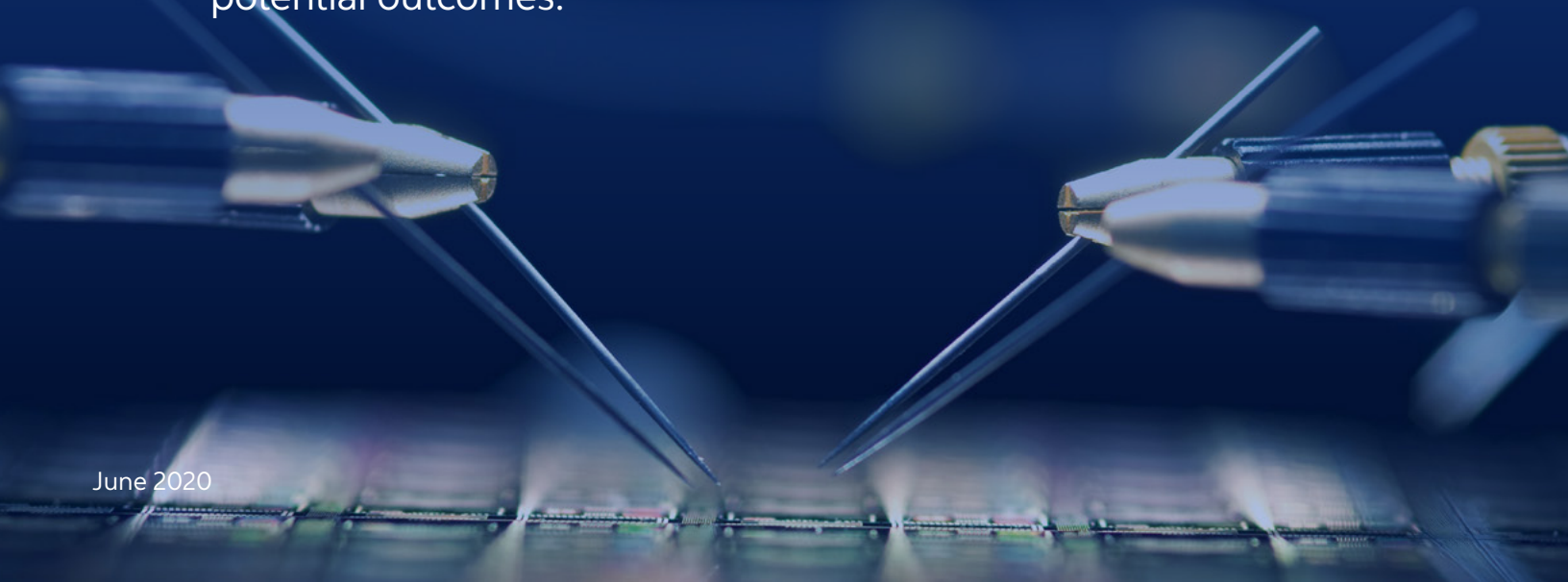
Cognizant

Digital Business

Decision-Making: The New Frontier for Automation

Decision process automation is a forward-looking, practical strategy to improve enterprise operations, enabling faster responses to rapidly changing conditions and identifying options for action based on a more complete exploration of potential outcomes.



June 2020

Executive Summary

Decision-making is a fundamentally human trait. But today's businesses must process an astonishing amount of data to make decisions, even in operational areas such as supply chain, procurement and contract pricing. Assessing extraordinary volumes of data is near impossible for even experienced managers, as they must be mindful of previous choices and weigh multiple variables that could affect outcomes.

Through distributed computing and powerful artificial intelligence (AI) and machine learning (ML), decision process automation (DPA) can address this complexity by automating how organizations analyze massive volumes of information. Simultaneously, human experience and insight complement algorithmic decision-making by assessing contexts too nuanced for AI and ML to address as of yet. DPA offers a new way to operationalize AI and optimize decision-making, by automating how organizations analyze what *has happened* and what *is happening* to more accurately predict what *could happen*.

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Augmenting the human capacity to solve problems

Across industries, businesses are witnessing massive, unprecedented growth in the volume of data available for analysis. This avalanche of data often exists in siloes, which impedes decision-making. If an organization cannot aggregate, consolidate and correlate data across siloes and include institutional knowledge such as previous decisions and their effects, productive insights will be limited and decision-making constrained.

