EULARIS

Using Artificial Intelligence to Transform Pharma Revenue and Profit

Machine Learning Enters the Pharmaceutical Industry

By Dr. Andrée Bates,
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A client recently interviewed an applicant for a position on his analytics team. The interviewee claimed to be an expert analyzing Big Data. When my client asked how he did this, the candidate replied: "I put it in an Excel spreadsheet." My client then gave him the biggest Excel file he could find and asked him to provide actionable insights by the next day. As expected, the applicant came up with nothing of significance.

Why? Because Big Data does not fit into an Excel spreadsheet.

The sheer volume of information available today means the old ways of analyzing data are dead. Even the analysis we used to create with linear modeling ceased fitting in Excel macros many years ago. So, if you are relying on Excel macros to provide insights into your sales and marketing, you are missing out on one of the most powerful tools available today to drive revenues and market share.

During the past 20 years, the techniques for Pharmaceutical analytics have changed dramatically. Simple descriptive analytics first yielded to diagnostic analytics, then predictive analytics, and now prescriptive analytics. The quality of the results obtained from these methods has also evolved, from simple activity tracking, statistics, promotional response and marketing mix models, to the sophisticated Artificial Intelligence based models of today.

Artificial Intelligence represents the next evolution of business intelligence, able to provide both strategic and tactical decision support.

Artificial Intelligence represents the next evolution of business intelligence, able to provide both strategic and tactical decision support. The overall goal is to move from what you think your customers want and need to the use of Artificial Intelligence techniques, such as machine learning, in order to identify what they really want... and then give it to them.

It is important, however, to remember that it's not just about the data and the analytics. The data must tell a story about what is moving your customers, what your competitors are doing, what is needed to grow in the fastest way possible, and then you must act on this business intelligence.

Every Pharmaceutical company - big and small - is rushing to get Big Data on their strategic agenda. They know that without it, they can't grow, innovate or compete. Indeed, a 2014 survey from the consulting company PWC found that 62 percent of Pharmaceutical and Life Sciences executives have changed their organizations' approach to big decision-making as a result of data and analytics. [1]

[1] pwc. Decision making in pharmaceuticals & life sciences. 2014. Available at: http://www.pwc.com/gx/en/issues/data-and-analytics/big-decisions-survey/industry/pharmaceuticals.jhtml. Accessed August 25, 2015.

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They're using new, richer sets of data and training executives on the benefits of analytical techniques. Another 24 percent haven't made these types of changes yet, however, although they say they plan to do so.

Nonetheless, while more data is available today to drive intelligent decisions, collecting, and mining, analyzing and preparing that data is more challenging than ever.

Enter Artificial Intelligence - especially machine learning.

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Machine Learning: A Game Changer Within Artificial Intelligence

Think of Artificial Intelligence (AI) simply as a branch of mathematics, designed for a world of Big Data to solve real problems. It is used to recognize behavioral patterns through computational learning. One game changer within AI is the ability to modify its algorithms as it 'learns' by making predictions from large structured or unstructured datasets.

Google's driverless car is a good example of a computer learning in real-time as it takes in information from a continually changing environment and immediately incorporates it into existing algorithms. This enables the car to identify the differences between a tree, a building and a pedestrian to determine what the vehicle should do next and how it should respond to unexpected events. And it works: the prototype has driven more than 1 million miles without incurring a single accident.

Google Earth also relies on machine learning and AI to map the exact location of every household, business and street number throughout much of the world. Engineers load an existing street view database and then let the machine go to work. In France, it took about an hour for the computer to spit out data on every location within the country, with far greater accuracy than would be possible using human intelligence. [2]

Artificial Intelligence machine learning based analytics are ideal for marketing.

This approach allows businesses to determine customer preferences from a massively large crowd of choices. Amazon, for instance, uses machine learning to suggest new products individualized to each customer, even when several people share a single account. Uber uses AI to provide real-time pricing based on current traffic and demand.

Artificial Intelligence is Ideal for Marketing

Artificial Intelligence machine learning based analytics are ideal for marketing. That's because successful marketing often requires numerous, complex decisions containing a large degree of judgment.

