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In pursuit of the  
'Self-Driving Supply Chain'

Redefining agility through cognitive automation





# In pursuit of the 'Self-Driving Supply Chain'

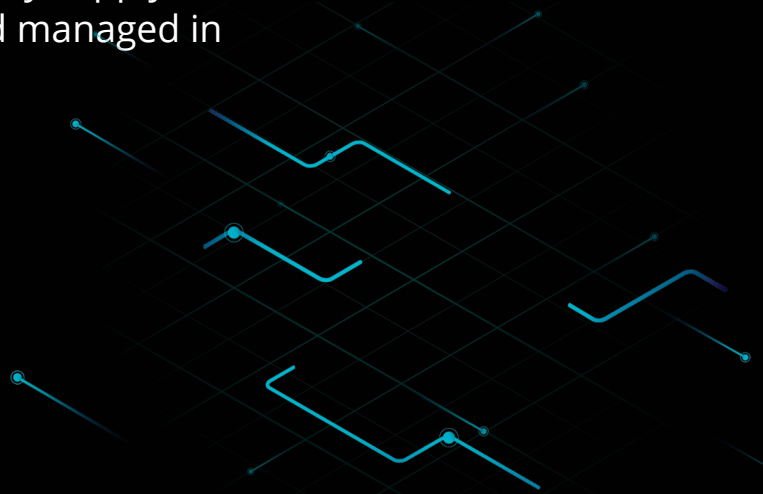
## Redefining agility through cognitive automation

In their path towards more digitized ways of working, many organizations have been on a run for decades towards implementing Enterprise Resource Planning (ERP) and Advanced Planning Systems (APS). Over the last decade however, these organizations have realized that these systems have - next to their merit as systems of records - their flaws: they indeed struggle to completely take away repetitive, labor-intensive tasks and, most importantly, they most often fail to support effective, decision-making.

With that, Industry leaders are now seeking to augment the strengths of their ERP (and the rest of their application landscape) by scaling up solution around task automation (referred as "Robotic Process Automation") and decision automation (referred as "Cognitive Automation").

In particular, we will see in this paper how the shift towards Cognitive Automation capabilities is expected to radically accelerate the transition from "people doing the work supported by machine", to "machine doing the work guided by people".

We will also see that "Cognitive Command Centers" have the potential to transform the way supply chains will be designed, operated and managed in the near future.





## What happens when (supply chain) planning does not match with reality?

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"Any plan won't survive its first encounter with reality. The reality will always be different. It will never be the plan."

— Jeff Bezos

# What happens when (supply chain) planning does not match with reality

As a company's supply chain expands in size and complexity, efficient planning and execution becomes crucial to their success. Disruptions or delays in production or product deliveries need to be detected and resolved quickly to mitigate any negative impact to the business and their customers.

The ability to make timely, accurate decisions related to sourcing and routing of products requires data to be gathered, processed and analyzed. As more data and business rules are added to the process, the cost of managing the information

in a comprehensive, harmonized and action-oriented way drastically increases. As a response to that challenge, organizations are forced to automate their supply chain in order to reduce manual efforts and speed-up the time-to-action.

As companies have massively invested in planning systems and transactional automation ("RPA"), the next step for the best-of-breed supply chain is to start developing new capabilities around automated decision-making, hence pushing the boundary of agility and responsiveness to unprecedented territories.

## Converging to more agile & resilient supply chains

Although companies have massively invested in planning systems over the last decade, recent history has demonstrated the need to shape more agile and resilient supply chains. The emergence of exponential technologies is now making this shift possible

### Major Supply Chain Trends

- € Increased cost pressure
- 🗣️ Rising customer expectations
- 🌐 Omnichannel imperative
- 📈 SKU Proliferation
- ⚠️ Black Swans
- 📊 Acquisitions & Divestitures
- 🌱 Sustainability

### Exponential Technologies

- Data as the "new oil"
- Automation
- Cloud & IoT
- Predictive analytics



Watch our video 'Deloitte and the future of Self-Driving Supply Chains' [here](#).



### Art-of-the-possible

If you look at your supply chain as a "Digital Supply Network", you might think of an almost unlimited number of use cases that could benefit from

Cognitive Automation. Virtually any supply chain process requiring a decision comes in as a candidate for Cognitive Automation.

#### Deloitte's Digital Supply Network framework



### What are Digital Supply Networks?

What separates DSNs from traditional, linear supply chains is the fact that DSNs are dynamic, integrated networks characterized by a continuous flow of information that facilitate automation, improve workflow and analytics, and generate actionable insights. With the ability to ascertain information in real time, many of the latency challenges inherent in linear supply chains can be avoided."

In that context, Deloitte has identified a wide spectrum of tasks and use cases that can be "outsourced" from traditional teams (e.g. customer service agents, planners, transportation specialists,...) to smart agents, responsible to drive:

- End-to-End Supply Chain Visibility
- Demand Forecast Optimization
- Production Yield Optimization
- Supply-and-Demand Balancing
- Smart Procurement
- Capable-to-Promise
- Touchless Order
- Pro-active Logistics Execution
- Dynamic Master Data Management
- Customer Service Assistant

A very simple, yet pragmatic, application is to deploy a smart agent that is responsible to automatically update Supply Chain master data in a dynamic fashion, based on recent measurements and evidences retrieved from the physical world (e.g. master data managed by the agent: replenishment lead-times, target safety stock levels, etc.).

Armed with these capabilities, organizations can more readily evolve their supply chain networks to make fulfillment personal, sourcing seamless, technology invisible, and trust automatic.



# The emergence of "Cognitive Automation"

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"Whatever you are studying right now, if you are not getting up to speed on deep learning, neural networks, etc., you lose. We are going through the process where software will automate software, automation will automate automation."