Moreover, certain types of institutional decisions depend upon particular people. Individual employees or departments may create models to address the mechanics of their internal processes, such as spreadsheets or other applications dedicated to a specific task. These models often do not connect to the enterprise's IT systems and become tribal knowledge, but rather take the form of conversations or ad hoc collaborations. In these cases, organizations lose valuable knowledge when roles change or employees depart.

Institutional decision-making depends not only on data inputs but on less easily modeled elements: the inherent biases of human decision-makers, including people's inability to recognize mistakes and reluctance to correct them, policy frameworks and organizational culture. Decisions cannot be made without accounting and adjusting for these elements—bringing context into the loop.

Decision-making is harder still in uncertain environments created by stressors such as macroeconomic events, supply chain interruptions or even a global pandemic. Decision-makers often react to uncertainty by making instinctive decisions, based on previous choices that may or may not have had optimal outcomes. And each decision affects other steps down the line.

All these complexities invite questions:

- How can managers make optimal decisions when they're overwhelmed with data from multiple sources?
- How can organizations collaborate across departmental or geographic lines and ensure they incorporate relevant institutional knowledge while still being able to avoid biases or previous mistakes?
- How can supervisors of critical operational processes understand the ramifications of specific choices, and decide which ones would result in optimal outcomes?
- How can we make decisions at the speed necessary to address rapidly evolving situations, even a black swan event like the recent pandemic?

The short answer? They cannot.

Facing extraordinary and accelerating data growth, businesses need new ways to quickly analyze the enormous pool of available data. Incorporating frameworks that reflect institutional culture and behavior is a step toward informed decision-making that eliminates data siloes, tacitly understood processes, data gaps and information latency.

Understanding DPA: Generating greater value from available data

Just as technology has created these challenges, technology offers the solution. Using distributed computing, algorithms that can process massive amounts of data at lightning speed and so-called evolutionary AI, organizations can continuously model, simulate and choose the best choices for decision-makers—automatically.

This is the opportunity presented by DPA—the logical next step from robotic process automation (RPA) and intelligent process automation (IPA) in the evolving continuum of business process automation.

RPA improves operational efficiency while reducing human error. IPA helps organizations automate complex tasks, leveraging cloud technologies to bind operational systems together. Other functional software addresses challenges in supply chains and procurement. All are valuable and effective, because they allow knowledge workers to focus on more value-added tasks. But none of these operational technologies can aggregate multivariate data, simulate and model the effects of different decisions past or present, or rank-order optimal decisions based on desired outcomes, allowing managers to then choose one. DPA can.

DPA leverages massive computing power and increasingly sophisticated algorithms to assist in business process decision-making, with huge potential value. Just as one might create a “digital twin” to model performance parameters on an aircraft engine, DPA creates a digital model of an organization. It examines repositories of historical data, trends and decisions, evaluates current conditions by analyzing incoming data streams from various sources, and models potential scenarios and outcomes.

This is DPA: the capability by which an organization can use an enterprise data analysis platform to create a virtual image of itself. This allows AI to simulate how different variables affect outcomes and account for policy frameworks and organizational culture. Using DPA, organizations can better examine evolving opportunities and formulate previously unseen solutions. Call it a look into potential futures.

DPA moves automation of business processes toward incorporating various types of data inputs and variable conditions. DPA can capture and retain the elements of inherently loose processes, such as individual decisions or tacit processes, by extracting and tracking key process details. And by analyzing a simulated instance of an organization's past choices and current data inputs, DPA optimizes decision-making in situations where even the best minds may balk or fall short. It winnows out optimal choices from overwhelming amounts of data, incorporating algorithms that progressively refine outcomes while eliminating human biases.

DPA delivers choices based on how the organization has worked in the past even as it incorporates data streams from the present. This brings humans back into the loop at the most critical juncture in the decision-making process: where the human capacity for insight and foresight, and the ability to understand institutional context, offer the most value.

DPA is the future, because it shows organizations what the future can look like—machines present optimal choices, while humans remain in the decision loop.

Quick Take

DPA's Building Blocks: RPA and IPA

Two types of process automation have become pervasive in industry: RPA and IPA.