The dramatic increase in the number of channels used, the complexity of these channels, the fast pace of change in the market itself, and the complexity of the decisions required, make it nearly impossible to manage without AI. Using AI and machine learning based algorithms distills the 'noise' and matches financial goals with the marketing decisions required to attain them.

[2] Brynjolfsson E, McAfee A. Artificial Intelligence meets the C-suite. McKinsey Quarterly. September 2014. Available at: http://www.mckinsey.com/insights/strategy/artificial_intelligence_meets_the_c-suite

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Artificial Intelligence: The Benefits

Companies that learn how to use Artificial Intelligence to drive decision-making gain substantial benefits, including:

- An understanding of the optimal strategic direction to follow
- Enhanced value proposition identification
- Enhanced competitor differentiation
- Optimal resource and budget allocation for maximum market share, revenue and profit
- The ability to see which segments offer the most value and how to reach those segments to maximize growth

Next-Generation Analytics

Next-generation analytics may involve using big or small data, but it must involve cutting-edge Artificial Intelligence techniques, especially machine learning.

The phrase 'Artificial Intelligence' has been bandied about for years now. It is, quite simply, a branch of mathematics designed to solve real problems by analyzing millions, or even billions, of data points.

The beauty of Artificial Intelligence is that it can recognize behavioral patterns through computational learning. Yes, the machine continues to learn as it mines datasets and provides predictions. For instance, we can parse enormous reams of data on Cancer and Cancer treatment to identify patterns that can lead to treatment decisions for individual patients. Every new study, every feedback from physicians, 'teaches' the computer algorithms more about the topic and enables it to fine-tune its recommendations.

The beauty of Artificial Intelligence is that it can recognize behavioral patterns through computational learning.

Machine learning is a subset of Artificial Intelligence based on algorithms that learn from data without the need for rules-based programming. In other words, the 'machine', or computer, learns to identify patterns humans cannot see and to solve problems without human intervention.

The fundamental goal of machine learning is to generalize beyond the examples in the training set. This differs markedly from statistics used in simple analytics, which was developed for small, more manageable datasets. The datasets now available are accessible only with the help of these complex algorithms. There is simply too much for humans alone to mine.

Computers, however, can process and mine data in real-time to discover insights

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and generate predictive models. Unconstrained by the preset assumptions required in statistics, machine learning can yield insights that statistics and humans cannot feasibly attain, and it does so with a far higher degree of accuracy than is possible with other approaches.

The bottom line is that the insights and pattern recognition that these powerful algorithms and super computers provide enable companies to make far better decisions, and provides them with new sources of power to gain real-world results.

The Process

1. Asking Questions

Insights begin with questions:

- "Why aren't we growing?"
- "Why are we losing share to competitor X?"
- "How can we gain share against competitor Y?"
- "What is the maximum revenue we can achieve for brand X with brand Y budget?"
- "How do we allocate the budget to achieve that?"
- "What is that maximum market share we can achieve?"
- "What mix of messages will provide the maximum market share?"

These questions are typical of those used in linear approaches, including basic regression, return-on-investment (ROI), marginal ROI, promotional response curves, and all forms of linear mathematics and multivariate statistics.

They worked well enough in the past, but they didn't lead to the kind of results marketers needed and they rarely translated into dramatically increased market share or revenues. Today's fast-moving, technologically advanced, multichannel environment with numerous stakeholders requires a more advanced, non-linear approach if Pharmaceutical companies want to deliver real-world value.

...these powerful algorithms and super computers provide enable companies to make far better decisions...

2. Getting the Right Data Sets to Answer the Questions Posed

Answering questions requires data. Not just any data but data that has the right components in it to answer the questions posed. Most datasets Pharma have access to currently do not contain the richness required to answer the core questions they need answered, which explains why many marketing teams get frustrated with their analytics teams not giving them the answers and turn to us. However, they are not giving them the right data to work with so, of course, they won't get the insights. We can examine both the outcomes required and the data available and see what data is missing to answer the core questions and get that data in place ready for the next step.

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3. Applying the Appropriate Combination of Artificial Intelligence Algorithms for Datasets

Once you have the combination of the right questions, and the right data to answer the questions, and apply the appropriate types of Artificial Intelligence algorithms for the combination of datasets available, then the world opens up and the information offered up becomes fascinating.