—Mark Cuban

# The emergence of "Cognitive Automation"

## The power of automation

The power of automation is the ability to reimagine the way organizations do things. Deloitte refers to this as the 'Age of With': a world where humans are aided and augmented by machines.

Now widely adopted across industries and business functions, Robotic Process Automation (usually referred to as "RPA") uses precisely programmed 'bots' to automate specific routine tasks, reducing processing time dramatically and

ensuring greater quality by providing consistent results with negligible errors. In addition, next to RPA, a Deloitte analysis from 2020 highlights that 58% of surveyed executives report they have started to explore the realm of "Cognitive Automation" and to investigate where it could create the most impact on their organization, including the end-to-end supply chain journey.

**58%** 

*of respondents have started their cognitive automation journey*

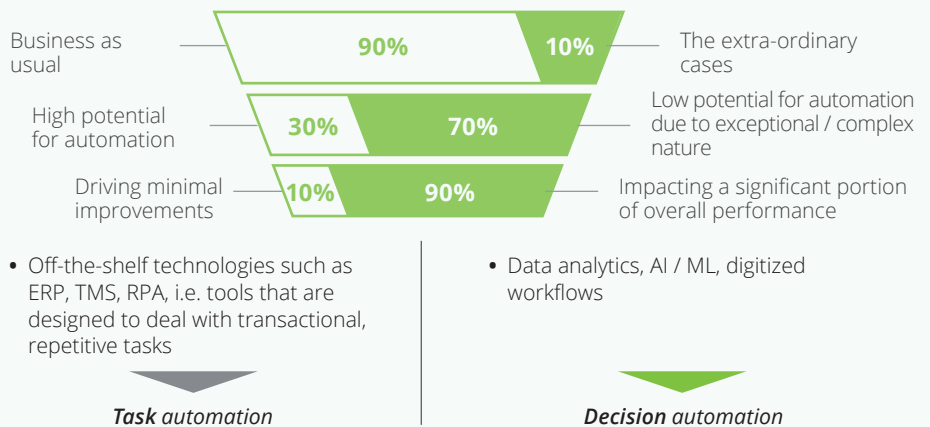
## What separates RPA from CA?

### Transactional complexity

### Amount of effort spent

### Aggregated Supply Chain performance impact

### Typical Technology Enablement



## The rise of cognitive technologies

Advances in technology — including cloud computing, artificial intelligence (AI), the Internet of Things, and robotics — enable highly responsive supply chains that orchestrate continuous collaboration between supply and demand, planning and fulfillment, expectations and customer satisfaction.

As software companies continue to develop systems with expanded data content (crawling both internal

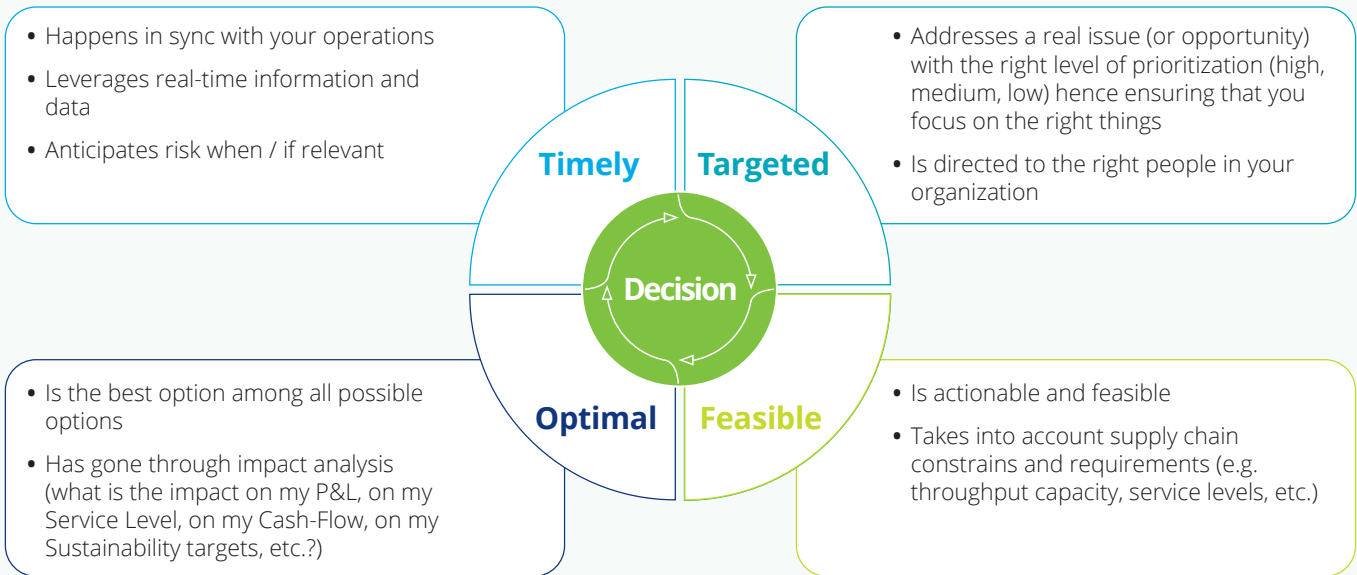
and external data sources) and more mature business models, the prediction of supply chain issues before they occur and automatic execution of corrective action are now becoming a reality. Observations from the field reveal that several Fortune 100 companies, have started to transfer that "cognitive complexity" to machines (or "smart agents") and as such automate and parallelize gigantic parts of their exception management and decision-making processes.

### Automated decision-making and exception management

With massive investments realized in advanced planning systems in the last decade, modern global supply chains can be planned with an increased level of precision. However, unpredictable events and

rising consumer demands require unprecedented efficiency and agility to react to changing network conditions with dynamic decisions. Making the "right" decisions hence often turns out to be more challenging than it should be.

