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Recommended Citation

Braverman, Andrew and Combs-Harris, Jarrold, "What can AI do for you?" (2019). *School of Continuing and Professional Studies Student Papers*. Paper 1.

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WHAT CAN AI DO FOR YOU?

DSL 705 ENABLING INFORMATION TECHNOLOGIES AND STRATEGIES

Doctor of Management in Strategic Leadership

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27 July 2019

Course Description

DSL 705 Enabling Information Technologies and Strategies is designed to challenge the traditional wisdom that IT strategy should respond to business demands and must be set up to support the chosen business model and strategy. Participants are called upon to think systematically about conditions in which modern technology can support business strategy and those in which technology platform strategy shapes the business strategy itself. This course designed to be highly interactive, project-based, and team-oriented. Through group discussions, participants will examine how digital technologies such as AI, advanced analytics, cloud computing, crowdsourcing, and cybersecurity help companies to become powerful global brands. This will include examining three phases of digital transformation, understand the opportunities and pressures from digital shifts, how to navigate in dynamic ecosystems, create new capabilities to deliver new business value, and to identify and integrate emerging technologies in the core business model.

INTRODUCTION

The world is changing, and very quickly. Perfetti, O’Dricoll, Canning and Koerwer (2019) describe today’s rate of change as an “ever-evolving game of business on an increasingly accelerating and shifting playing field” (para. 3). Change, they say, is moving from linear to exponential, while the problems that businesses face are transforming from complicated to complex (Perfetti, et al., 2019). According to Snowden and Boone (2007), complicated problems carry “a clear relationship between cause an effect” (para. 14) that, while invisible to amateurs, is apparent to experts. Complex problems, on the other hand, result from the “unknown unknowns” associated with constant change and the interaction between massive numbers of variables (Snowden & Boone, 2007, para. 22). Perfetti, Kooerwer and Canning (2019) combine these concepts into four cycles of business - production, interaction, financial, and decision – each of which feed the ultimate goal of managing business through prediction, which they describe as “your ability to use [artificial intelligence], data analytics, and your customer interactions to create the new products and services your customers don’t know they need... yet” (p. sidebar). Artificial intelligence (AI), with its ability to explore thousands or millions of variables (or more), as well as the relationships between them, is rapidly attacking complex problems. But what, really, is AI – and what can it do for you?

John McCarthy created the term artificial intelligence in 1955 when he invited a group to meet at Dartmouth College to research computer automation, computer natural language usage, neuron networks, abstraction, the correlation between randomness and creativity, and how machines could self-improve (McCarthy, Minsky, Rochester, & Shannon, 1955). Since then, the definition has changed and grown. Northwestern Professor Kris Hammond (2015) describes three current working definitions of AI:

- Weak AI: getting machines to work – to learn to do something we want them to do – without making them think the way humans think.
- Strong AI: getting machines to think and reason in ways that are similar to how humans think and reason.
- In-between: using human reasoning as a prototype for getting machines to learn, but not as the end goal.

Hammond (2015) further argues that “for a system to be considered AI, it doesn’t have to work in the same way we do. It just needs to be smart” (para. 17).

One goal of artificial intelligence is to automate systems and processes such that human effort is minimized, and human error is reduced. Beyond automation, artificial intelligence is targeted to vastly exceed human capacity for monitoring variables and, more importantly, the interaction between variables. For this reason, AI can be a powerful tool to address complex problems. As we learned from Perfetti, et al (2019), exponential rates of change are impacting nearly every field of business, thus organizations around the world are considering investments in AI.

Gartner’s 2019 CIO survey found “that AI adoption has tripled in the last year alone, with an estimated 37 percent of firms now implementing AI in some form” resulting in a 270% increase over four years (Osborne, 2019, para. 2). A *Forbes* (2018) Insight survey showed that 95% of executives “believe that AI will play an important role in their responsibilities in the near-future.” Clearly there is a tremendous desire to leverage AI to address business challenges. Unfortunately, most companies don’t know where to start. A study published in the *MIT Sloan Management Review* showed that “only one in 20 companies has extensively incorporated AI” and “less than 39% of companies have an AI strategy” at all (Ransbotham, Kiron, Gerbert, &

Reeves, 2017, para. 2). Some are even afraid of what artificial intelligence will bring: “Unfortunately, as our AI capabilities expand, we will also see it being used for dangerous or malicious purposes. Since AI technology is advancing so rapidly, it is vital for us to start to debate the best ways for AI to develop positively while minimizing its destructive potential” (Marr, 2018, para. 12).