4. Ensuring the Strategic Team Working with the Analytics Teams Can Convert the Insights into a Story and Plan of Action that Ensures the Brand Maximizes Results From the Insights Gained

Once the data scientists do their thing, you still need something else to achieve results - strategic insights from industry experts. The strategic insights team need to examine all the data analyses and consider the strategic and tactical questions being posed, and then weave these together. Data scientists without a strategic team will have a difficult time knowing where to look. The strategic team, without the data scientists working through the data, will be guessing. The teams weave together to create a dream team with the intention of uncovering and conquering all challenges.

Applying the Appropriate Combination of Artificial Intelligence Algorithms for Datasets

5. Acting on the Insights to Gain a Competitive Advantage and Real-World Results

The timing is critical. Once the insights are uncovered and translated into a strategy or tactical plan, the team must act and execute the plan. Knowledge without action gets you nowhere. Act, and act fast, before you lose the competitive advantage. By procrastinating and waiting, many opportunities are lost. Your brand can fall so far behind that it will be very difficult to regain lost ground.

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The Business Case for Artificial Intelligence - Especially Machine Learning

"We don't really care about the machine learning underpinning, we just need strong results from it. And that is what it delivers."
Pharmaceutical marketing executive at one of the 10 largest Pharmaceutical companies in the world.

Machine learning based approaches should lead your analytics efforts if you want:

- **Deep, accurate insights to create real-world improvements and results**
  We are now creating billions of data points and combinations. Statistics and other older analytics techniques simply don't have the power to provide the level of meaningful information that machine learning offers.

- **Exponential advances and continually increasing power**
  We are constantly innovating as the pace of knowledge increases in this domain. For instance, the machine learning algorithms Eularis uses today did not even exist three years ago.

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- **To be able to exceed human ability**
  Today's machine learning algorithms are better than humans at things once thought to be the unique domain of humans. For example, lawyers used to painstakingly read through boxes of legal documents to develop their case. Now, the documents are uploaded and sophisticated algorithms are used to identify useful material.

- **Extreme accuracy**
  Machine learning can churn through hundreds of millions of data points to provide answers you can trust with an accuracy that is in a different league to older approaches. For instance, we're finding that machine learning analytics are actually better than experienced Pathologists at identifying certain Breast Cancers.[2]

- **Improved productivity**
  How long does your analytics staff spend blearily staring at spreadsheets to identify trends and pull data that, as you know, doesn't provide the expected return? The kind of computer analytics we're talking about is capable of identifying trends and patterns in minutes, even seconds, providing more timely business intelligence than even your best analyst.

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- **The ability to continually add data**
  Data is dynamic, and the amount and type of data available changes on a daily - even hourly - basis. Machine learning can integrate such data in real-time, even incorporating events outside your company such as economic issues, weather, and natural disasters, to provide the most accurate, comprehensive results possible.

Advantages of Artificial Intelligence (AI) Algorithms Over Traditional Linear Approaches

In conversations with clients the question invariably comes up – *'What are the specific differences in traditional linear approaches that I am using now e.g. regression, multivariate statistics, conjoint analyses, promotional response curves, heuristics, attrition modeling etc, and an artificial intelligence based approach? The output addresses similar questions, so why this instead of what I have been doing for many years?'*

Here are a few reasons to move from linear approaches to non-linear AI approaches:

- Big data. AI approaches are very useful for extremely large data sets.
- Discovers all relationships in the data both linear and non-linear relationships. If the relationships in the data are non-linear, then the linear models either completely miss them, or give an erroneous answer, but machine learning will pick up the true relationships in the data - whether linear or nonlinear -whereas linear cannot do that.
- Accuracy. AI is more accurate than linear by a lot. An example we saw on the same data gave an accuracy of 40% using linear and 94% with machine learning
- Speed. Our projects can create over a billion data combinations to soft through in a matter of hours. The speed is unparalleled by traditional approaches which cannot get through that amount of analyses in such a short time.
- Uncovering all the complex interactions in the data. Linear approaches cannot do this.
- Detects new relationships in data and therefore uncover previously unconsidered items, whereas linear approaches are more about testing hypotheses that you have considered.
- Sample data. Linear approaches using sample data require robust sizes of data but AI can provide good insights even when only a sample data set is available. These limit the results in linear models more than they do AI models.