#### What does a "good" decision look like in the "Age of With"?



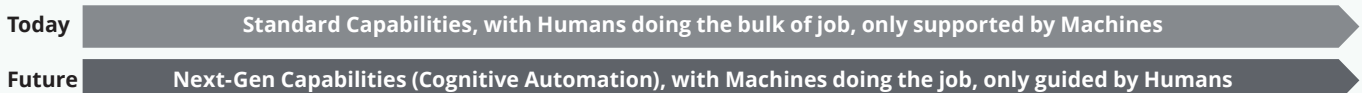
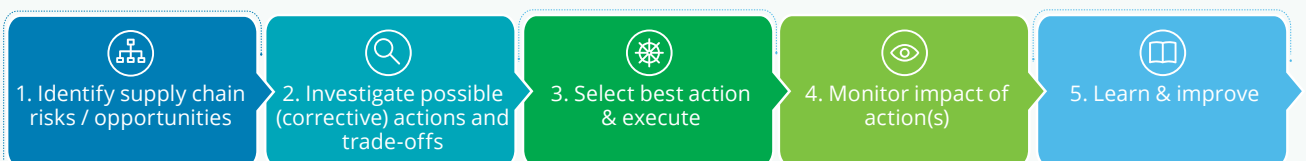
### The future of decision-making

In 5 years from now, Deloitte envisions that the best-equipped supply chains will be the ones which decided to let machines take over the full exception management process and drive

autonomous action-taking, from anomaly detection to trade-off analysis to write-back in operational systems to continuous improvement through self-learning.

#### The 5 steps of decision-making

Cognitive Automation to augment and automate the E2E decision-making process



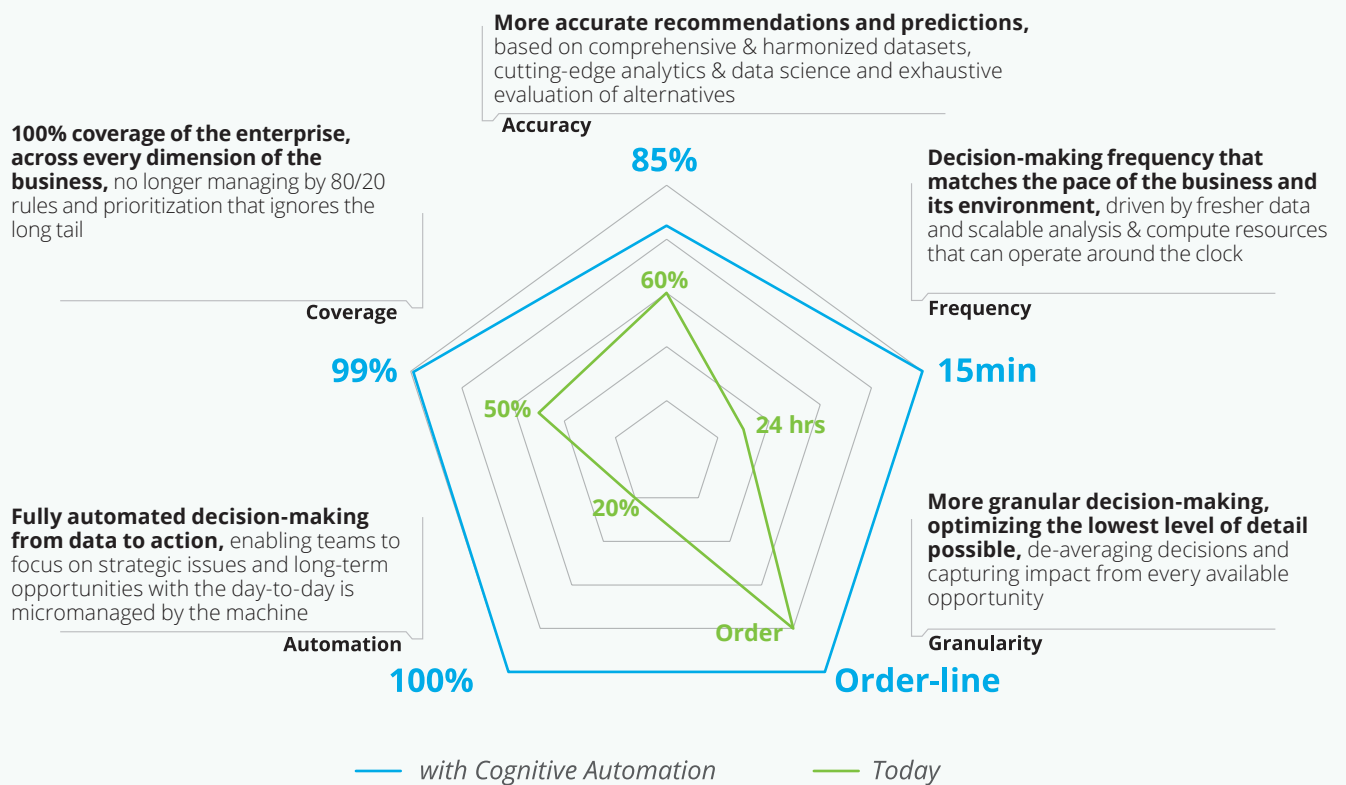


**Machines to do the work, guided by humans**

The strength of Cognitive Automation is to enable applications that go beyond the routine to the innovative: from collecting and processing data to analyzing and making contextual decisions, with machines in the driver's seat while humans monitor decisions and leverage machine-generated insights to steer continuous improvement within the organization.

In practice, Silicon-Valley based scale-up Aera Technology sees Cognitive Automation as taking the old model of people's work being augmented with the help of machines, and turning it into a model where machines do the intensive labor while being guided by people. A transformation that continuously drives improvements across the organization compared to as-is models:

**Process Improvement through Cognitive Enablement**



source: Aera Technology Inc.



