

BREAKING THE DISCOVERY AND DEVELOPMENT PIPELINE WITH AI

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ARTIFICIAL INTELLIGENCE IS A HORRIBLE TERM.

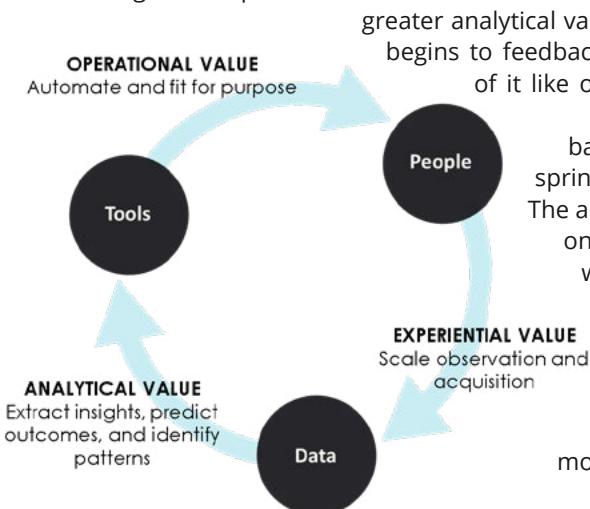


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Thanks in no small part to the marketing and commercially driven interests of Google, Facebook, Amazon, Apple, Microsoft, and the startup ecosystem, the term Artificial Intelligence has lost all meaning. We now use it as a catch-all term for technology approaches utilizing machine learning, cognitive computing, and even robotic process automation. To add insult to injury, AI itself is a co-conspirator with hyperpersonalization, distributed computing, Internet-of-Things, quantum computing, design thinking, blockchain, and a host of other emerging technologies and concepts in the even more intangibly vague concept of digital transformation. All this ambiguity in nomenclature belies the simple truth that these ideas – independently or in joint conspiracy – are fundamentally changing the way we work with technology, data, and people. In pharmaceutical research and development, this means the concept of drug R&D as a pipeline with a start and an end is history.

Embracing the virtuous cycle

Leveraging these technologies through the virtuous cycle's three core types of value delivery is core to executing a true digital transformation. How does this work? Many companies start with a focus on delivering operational value through Robotic Process Automation (RPA) and human-in-the-loop platforms to support data quality/classification, drive efficiency, and augment capacity limited workflows. The value delivered operationally then can be reinvested into the delivery of analytical value. Here is where many of the traditional machine learning and distributed computing techniques come into play through development of tools with better predictive capabilities and richer data integrations. Much of the learning and insight in the analytical value chain drives development of better tools for users. These tools then lead to delivering experiential value for users which in turn drive adoption and satisfaction. Cognitive capabilities from these advanced tools like conversational assistants and hyperpersonalized experiences drive higher adoption and create better and richer data with



greater analytical value, and the cycle begins to feedback on itself. Think of it like one of those little cars that you pull backward to wind a spring and then let go. The act of 'pulling back' on the toy car is like working backward through the feedback cycle and then releasing it to generate momentum for your transformation.

Strategies for bending pipelines into cycles

The process of pharma discovery and development is a primarily linear process utilizing scientific research to work through iterative steps of filtering, selection, and evaluation. Starting with such vast spaces as all possible chemical compounds and such complexities as the human biological machine, the goal is to whittle down the infinite possibilities to the point where a single possibility makes a remarkable impact in disease outcomes and patient experiences. In order to accelerate this process and create feedback driven momentum we must start with the three elements of the cycle – data, tools, and people – and find out which will help us drive our initial value exercises. Having a strategy for each of these elements helps to orient the path forward.

A tool strategy should take an ecosystem/platform view towards development, engage an agile DevOps mindset, and focus on integration while driving to deliver value through efficiency. Tools delivered with this approach are easy to combine and evolve with other tools supporting the entire research process.

A data strategy that encompasses the FAIR (Findable, Accessible, Interoperable, Reusable) principles and tackles the five key classes of data actions (Acquisition / Ingestion, Storage / Persistence, Transport / Movement, Access / Usage / Analysis, and Governance / Management) will enable the data outputs of each successive iteration to be used to deliver analytical value and better tools in other steps and iterations.

A patient focused strategy that maximizes the quality of experiences both in clinical trials and in prescriptive use will drive higher quality data and even higher positive outcomes for patients.

AI's role in driving the cycle

Artificial intelligence – or more specifically, narrow or specialized artificial intelligence techniques – play key roles in enabling value delivery in all steps of the cycle. Beyond the obvious analytical value from more precise and accurate predictions, the ability of these techniques to see patterns and extract insights from datasets that are dimensionally intractable to the human mind illustrates a sometimes scary 'superhuman' potential. Operationally, engaging these techniques to take repetitive low value work away from our colleagues will free them for the creative and intuitive engagement that makes work mentally fulfilling. Experientially, the ability for these loops and systems to thin and cross the human-computer interface through perceptive and cognitive capabilities will make the feedback cycle empowered human experience continually richer and more fulfilling. All of this ends up with the power of AI not being in its artificiality but in its truly augmenting possibilities – and there is nothing artificial about the value for humanity that can be found there ■