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- Solves real problems. AI based approaches are far superior for solving real world problems including impact on revenue of specific marketing actions and their synergistic impact.
- Automation. Once you plan and implement these appropriately, they learn when new data comes in and adjust their own algorithms to take the new data points into account. So you can keep adding data and the more data you put in, the more they adapt and learn and millions and billions of data points can be processed quickly and easily.
- Gain a competitive edge. If your competitors are all using linear they will not be getting the richness of the data and you will have access to more information that allows you to succeed than they do - hence our results.

Figure 1 compares classical regression analysis with machine learning. While both options examine the same areas, machine learning provides a depth of insight needed to make the optimal changes to improve business result.

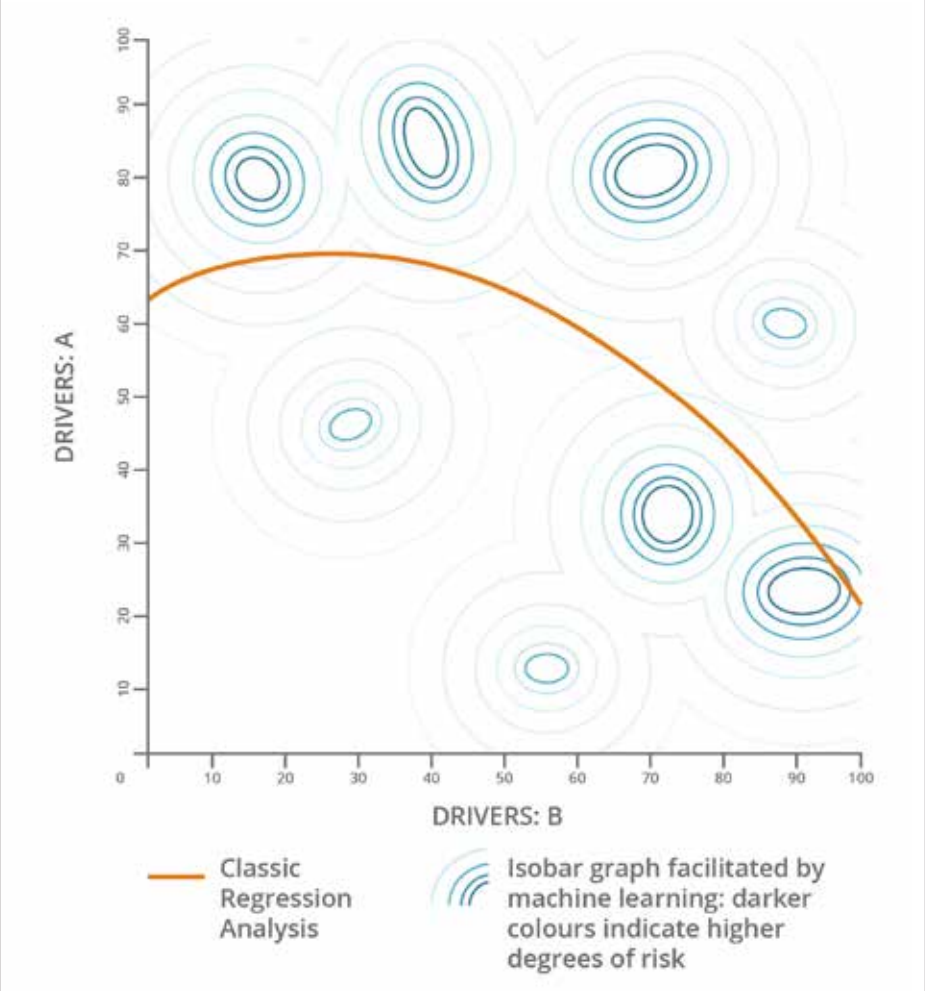

Figure 1 **Linear Regression Analysis vs Non-Linear Machine Learning**

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We recently used these techniques with a company that had done everything it could with traditional analytics. Its brand was first-in-class, but failed to achieve the sales result of its main competitor. The client thought we would not be able to find anything new, given the amount of traditional linear analytics already performed. However, we did. In this client example, our machine learning algorithms culled through 277 million data combinations to hone in on the impediments to higher sales and identify needed changes. The client applied the results to their sales and marketing and the brand began growing at an annual rate of 27 percent. Today, the brand is not only first-in-class, but first in sales as well.