# Capturing untapped value across the E2E Supply Chain with Cognitive Automation

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"Agility beats forecasting when the supply chain is stressed, At the end of the day, every dollar we spent on agility has probably got a 10x return on every dollar spent on forecasting or scenario planning."

**—Marc Engel (Unilver Chief Supply Chain Officer)**

# Capturing untapped value across the E2E Supply Chain with Cognitive Automation

## Observations from the field

Typically, companies that have an enterprise-wide strategy around the enablement of Cognitive Automation capabilities report higher returns in terms of workforce capacity, cost reduction and increased revenues. Executives estimated that intelligent automation will provide an average

cost reduction of 22 percent and an increase in revenue of 11 percent over the next three years. However, those organizations which succeed in scaling cognitive automation report that they have already achieved a 27 percent reduction in costs on average from their implementations to date.

**27%** 

*in cost reduction for industry pioneers with scaled-up cognitive automation capabilities*

## Cognitive Automation as Value Driver for your Supply Chain

### Deloitte's Supply Chain Value Map



#### Revenue

##### Value leakage:

Poor Service Level performance leading to lost sales and deteriorated brand image

##### What value can you achieve with Cognitive Automation?

**+ 2 to 3% OTIF uplift**

##### How do you create value with Cognitive Automation? By enabling smart agents capable of doing:

- Stock-out / back-order prevention
- Automated Supply vs. Demand balancing
- Dynamic safety stock definition
- Pro-active logistics orchestration



#### Margin Contribution

##### Value leakage:

High supply chain cost leading to thin margin and / or reduction of competitive edge

##### What value can you achieve with Cognitive Automation?

**- 5 to 10% Inventory Carrying Cost**  
**- 2 to 5% in Transportation Cost**

##### How do you create value with Cognitive Automation? By enabling smart agents capable of doing:

- Excess inventory elimination
- Smart sourcing
- Automated PO coverage



#### Asset Efficiency

##### Value leakage:

Low asset utilization and sub-optimal process throughput leading to high capital and payroll cost

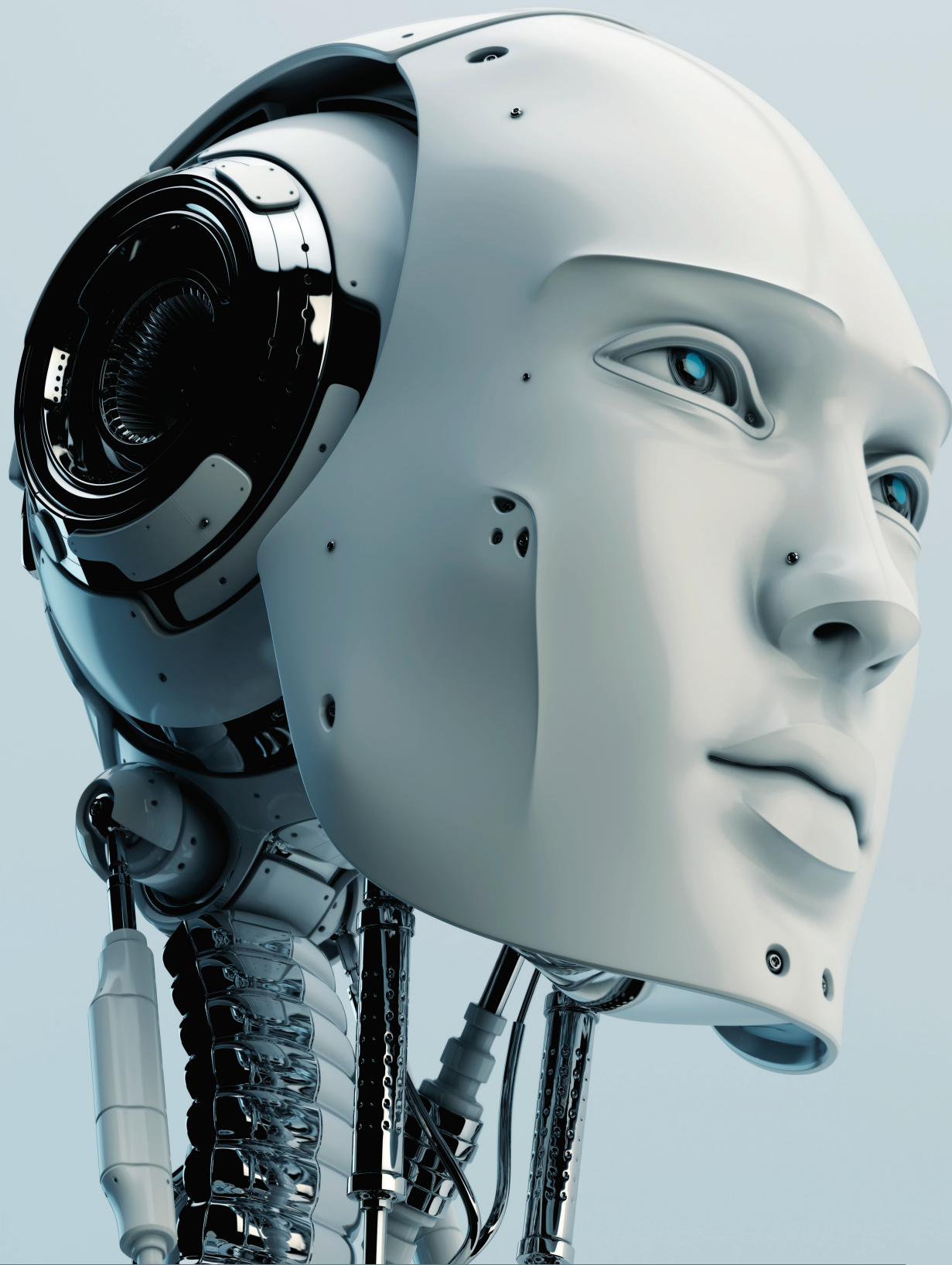
##### What value can you achieve with Cognitive Automation?