Simply put, most organizations do not know how to approach the incorporation of AI into their businesses, and few are knowledgeable enough to understand which concepts are applicable to their business models. Doing nothing and waiting is not an option: Mahidar and Davenport (2018) argue that companies that try to play catch-up will ultimately lose to those who invested and began learning early. But how do we bridge the gap between skepticism and adoption? We propose a toolkit, inclusive of people, processes, and technologies, to help companies with discovery and readiness to start their AI journey. Our toolkit will deliver specific and actionable answers to the operative question: What can AI do for you?

BUSINESS MODEL

The primary business model of large consultancy practices is to leverage a combination of tools and experts to help clients realize the art of the possible. An example of this is professional services firm Genpact and their *The Intelligent Automation Index* which “provides an algorithm-based assessment that objectively calculates automation potential, evaluating various technologies—basic robotics, machine learning, and cognitive automation—and offering indicative efficiency potential” (Genpact, n.d., para. 2). A typical engagement involves a consultant, frequently under pretense of an already established statement of work, to review

client processes and offer recommendations. Discovery, unfortunately, doesn't always lead to actionable recommendations or projects, and may lead to unnecessary costs.

To solve these challenges and allow more companies to leverage artificial intelligence, we propose the AI Toolkit and associated consulting services. The toolkit will enable clients to traverse the initial steps of readiness while helping them find the best opportunities to deploy AI in their organizations. The AI Toolkit will complement the current solution process, allowing for additional opportunities to sell services, and is founded on Venkatraman's (2017) Principle #1: "Be passionately curious about the future and profoundly uncomfortable with the status quo" (p. 293). As a point of reference, the AI Toolkit shares some design foundations to cloud readiness toolkits that are prevalent in the marketplace today, such as the World Bank's (2016) *Cloud Readiness Toolkit*, combined with complimentary services.

The market for the AI Toolkit is very broad, inclusive of all companies who see a need to embrace AI, but don't know where to start, don't want to blindly invest, or are unsure of their readiness. Digital transformation, which we discuss in detail later, has come to include AI as a key component. This means that the AI Toolkit is targeted at companies who are on the digital transformation path, regardless of how far along they are.

The AI Toolkit includes the following three key components, each of which consist of a blend of tools and services that are aligned to maximize impact while minimizing time and cost.

The first are *Desired Outcome Workshops* that enable clients to freely discuss what they are hoping to achieve. These workshops leverage the concept of idealized design to focus and prioritize interventions on elements of the business that will have the highest impact on the desired outcome. Next are *Scored Questionnaires* which are focused on the five key areas of strategy, ethics, infrastructure, data, and people. The output from scoring questionnaires will

serve to highlight areas where readiness is strong or weak and will inform decisions on future engagements and interventions. The third are *Example Data Analyses* which leverage two phases. Phase one will analyze metadata from unstructured and/or semi-structured data sources to identify potential areas of benefit from AI tools. Phase two will extract, transform, and load sample data sets and run them through prebuilt off the shelf AI models from similar scenarios to estimate and approximate the potential from building custom models against larger datasets.

Ultimately, clients utilizing the AI Toolkit will receive actionable feedback that aligns with the stages of the Data Maturity Framework from the University of Chicago's (n.d.) Center for Data Science and Public Policy:

1. Defining the real-world problems that AI can help to address
2. Leveraging the right technologies, best practices, and best processes
3. Optimizing operations and organizing the right team
4. Generating or finding the right data and processing it appropriately
5. Assessing return on investment
6. Enabling buy-in from key stakeholders

The AI Toolkit business model relies on significant connections across the value network. As a startup, we will leverage these connections to rapidly build credibility among potential clients. Engaging with partners in the consulting and professional services space will be difficult, as our offering may be considered competitive. The AI Toolkit, however, is not competitive with vendors that underpin the enabling technologies. These vendors, including cloud providers such as Google Cloud Platform, infrastructure providers like Nvidia and Dell Technologies, and software vendors, such as Starfish Storage, stand to benefit in terms of sales and customer satisfaction from successful AI Toolkit engagements. Each of them employs strong

sales and presales teams and have partner “sell-through” programs like Dell Tech Connect – Select, where vendor sales teams sell and are compensated for high-value partner products (Dell Technologies, n.d.).