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Client Case Study

The client company was a large Pharmaceutical organization with nine priority A1 brands in a mix of primary and secondary care. The brands were originally managed by national, regional and global brand managers. Brand performance was mixed, with no consistent method for recognizing the company's global bottom line across all brands.

Data collection was difficult because the company operated in 107 countries. This presented them with a bewildering array of product, category and country data. Plus, most of the countries did not have strong data.

We started by getting the local affiliates to provide input on their greatest challenges. Thereafter, we analyzed the client's brand performance and marketing spend by channel. We also gathered data on the client's priority markets and evaluated them in terms of sales volume and growth potential.

We then applied our proprietary analytics to identify the major growth drivers within each product category. We also used predictive algorithms for every brand in each country to uncover the greatest growth opportunities.

The brands and countries with the highest potential were subjected to even more in-depth analysis, right down to the marketing messaging and tactics used to engage physicians, payers and pharmacists.

The result? We discovered some serious mismatches between allocation and potential.

The client was significantly over-investing in markets with low growth

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potential. While important markets, they did not justify the high percentage of the marketing budget they received.

The client was also under-investing in 'high growth' potential markets in Asia and Latin America. These franchises received just 24 percent of the global marketing budget. Our analysis suggested they should receive closer to 34 percent.

Three brands had the lion's share of the marketing budget, but these brands were already mature and less likely to grow than some of the smaller A1 brands. The numbers told a story the client couldn't ignore.

Consequently, staff reallocated spending across portfolios and countries, as well as across specific sales and marketing activities for each brand in each country. They freed up some of the budget and reinvested it where it would yield a bigger return.

The process was not easy, but the global Chief Financial Officer persevered in order to maximize revenues and shareholder value.

Two years later...the results were impressive. The client achieved consistent high growth in its priority A1 brands, putting it far ahead of its key competitors. Pre-tax profits grew in line with sales, which impressed investors and led to a higher share price, despite a gloomy market outlook for the Pharmaceutical Industry overall.

The company continues to use our analytics to drive financial and marketing decisions. It displays results on an intranet dashboard available to all involved with the products. Now, teams in any country can not only view the data to compare their performance to other brands and other markets within the company, but use simple interfaces to run analytics to answer other questions.

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Artificial Intelligence and Marketing

Marketing requires numerous complex decisions that have traditionally been made based on a great deal of qualitative – not quantitative – data and, let's be honest, gut feeling.

That simply doesn't work in today's data-driven environment. Artificial Intelligence, however, provides a way to distill the 'noise' into actions and match financial goals with the marketing decisions necessary to attain them.

Put simply: Artificial Intelligence simplifies the marketing executive's ability to process large volumes of customer data and obtain accurate and consistent findings that can result in improved sales and real-world financial results. It can separate the 'the wood from the trees', enabling marketers to determine the best strategies as well as individual tactics for a brand.

Specific marketing challenges that artificial intelligence and especially machine learning type of AI algorithms can address more accurately than other approaches include:

- **Financial results:** Questions to ask include are:-
  - What is the maximum market share and revenue I can achieve given the market and competitors, and what do I have to do to get there?
  - How do I allocate my marketing budget across channels to realize maximum profit?
- **Customer segmentation:** Machine learning models can identify groups of customers with similar behaviors, as well as your most valuable customers, enabling targeted marketing for optimal results.
- **Strategic direction:** Using machine learning analytics to assess existing strategies can objectively identify flawed approaches and, by analyzing the results, provide the necessary information to shift direction.
- **Personalized driver messaging:** Machine learning enables marketers to process the huge amounts of data coming from multiple sources - such as CRM systems, sales data, distributor data, website visit flow and campaign responses - required to predict the most effective marketing message for small market segments. Targeting messaging to smaller segments of the market can change customer behavior, thus improving revenue.