**+ 10 to 20% Workforce Efficiencies**  
**- 5 to 10% in Working Capital**

##### How do you create value with Cognitive Automation? By enabling smart agents capable of doing:

- Process automation
- Excess inventory elimination
- Production yield optimization

source: Deloitte analysis 2019-2021



## The rise of "Cognitive Command Centers"

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"A Cognitive Command Center is an end-to-end orchestration capability that holds the keys to true Agility in Digital Supply Networks, and well-beyond across an ecosystem of enterprises."

—Kevin Overdulve,  
Logistics & Distribution co-Lead for EMEA (Deloitte)

# The rise of "Cognitive Command Centers"

## The next generation of "Control Towers"

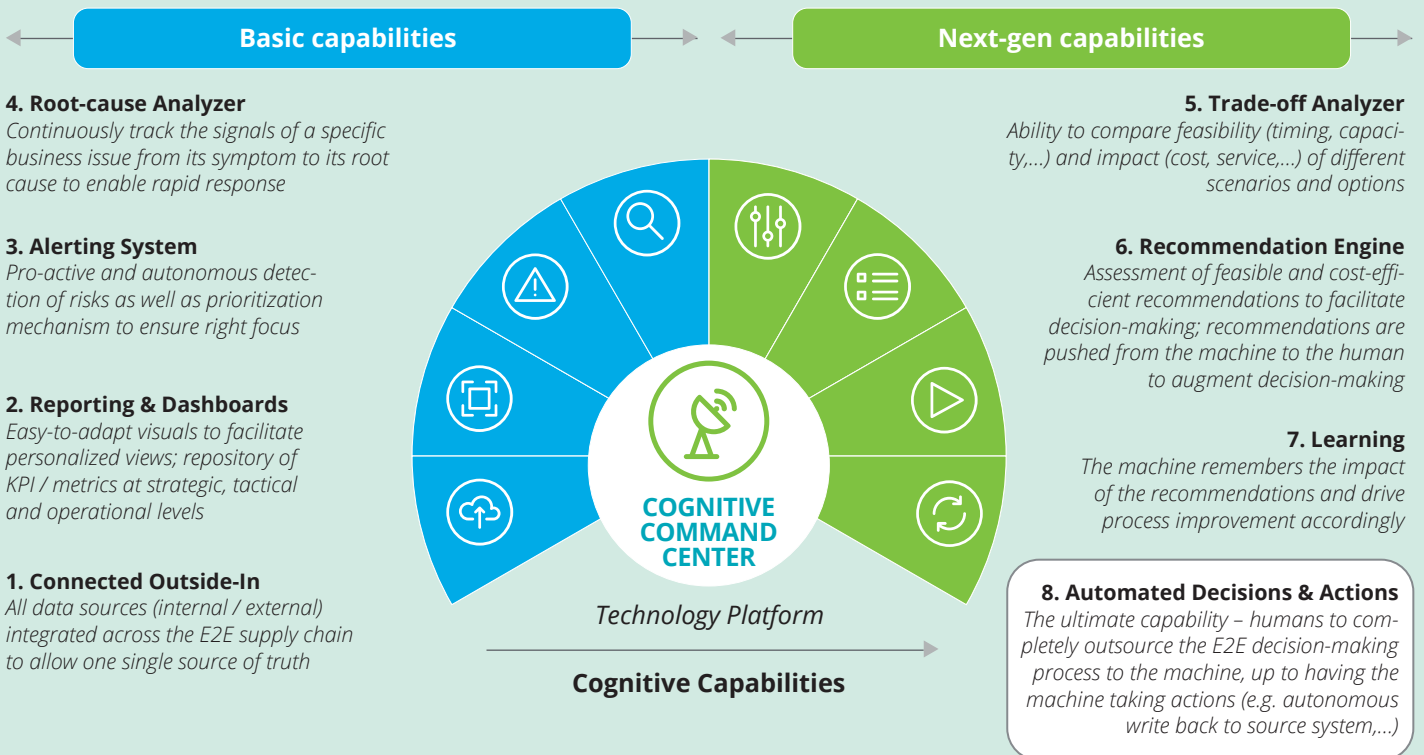
In today's world, we have seen that it is expected from organizations to develop capabilities that go far beyond traditional reporting & dashboard capabilities – in that sense, the emergence of exponential technologies (e.g. Cloud, AI, ...) has paved the way to a new type of Control Towers: the "Cognitive Command Centers". These Command Centers distinguish themselves from more traditional Control Towers by their ability to sense **and** respond to supply chain events in a pro-active, cost-efficient and a data-driven way enabling supply chain to act autonomously.

From visibility into key components of the supply chain (e.g. OTIF, Forecast Accuracy, Inventory levels, Production Scheduling Adherence, ...) to near real time decision points down to SKU level. Examples include:

- Shall I produce less / more in week X in order to cover for a spike of demand?
- Shall I redeploy inventory from one location to the other to fulfill demand in country Y?
- What part of my inventory is Slow Moving and Obsolete (SLOB) and what can I do about it?
- What shipments face a risk of being delayed?
- How can I optimize my spend?
- Etc.