- RPA uses virtual assistants—i.e., software "bots"—to automate routine tasks, which speeds turnaround times, reduces errors and frees staff to focus on higher-value work. RPA tends to be localized in operational environments, customized by on-site process engineers.
- IPA typically ties multiple bots together to perform more complex tasks, often between systems that did not previously interoperate. Using AI, IPA makes sense of larger data sets to improve processes automatically, with the added benefit of continuous learning optimization. Algorithms link process automation to specific outcomes based on sets of variables, offering higher order processing. IPA also reduces demand on human resources and is often leveraged across geographical units via the cloud.

DPA leverages massive computing power and increasingly sophisticated algorithms to assist in business process decision-making, promising higher value. In this way, it goes beyond IPA and RPA by aggregating multivariate data, simulating and modeling the effects of different decisions past or present and rank-ordering optimal decisions based on desired outcomes, providing managers with more options.

How DPA works: The power of distributed computing

DPA represents the next step forward in managing enormous data sets to arrive at optimal decisions. It does not eliminate RPA or IPA, but uses data generated from both as input. It represents a categorical leap forward—assisting in decision-making at the supervisorial and process management levels, even at a strategic level.

Fundamentally, DPA is a higher-order decision engine running in a virtual model of a business's operations. It relies on evolutionary AI, running iterative sequences of scenarios, with thousands or even millions of variables, on a cloud-based network of millions of distributed processors.

This sequential algorithmic analysis allows the decision engine to rapidly refine to optimal outcomes, enabling automated decision-making at lightning speed. DPA makes choices as humans might, but with the ability to manage an extraordinary number of complex variables, including data inputs from evolving conditions in real time, without overlooking data or making decisions based on hunches.

Consider how proactive insight and rapid scenario modeling could help save millions of dollars in contract pricing annually by repricing contracts for key commodities, raw materials or parts as conditions change, automatically optimizing the structure and terms of counterparty deals and streamlining customer interactions. Then, consider how an individual, or even a team of analysts, would struggle to optimize decision-making in rapidly evolving circumstances.

Figure 1 (next page) shows how DPA can use information streams from tens of thousands of customers to predict order patterns across products. First, ML solutions analyze variable data from customer contracts to more accurately predict emerging patterns that could affect contract negotiations. Then, DPA clarifies at a granular level how contracts are priced and, importantly, how they could be. This produces precise information—on timing, alternative providers, external forces, or all three—that enables the business to earn a higher profit per contract while reducing the company's risk due to financial and market changes.

DPA gives enterprises new, more flexible decision support—the power to evaluate constraints and prescribe the right spend to the right customer at the right time across every channel, automatically.