Artificial Intelligence, however, provides a way to distill the 'noise' into actions and match financial goals with the marketing decisions necessary to attain them.

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- **Rx switch prediction:** Machine learning enables marketers to see patterns in the data which can identify why healthcare providers who switched brands decided to switch and, more importantly, accurately predict which providers are at a high risk of switching. This allows marketers to engage in targeted, proactive switch prevention approaches.

- **Resource allocation:** Machine learning analytics accurately identifies the right way to reallocate resources and budget to achieve optimal results, if companies are willing to take a risk (a small risk, given the accuracy of the data) to implement the changes.

Implementing Artificial Intelligence in Your Organization

Achieving real-world results from artificial intelligence requires the following:

- **The right questions:** You must ask the right questions to ensure the algorithms can provide the right answers. It's the classic adage, "Garbage in, garbage out". This requires a team approach to identify the questions and determine the datasets required for answers.

Understanding which technique is needed to provide answers to your questions is critical.

- **The right data:** Data relevance and quality is key, and is often the issue that paralyzes executives from implementing sophisticated analytics. Even the multitude of datasets available in the United States (public and commercial claims, public health data from the Centers for Disease Control and Prevention, research data from the National Institutes of Health, all payer/all claims datasets, electronic health record data) are often incomplete and may not contain the variables needed to answer the questions that are most critical to success. However, incomplete or irrelevant data is not a roadblock. No dataset will be perfect, and you can still find data that does provide the variables required to answer the questions. Eularis are doing this constantly as a lot of data we are given is incomplete and often does not contain the areas required to answer the questions needed to transform results.

- **The right analytics approach:** Understanding which machine learning technique is needed to provide answers to your questions is critical. This involves planning and teamwork.

- **The right strategic analysis:** Understanding what the analytics are telling us and weaving this into a strategic and tactical approach to change the results is critical. Lots of mathematics and graphs are useless without interpretation of what this means the team needs to do.

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- **Taking action on the results:** By knowing what to do, we are closer than ever to greater results. However, we need to take immediate action and execute our plan. Only then can we achieve the results promised.

We use different types of data depending on the client's data availability and needs.

1. Internal Big Data
This is the most basic dataset. It is typically large and includes all IMS data available, conference attendees, doctor prescribing data and patient data. We see the same data from most companies and this is usually Big Data. The challenge is that it often misses critical elements needed to provide the insights we require. It typically doesn't get to the "why" behind the findings. It can provide some awareness but it usually needs to be supplemented with additional richer data to uncover transformative insights. And this also explains why internal analytics teams are not providing the answers needed for many brands. They are relying on analyzing the data they have, rather than the data they need.

They are relying on analyzing the data they have rather than the data they need.

2. Collected Data
This is data we identify and source ourselves for the client. It is the most common type of data we work with, combined with internal data, as most internal data is missing critical components needed to analyze the questions posed. The data collected is individualized to the questions for which the client needs answers. For instance, it may be market research data or specific external datasets. The advantage of this approach is the ability to provide highly accurate resource allocations, including budget allocations, as well as obtain the "why" behind the findings and the next steps.

By matching the data to the right technique, marketers reap far stronger results than randomly choosing just one. This involves creating machine learning algorithms (and the right combination of these) to mine the data, formulate hypotheses and create insights. It leads to bespoke visualization platforms that allow Pharmaceutical teams to easily extract insights. It also allows for the addition of data as more is collected. This, in turn, allows the data and insights to be embedded in the 'business-as-usual' processes.

Conclusion

Pharmaceutical executives can best use the power of AI - in particular, machine learning techniques- if they view it as a tool to help plan and implement a strategic vision. That requires, of course, defining the challenges to be met first before even considering the data. Where do you want to go? What is most

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important to your team? Identifying the right data and the right analytics will show you how to get there.

The right prescriptive and cognitive machine learning analytics not only predicts the results of various scenarios but shows you how to optimize those results in the future by changing various components of current approaches. With simple-to-use interfaces, marketers can also test various options and scenarios to see real-world results before they implement a message, campaign or plan.