## Cognitive Command Center: Next-Gen Capabilities

Developing a CCC capability allows organizations to cover a wide spectrum of use cases, from bringing visibility into key components of the E2E supply chain, to augmenting and automated sophisticated processes



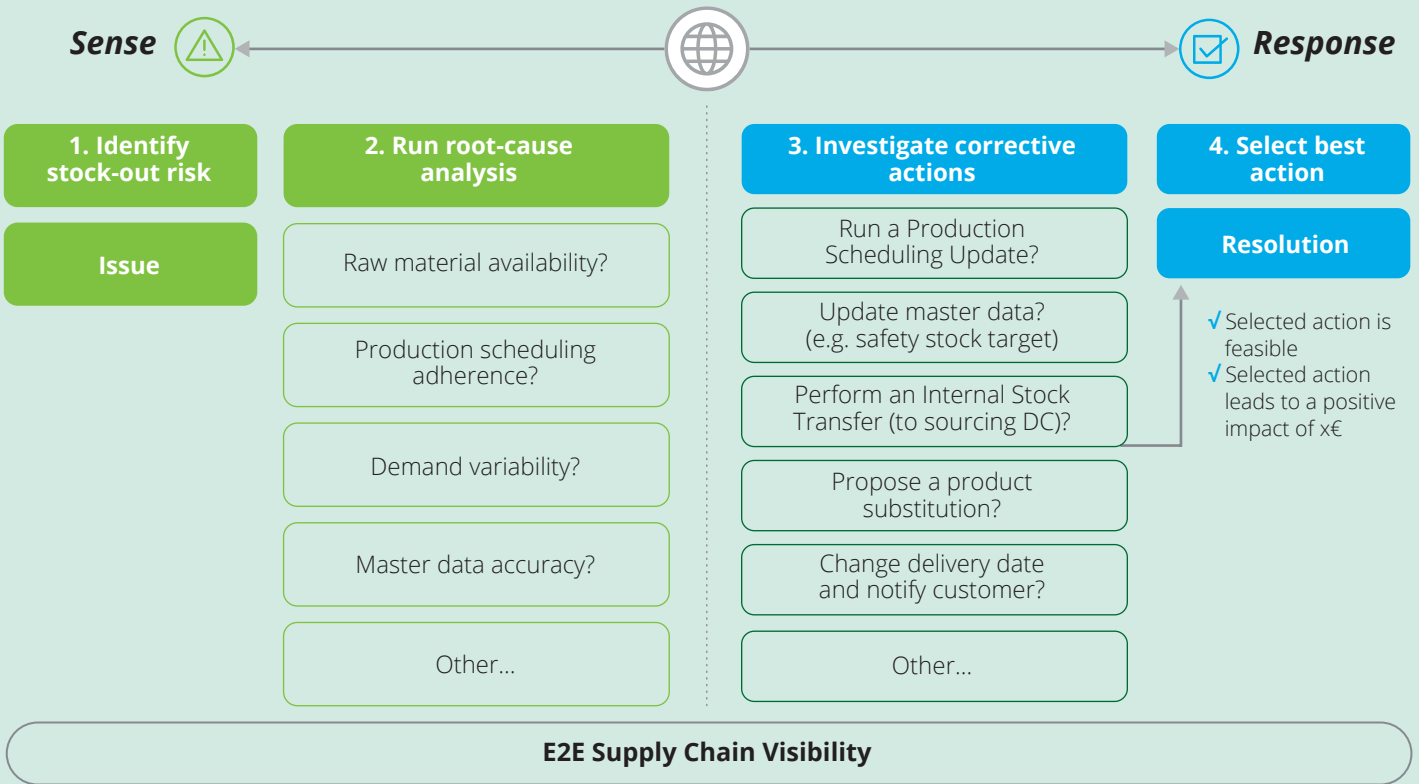
**Preventive stock-out management**

Taking the example of a customer-centric supply chain that is looking at maximizing service level, more and more organization decide to invest in capabilities allowing them to managing stock-out risk in more proactive and cost-efficient ways. Serving as a cross-functional brain, such a command center helps stakeholders across the value chain to:

- **Step 1:** identify a risk (in this case a "stock-out risk") in a pro-active fashion (i.e. before it materializes); a mix of deterministic and machine-learning models have proven to be extremely accurate at this task.
- **Step 2:** understand the risk's root-cause, e.g. raw materials availability, supply and demand variability, master data accuracy, etc.
- **Step 3:** investigate possible resolutions, e.g. production scheduling update, stock transfer, product substitution, change requested delivery date, etc.
- **Step 4:** select the best possible corrective action and execute.

**An example of smart agent plugged into your Command Center**

A preventive stock-out agent powered by Cognitive Automation



**?** Why have so many traditional Control Tower projects failed?

- **Not action-oriented**  
A Command Center however is all about (automated) decision-making and action-taking
- **Not value-driven**  
A Command Center however links any corrective action back to a certain (monetary or service) impact
- **Too big too soon**  
A Command Center however relies on smart agents that address a specific business issue - it scales at pace with the operations and business reality



## Technology is (not) the (only) enabler

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"The first rule of any technology used in a business is that automation applied to an efficient operation will magnify the efficiency. The second is that automation applied to an inefficient operation will magnify the inefficiency."