DESIREABILITY TEST

Mark Edmead (2016), advisor to *CIO Magazine*, argues that “organizations need to evolve to address changing business landscapes” (para. 2) and that “digital transformation is business transformation” (para 3). Edmead (2016) continues that digital transformation is built on digital capabilities interconnected across the entire organization, supporting customer experience, operational process, and ultimately the business model. As we discussed in the introduction, the rapidly changing world requires managers to look at problems differently than they did in the past; digital transformation is vital for companies as they address these rapid changes. BrightEdge’s Jim Yu (2018) explains that “artificial intelligence and digital transformation go hand-in-hand” (para. 26). Charles Richards (2019) goes several steps further, describing artificial intelligence as one third of the triad of technologies that make up digital transformation in 2019. Clearly, digital transformation is necessary, and artificial intelligence is a key component of digital transformation.

The AI Toolkit fits into this landscape nicely; many companies would like to use AI on their quest for digital transformation but aren’t ready to take the plunge and invest in expensive consulting engagements and enabling infrastructure to create solutions for them. The AI Toolkit will serve as a pathway to discovering future products and solutions by aligning with the six steps of digital transformation (see Figure 1) described by Brian Solis (2016).

Figure 1. Six Steps of Digital Transformation *

THE SIX STAGES OF DIGITAL TRANSFORMATION



*Source: Reprinted from The Race Against Digital Darwinism: The six stages of digital transformation from SmartInsights.com, by B. Solis, 2016, Retrieved from https://www.smartinsights.com/?attachment_id=76144

Digital transformation, in conjunction with the AI Toolkit, can help companies gain competitive advantage against their competitors in many ways, including five suggestions described by Datascope (2018):

1. Increased Productivity through enhanced understanding of markets, supply chains, and internal and external processes, and the optimization thereof.
2. Reduced operating costs through the control of production processes and cost management.

3. Improved customer service through immediate and multidirectional feedback, flexible access to company resources regardless of time or place, and accurate analysis of customer and market preferences.
4. More effective branding through the use of social media and interactive campaigns.
5. Access to new markets through enhancements in logistics and communications.

Clearly digital transformation is the future, and AI is a key component of digital transformation. The AI Toolkit will be desirable in the marketplace because most executives are interested in envisioning future outcomes prior to significant investment. The Toolkit will cover clients' introspective needs, building on idealized design and a desired outcome with qualified options before making significant commitment of finances or other resources. Working through the AI Toolkit process will give companies low-risk opportunities to assess current strategy and processes, acting as a form of "business diagnostics" and allowing "executives to find out what is working and what needs to be tweaked or removed completely from the system" (Keith, 2015, para. 2).

ENABLING TECHNOLOGIES

McKinsey's Bhens, Lay, and Sarrazin (2016) argue that "[digital transformation] requires IT systems that can process massive amounts of data, continuously deliver new infrastructure environments in minutes, be flexible enough to integrate with outside platforms and technologies and deliver exceptional customer experiences - all while maintaining core legacy IT systems" (para. 3). Enabling technologies are vitally important to both the successful deployment of the AI Toolkit and the ultimate execution of the recommendations that are delivered. Enabling technologies required for the AI Toolkit include data and metadata analysis tools, off the shelf AI

models, and public cloud services. Additional enabling technologies will apply to the recommendations delivered, including software development frameworks for AI, infrastructure for data collection and storage, and compute resources to run AI workloads.

Data and metadata analysis tools (AI Toolkit)

The AI Toolkit includes the analysis of sample data to estimate the impact of AI on larger datasets. Locating the right data to analyze can be difficult – IBM’s Armand Ruiz (2017) argues that 80% of the problem facing data scientists is finding the right data. IDG projects that 80% of data generated is, or will be, unstructured – that is, files, objects, and items that are not part of traditional databases (King, 2019). To address that, the AI Toolkit will work within the value chain to leverage unstructured data scanning software that provides insight into both unstructured data and its metadata – data about the data. Examples of these technologies are Starfish Storage (n.d.) and Dell Technologies’ (2019) ClarityNow.