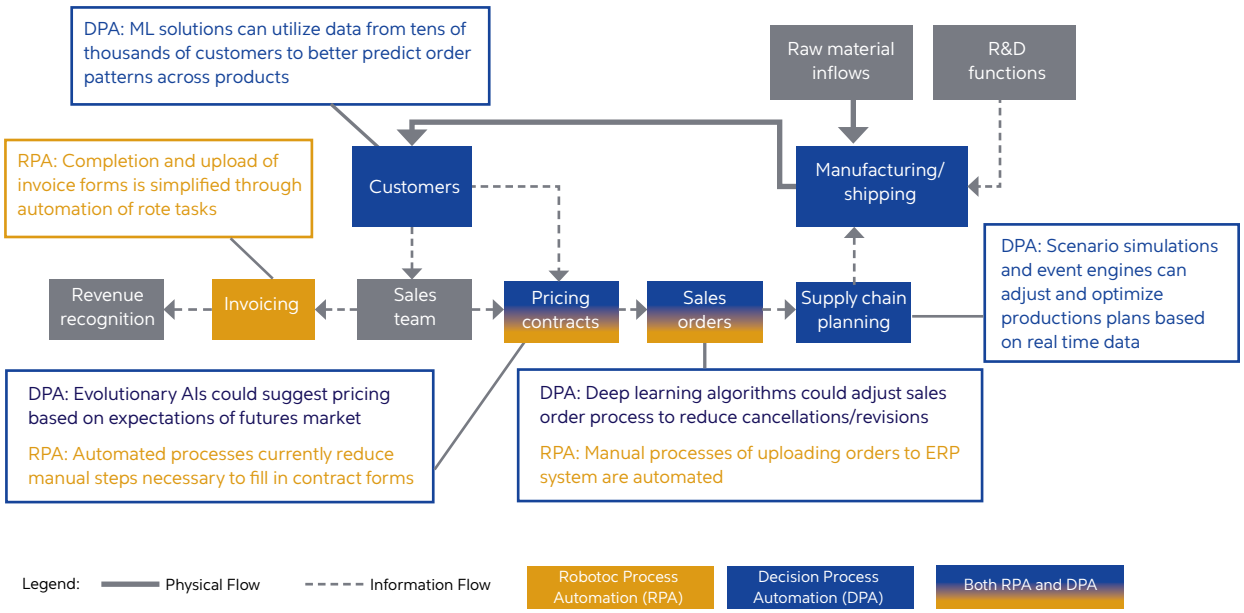

DPA: ML solutions can utilize data from tens of thousands of customers to better predict order patterns across products
Raw material inflows
R&D functions
RPA: Completion and upload of invoice forms is simplified through automation of rote tasks
Customers
Manufacturing/ shipping
Revenue recognition
Invoicing
Sales team
Pricing contracts
Sales orders
Supply chain planning
DPA: Scenario simulations and event engines can adjust and optimize productions plans based on real time data
DPA: Evolutionary AIs could suggest pricing based on expectations of futures market
RPA: Automated processes currently reduce manual steps necessary to fill in contract forms
DPA: Deep learning algorithms could adjust sales order process to reduce cancellations/revisions
RPA: Manual processes of uploading orders to ERP system are automated
Legend:
Physical Flow
Information Flow
Robotoc Process Automation (RPA)
Decision Process Automation (DPA)
Both RPA and DPA

Figure 1

Quick Take

The Power of Evolutionary Computation

When experts describe the power of digital, they are often alluding to AI's potential to make decisions based on data as well as humans or better. But life is not a game of Go; nor does the world obey a single set of rules.

Evolutionary computation is a powerful new method for leveraging AI across a distributed network of processors, to apply massive computing power to examine complex, multivariate problems and drive toward optimal solutions. It borrows from principles drawn from genetic evolution and mutation, but accelerates the process of evolution exponentially to solve the most complicated problems and deliver meaningful results.

Evolutionary AI begins by generating candidate "agents" that represent a range of possible inputs, inflections or mutations, then compares them to distinguish which ones are better suited to solving a particular problem. Then it runs millions of generations of parallel algorithmic exploration over a distributed network of CPUs connected via the cloud, vastly accelerating its arrival at an optimal solution.

ML predicts outcomes with a fixed set of variables by modeling solutions based on past performance. Evolutionary computation more nearly approximates the human brain, investigating alternatives based on varying sets of assumptions at a speed and scale unattainable by humans. It moves AI beyond predicting outcomes to generating complex models automatically, solving problems creatively and augmenting decision-making by offering potential new outcomes.

Drive better decisions

DPA can give organizations a deeper view of operations and provide more clarity in resolving complex problems and predicting outcomes. It provides a framework to help organizations create higher value—a decision optimization capability that models different business rules, eliminates latency in determining what path to take and lessens errors in decision-making. This supports the organization's ability to:

- Analyze and correlate historical data, details on the outcomes of earlier decisions and the flow of incoming data from current activities, in order to anticipate future outcomes.
- Adapt to changing situations, such as evaluating contract performance, comparing the relative cost of spot purchases, examining trading and/or hedging decisions, managing supply-chain risk during weather events, or reducing logistics bottlenecks and costs even in an international crisis such as the recent pandemic.
- Gain insight into what is happening in near-real time, discovering the causes of certain outcomes and being able to adjust proactively to evolving circumstances, while eliminating human biases.

In the context of supply chains, for example, DPA ML algorithms could perform scenario modeling on demand, based on inputs about changing conditions. This could lower inventory requirements while reducing unfilled sales and the number of changes to sales orders. DPA could optimize delivery volumes, sales routes and vendor selection, increasing on-time delivery while smoothing disruptions. And DPA could intelligently improve contract pricing, to lessen uncertainty in changing financial conditions and increase profits per contract.

DPA can build rules based on correlations drawn among the conditions present when a set of decisions were made, factoring in their downstream impact. Iterative modeling toward outcomes means that once a path to an outcome is explored, a business can feed process output data continuously back into the DPA engine. Applied on a larger scale, it can generate insights about the outcomes of historical decisions and their results, which human decision-makers can use.