—**Bill Gates**

# Technology is (not) the (only) enabler

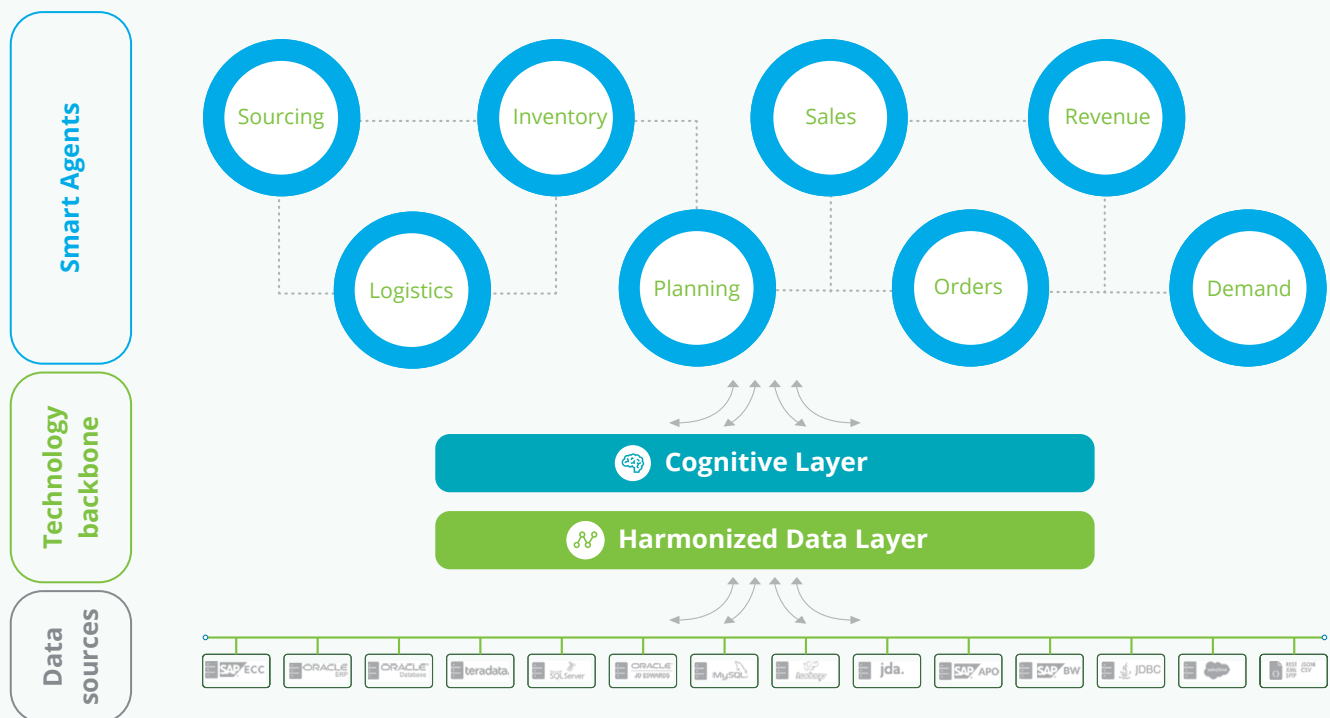
## Technology at the core

From a technology stand-point, a Cognitive Command Center platform must observe the following design principles as part of its technology stack:

- **Connected inside-out:** your command center platform is able to connect to any internal systems (ERP, APS, EMS, WMS, TMS, CRM, etc.) through optimized data connectors as well as to external sources (external database, rest APIs, etc.); the most advanced platforms then allows for (semi-) automated data harmonization, indexing and modeling.
- **Always-on:** your platform is able to adapt to the pace of your business, allowing for real-time data feeds when relevant and applicable.
- **Action-oriented:** your platform is capable to turn data into insights, then insights into actions. The most advanced platforms are also capable of linking these actions to actual business value (e.g. monetary impact, service level impact, etc.).
- **Intelligent:** your platform is capable to deal with complex use cases, and hence embeds advanced analytics and cognitive capabilities allowing to deploy machine learning algorithms, decision trees and altering systems at scale.

## The Cognitive Automation Stack

The Data layer is augmented by a "Cognitive Layer" that fuels "Smart Agents" doing the work across the E2E supply chain



Source: Aera Technology Inc.

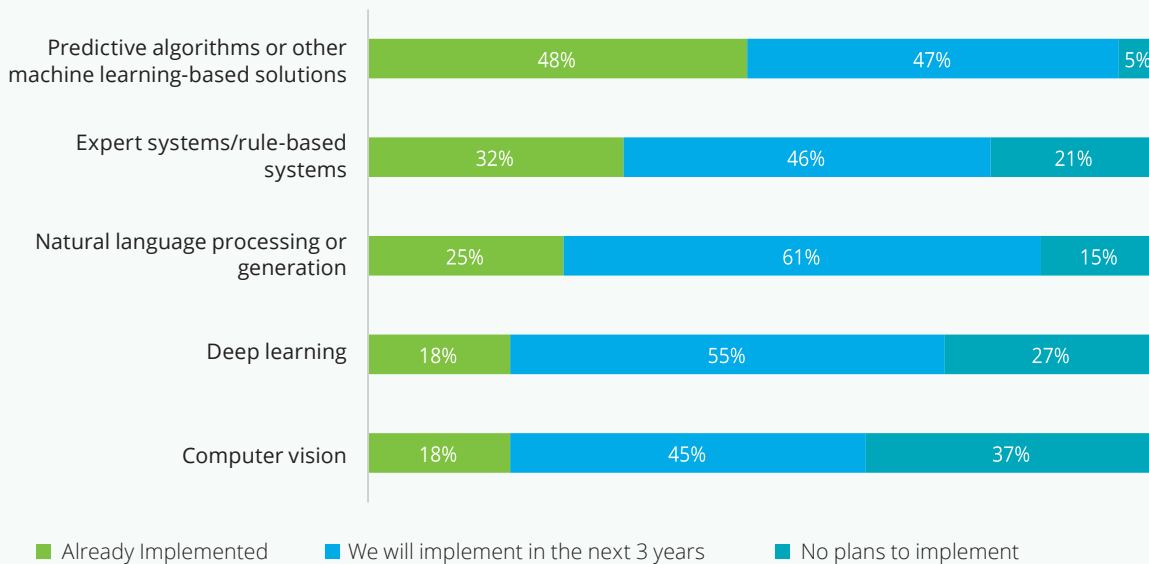


### Intelligence on steroids !

We have seen that Cognitive Automation relies on intelligent models to identify risks and opportunities, and drive decision-making to the best outcome. These technologies are usually based on predictive algorithms or machine learning-based solutions, expert or rule-based systems and natural

language processing or generation (NLP/NLG). Deloitte expects this will change, with deep-learning in particular becoming more prominent. Research shows that 18% of respondents have already implemented deep-learning capabilities and 55% are planning to do so.