Prescriptive and cognitive analytics is the most advanced stage of analytics to date. It represents the future of marketing. It does far more than predict what your customers will do. It helps you understand why they will do it so that you can target your marketing approach.

*For more information on what machine learning or Artificial Intelligence can do for you and your company, please contact **Dr. Andrée Bates** at Eularis: www.eularis.com*

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ABOUT THE AUTHOR

Dr Andrée Bates

Dr. Andrée Bates is a pharmaceutical industry veteran with 30 years in the industry and 20 years working specifically in pharma AI. She brings blended expertise in Artificial Intelligence (AI), Pharmaceuticals, and Strategy. Dr. Bates has led Artificial Intelligence powered projects for numerous top-tier pharmaceutical companies in diverse areas such as clinical trials and R&D, market access, regulatory, medical affairs, and sales and marketing. These have all resulted in measurable growth in revenue, profit, and market share for her clients. Having worked in the pharmaceutical industry since 1993, and AI in Pharma since 2003, she has a detailed understanding of the pharmaceutical environment and how AI can be leveraged compliantly and effectively. She has authored many articles in peer-reviewed journals and industry reports. She has also been a guest lecturer on Healthcare Innovation and AI in multiple university MBA programs: INSEAD Business School (Fontainebleau), the Erivan K Haub School of Business at St Joseph's University (Pennsylvania), Fordham University (New York) Global Healthcare Innovation Management postgraduate program, and Bayes Business School (Formerly Cass Business School – The University of London), and she lectures on AI for Boards at Henley Business School at the University of Reading, as well being a guest speaker in numerous internal pharmaceutical company meetings and international conferences in UK, USA, Latin America, Canada, France, Germany, Spain, Hungry, Poland, Japan, China, Singapore, and Australia.

About Eularis

Eularis exist to help biopharma and healthcare commercial teams who want to weave FutureTech like Artificial Intelligence (AI) and Machine Learning (ML) and Virtual Reality (VR) and Augmented Reality (AR) and Internet of Things (IOT) to solve their challenges and deliver unprecedented measurable results.

The Eularis team of experts have extensive qualifications combined with many years of real-world experience in both biopharma and AI companies. The mix of qualifications (MD, PhD, MBA, M. Sc., M Engineer.) along with prior experience in executive-level positions in top 20 pharmaceutical companies ensures our clients have the right strategic and tactical questions solved and planned with cutting edge technology and AI. You have access to Pharma AI Futurists, Pharma Board level team, and AI Strategists, and Data Scientists and Big Data Engineers and Developers to ensure you are playing at the top of your game.

Every project is unique and begin by developing a deep understanding of your strategic needs and your data. Then, we plan the right approach to meet your strategic needs and transform your performance.

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TRY ONE OF OUR CORE SERVICES

1 AI STRATEGIC BLUEPRINT

Give us your most difficult challenges to solve with AI and FutureTech!

The problem of poor AI impact comes down to a lack of strategy and pre-strategy. We know AI is impressive, and we see the results all around us. So why do many pharma AI project never pass the pilot stage? There is a plethora of evidence as to why not having a strategic AI blueprint before you begin is problematic and leads to project failure. We create strategic AI blueprints to ensure all AI projects meet the company's strategic objectives and move the needle for maximum impact.

2 AI DEPLOYMENT BLUEPRINT

Ensuring the key foundational elements required for success in your AI FutureTech projects are in place.

In the pharma environment, we face unique challenges. Knowing where you want to go is one thing, but the trap many then fall into is ensuring that the key foundational elements are in place (e.g., finding the right data, getting through internal legal and compliance, buy vs build, tech planning SOW, choosing the optimal AI vendor etc.) so that you can execute quickly. Our deployment blueprint accelerates your ability to industrialise the opportunity effectively by taking care of all these foundation pieces enabling you to easily commercialize the most effective solutions rapidly and seamlessly.

3 AI MODEL IMPLEMENTATION & TECH BUILD

End-to-end solutions focused AI and tech implementation

Tech implementation from end-to-end including tech project planning, implementing security procedures, data discovery, data staging, data preparation, data AI modelling (with ML, NLP, Generative AI etc) model evaluation, UI/UX creation, integration services, software integration and cloud services, perform testing and quality controls and launch.

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