Off the shelf AI models (AI Toolkit)

Razavian, Azizpour, Sullivan, & Carlsson (2014) argue that “generic descriptors extracted from the convolutional neural networks are very powerful” (para. 1), demonstrating that off-the-shelf models can be applied to data that is significantly different from the data that they were trained on and still produce viable results. While there is no one off-the-shelf model that will work for every use case, there are many prebuilt models and tools that the AI Toolkit will take advantage to produce estimated or sample results. These results will be used as part of the recommendation process to indicate what kind of outcomes clients can expect when they execute on recommendations.

Public cloud services (AI Toolkit)

As the AI Toolkit is designed to demonstrate capabilities and find opportunities without a significant investment, it is important that capital expenditures on enabling technologies are limited as much as possible. To that end, it makes sense to rent resources available in the public cloud to operate the off-the-shelf AI models described above. Google Cloud (n.d.), for example, offers post-training prediction capabilities for \$0.0791 per node per hour.

AI software development frameworks (post-Toolkit execution)

The scope of the AI Toolkit does not include developing AI applications. Once recommendations are delivered, it is likely that clients or their consultants will be developing AI capabilities and models by leveraging one of the many frameworks. These include the popular Torch framework (especially Facebook's Python version, PyTorch), Google's TensorFlow, and Caffe, which grew from Matlab's neural network implementations (Skymind, n.d.).

Data storage infrastructure (post-Toolkit execution)

Once recommendations are made, clients will feed new AI applications with data that is already within their systems, is newly collected, or a combination of the two. Leveraging platforms that allow for data to be analyzed in place can avoid the time consuming and expensive process of data movement and consolidation for analysis. Dell Technologies' (2016) Isilon scale-out network attached storage solution offers multiprotocol access, enabling direct access from various analytics platforms. The efficient locking nature of Isilon's OneFS file system also allows for "embarrassingly parallel model training," that ensures the most efficient use of

expensive compute resources (Fahey, 2019, p. 5). Finally, solutions like Isilon can be deployed in the traditional, on-premise model or directly integrated with the public cloud (Das, 2018).

Compute resources (post-Toolkit execution)

MSV (2017) argues that AI applications rely heavily on parallelism – processing many small calculations simultaneously – and that GPUs – graphics processing units – are far better suited to this task than traditional CPUs. Nvidia is a leader in the GPU space, and the Nvidia Tesla V100 GPU is an example of a modern, high-powered GPU platform with its 5120 processing (known as CUDA) cores and 640 cores specially designed to run TensorFlow workloads (Fahey, 2019). GPUs are available in many platforms, including servers like the Dell PowerEdge C4140 (Fahey, 2019), Nvidia’s DGX-1 platform (Nvidia, 2017), and in the public cloud (Barr, 2017).

MARKET IMPACT AND CONCLUSION

As previously reported, Gartner’s (2019) CIO survey found “that AI adoption has tripled in the last year alone, with an estimated 37 percent of firms now implementing AI in some form”, resulting in a 270% increase over four years (Osborne, 2019, para. 2) and a *Forbes* (2018) Insight survey showed that 95% of executives “believe that AI will play an important role in their responsibilities in the near-future”. The foundation that AI is and will continue to grow in importance is undeniable. The fact that “only one in 20 companies has extensively incorporated AI” and “less than 39% of companies have an AI strategy” at all (Ransbotham, Kiron, Gerbert, & Reeves, 2017, para. 2) produces a massive market opportunity. Companies know that it is time to transform or die but are painfully unaware of what it takes to transform. The wrong

investments can be even worse than doing nothing, diverting money from what is working. This leads us to the key question each of our potential customers is asking: What can AI do for me? The AI Toolkit answers this question.

The AI Toolkit incorporates three critical components: desired outcome workshops, scored questionnaires, and example data analysis. These components are delivered through a blend of deliverables and consulting services, ultimately providing clients with actionable recommendations on how to embrace artificial intelligence. With these recommendations, clients will be prepared to embark on AI-focused digital transformation with a clear view of the path ahead, directing investment towards the most impactful interventions, ultimately answering the question: What can AI do for you?

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