial intelligence is expected to change current business models and introduce new ones. Established organisations, therefore, should delve into their business strategy and consider three to four key enterprise-wide capabilities that can provide significant differentiation. Business leaders should identify opportunities to embed intelligence into the capabilities using AI technologies and implementing these intelligent capabilities in a cohesive manner requires a well-defined strategic architecture foundation. The strategic architecture describes core building blocks and the relationships between the building blocks to realise the intelligent capabilities. Given building intelligence relies heavily on enterprise data, strategic architecture must address what data is required, how data is captured, pooled and shared and, how data is utilised by the deep learning and prediction systems delivering the enterprise core capabilities.

Figure 3 provides a sample strategic architecture of an organisation. Organisations receive or generate voluminous amounts of data on a daily basis. However, the data is seldom collected and used effectively. Some of the data sources include: business services, sensory network, Internet of Things (IoT), internal data streams and external data streams. An API or micro services-based platform can assist with collecting the data from various sources and storing in the data pool.
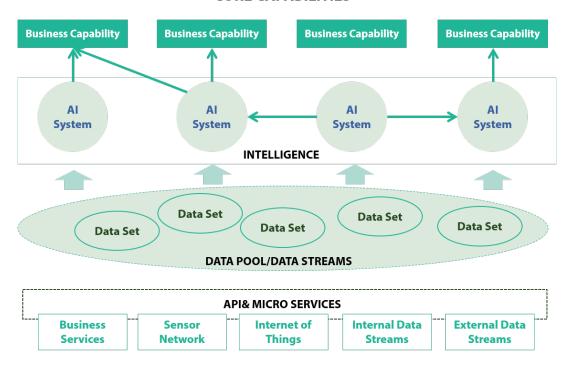

Figure 3: Strategic architecture of an organisation

It is critical to understand the required data elements for AI systems to function. The effectiveness and the accuracy of the AI systems depend on using appropriate data elements and the quality of the data elements respectively. Building required datasets is critical for AI systems to perform decision making, classification or prediction activities. The number of datasets and the size of the each dataset increases as new AI systems are added and existing AI systems continue to learn. The interconnected AI systems constantly monitor the environment and respond in real-time in response to any enterprise events.

The building blocks functioning in congruence can deliver core capabilities with built-in intelligence. These capabilities assist organisations with building new products and adding new product features easier and faster. Such a group of intelligent capabilities together provides core competency (Hamel and Prahalad, 1996) for an organisation with a real differentiation, leading to a sustainable advantage.

Delivering enterprise-wide intelligent capabilities, by realising the strategic architecture, requires significant investment in running cross-functional teams, up-skilling business and technical workforce,

and training the enterprise-specific deep learning systems with a multi-year plan.

Nonetheless, the concerted approach to build intelligent capabilities has numerous benefits:

- Empowers with real time complex decision making and prediction
- Avoids fragmented system landscape by adopting enterprise-wide platforms
- Enables effective use of valuable enterprise data across the organisation
- Promotes reuse resulting in better business and technical agility
- Provides a consolidated view of investment prioritisation

How to drive the adaption?

Organisations must act swiftly and redefine the business strategy with Artificial Intelligence as a key enabler for long term success. Subsequently, leaders should develop a long term plan to define and implement an enterprise specific strategic architecture with built-in intelligent capabilities. Such a long term plan must include, at least, four critical components for the successful implementation.

- *A cross functional team:* Set up a cross functional team responsible for identifying and implementing core capabilities. The team should consist of business strategists, domain experts, IT strategists, and enterprise architects and data scientists.

- *Revised target operating model:* The cross functional team develops/realigns the Target Operating Model with the business strategy by introducing intelligent capabilities. A detailed technology strategy and a strategic architecture roadmap should be developed to identify and build core systems and features. The strategic architecture roadmap encompasses all intelligent capabilities: productivity enablers, user experience enhancers and core capabilities.

- *Effective governance:* The success of realising the strategic architecture

roadmap requires large investments over multiple years. This can only be achieved with leadership commitment. A governance team consisting of senior business leaders along with senior IT executives should prioritise, fund, monitor and track the initiatives effectively.

- *Skills development:* Developing intelligence capabilities requires different thinking and skills that are not currently available within the organisation. Invest in training to upskill developers, architects, business analysts, subject matter experts in design thinking, data science and advanced process management.

Building intelligent capabilities through the strategic architecture foundation requires significant resources and also advanced skills. Not every organisation is ready to build a similar foundation, nor capable of making larger investments to build these capabilities even if it wants to. Nonetheless, developing a strategic architecture roadmap creates necessary awareness (Wijegunaratne and Madiraju, 2016) within the organisation and identifies skills and resources required to build relevant intelligent capabilities.

Despite the lack of readiness to implement the strategic foundation, organisations can embark on an incremental journey towards implementing the strategic architecture. Firstly, identify and implement

the Operational Effectiveness initiatives: productivity enablers and user experience enhancers. The Operational Effectiveness initiatives are usually the low hanging fruits, which are easier to implement and require minimum investment. These initiatives can be funded and implemented through enterprise-wide innovation program. Secondly, understand various enterprise specific data elements useful to build intelligence and implement efficient mechanisms to capture and easily share the data across the organisation. These mechanisms include building components like APIs, micro services, distributed messaging and distributed file systems. Organisations can leverage any inflight or future integration and business intelligence projects to build these components. Thirdly, address the skills gaps required to build intelligent capabilities gradually through appropriate training in data driven programming and data science. In some cases, skill gap can be addressed by engaging external consultants to provide the necessary skills rather than building in house. Finally, choose a technology platform that is capable of hosting future AI systems. There are multiple commercial and open source platforms to choose from depending on the complexity of the intended core capabilities.

Conclusion

In summary, Artificial Intelligence transforms the way businesses will operate in coming years. Business leaders, along with technology leaders, must realign their business strategy and define an appropriate strategic architecture foundation to deliver enterprise-wide intelligent capabilities. Building the intelligent capabilities requires significant leadership commitment and resources; however, it is certain to deliver sustainable advantage

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