Quick Take

Advancing Decision-Making While Keeping Humans in the Loop

Organizations today are looking to recover from the swiftest, potentially most damaging economic downturn in modern history. But many are using outdated, increasingly fragile models for making decisions in unpredictable circumstances. They can experience a crippling lag between the time data comes into the organization and when it is processed. Decision-making variables are dauntingly complex. And while information must be available, understandable and timely, its sheer volume induces a sort of human overload.

The real cost of decisions can only be addressed by understanding organizational context, leveraging technologies that learn from previous decisions, modeling human behaviors and preferences and decision biases to understand how decisions are made, and applying an institutional framework to create the right heuristics for decision processing. Decision models need to be refreshed. If an organization wants to realize big gains with automation, it needs to examine decisions made in everyday processes and at a strategic level.

DPA should be understood as augmenting human capacity, not replacing it. Not every variable can be modelled or every scenario anticipated. This philosophy should underpin any effort toward decision automation. Every decision is made with some limitations and information deficiencies, and human decision-making remains necessary and desirable. Human ingenuity, our creativity, the sensory perception of what is going on in context and in the culture and DNA of an organization all demand that humans remain in the decision loop, even as automated decision processes help correct or guard against biases that can lead to mistakes or losses.

Use case: Driving better decisions in procurement

When automation efforts are begun, processes are measured by how efficiently they are executed, including whether the tools adopted allow users to complete transactions at an acceptable rate. Businesses can overlook, however, that simply executing a process faster is not the objective. It is more critical that the process delivers a high return and a positive impact.

Consider a global procurement group that spends $5 billion annually and wants to meaningfully reduce that spend. Such a function may employ 100 people or more worldwide to perform processes. Some might talk to customers to complete purchase orders and place them; others use software to complete transactions. Processes may formerly have been manual, though repetitive tasks are now performed by robots and automation, from scanning purchase orders to using optical character recognition (OCR) to assign codes to products.

If the intent of process improvement is to optimize procurement spending by making better decisions in real time, based on prevailing commodities prices or by changing the amounts ordered from different vendors, then the question for managers is how to do it when individual agents cannot process all the data needed to make the best decisions. An automated decision engine can aggregate and analyze spending patterns, identify areas that can be optimized, and achieve measurable gains by tracking and analyzing the complete process.

Benefits of DPA

A business does not have to revamp its RPA and IPA efforts to adopt DPA. Information delivered from automated processes at a lower level is vital to driving the DPA strategy. Bringing DPA online depends on understanding specific needs for decision-making and where it would have the greatest impact—to accelerate and optimize organizational responses.

The following conditions could signal such needs:

- Existing rules or scenarios are used to address certain situations, and they are repeatable.
- A combination of events or environment-related issues occurs repeatedly, and automated rules could augment human decision-making.
- The business encounters scenarios that never happened before and must conceive rules to address them, while leveraging such new rules to address other scenarios with similar characteristics.

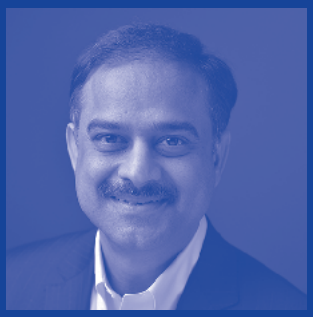
Such conditions suggest asking the following questions:

- In what areas could DPA most benefit managers and supervisors? In managing inventory? The supply chain? Freight management and costing, and ensuring OTD? Adjusting contracts or procurement? Revenue collection?
- Which KPIs correlate to decisions? How could monitoring those KPIs help verify the benefit of DPA? What is the frequency and volume of decisions?
- What applications or systems does the business use to make decisions? Do different departments rely only on certain systems to make decisions?
- What sources of information or knowledge could contribute to better decision-making? What form of collaboration should be enabled?
- Does the business record sets of circumstances and the external conditions of decisions?
- At what points do you create, capture and process automation data?

With answers to these questions and the input of an advisor experienced in implementing DPA, the organization then can create a roadmap to realizing a more agile, accelerated, higher-value decision-making function.

Learn more about DPA by visiting www.cognizant.com/manufacturing-technology-solutions and completing the form at the bottom.

About the author



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About Cognizant

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