### The adoption of advanced technologies to advance in the Cognitive Automation space



source: Deloitte analysis 2019-2021

Our studies, however, reveal that the major challenge of the adoption of Cognitive Automation capabilities is not directly linked to the technology itself. In reality, it turns out that the identification of appropriate use cases comes across as the most significant barrier to implementation. Deloitte's experience in the field has taught that an "appropriate" use case shall comply with the following imperatives:

- The use case is driven by a clear, recurring business issue or challenge.
- The use case is linked to a clear-cut opportunity cost or the leakage of enterprise value.
- The use case is feasible and fits into your application landscape.
- The use case is scalable to other parts of your business.

"In some cases, using a Machine Learning model will drastically outperform traditional business rules and provide a more accurate, and more future-looking output to Supply Chain Managers"

### Define new Target Operating Models

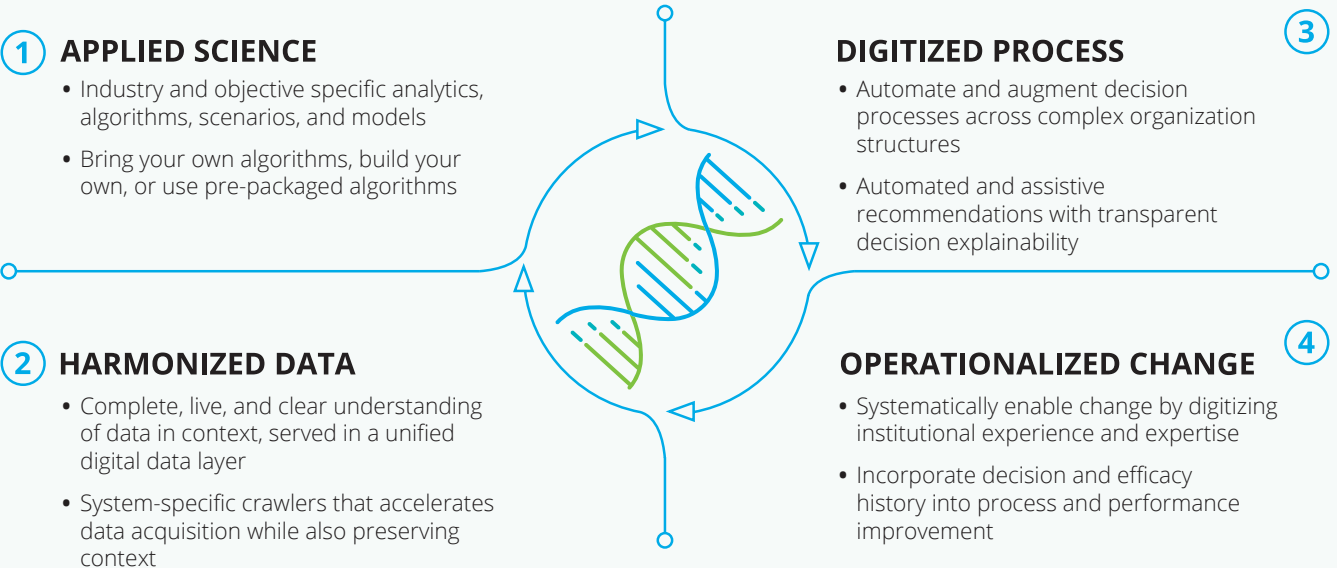
The increasing power and capability of machines will ultimately transform work and change the requirements for skills and roles that shipping and transportation providers seek. Executives will likely find themselves deciding aspects of the work that need to be automated and those that should remain innately human. They should redesign processes, roles and teams to leverage the best of technology and the worker. And as companies prepare for the future, talent models and skill sets should evolve to address the accelerating integration of technology in the workplace. At Deloitte, we call this "The Future of Work".

Re-skilling based on how the human workforce will interact with machines, including changes to role definitions, should be baked into organizations' plans for cognitive automation adoption in order to capture the expected value creation.

Still looking beyond technology, Silicon-Valley based scale-up Aera Technology complements the Deloitte vision by introducing "the 4 pillars of Cognitive Automation". Aera Technology prescribes that companies need to have these pillars in place in order to guarantee a successful transformation journey towards the Self-Driving Supply Chain,

### The 4 dimensions of a successful Cognitive Automation use case implementation

Reimagining the roles of humans and machines in The Future of Work



source: Aera Technology Inc.

# Getting Started

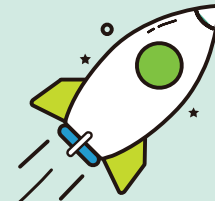
Following its "Think Big, Start Small, Scale Fast" motto, Deloitte is there to accompany its clients in their Cognitive Automation Journey. Deloitte capitalizes on its cross-functional expertise to advise on strategy definition, technology selection and organizational change.

## If you are at the start of your cognitive automation journey, Deloitte can:

- Advise on where to start (leveraging our Deloitte Enterprise Value approach) and identify which use case(s) to begin with, depending on your industry challenges, your top-line ambitions and your bottom-line targets;
- Advise on the development of a cognitive automation roadmap as part of your broader "SC Digital Strategy for 2025";
- Advise on the right technology to use;
- Support you in the development of pilot / prototype, and help you evaluate and track the resulting benefits.

## If you already started to develop cognitive capabilities and want to scale, Deloitte can:

- Help you scale-up the capability internally (at the right cost);
- Help you define the future Target Operating Model around the newly developed cognitive capabilities;
- Advise on how to embed the change in your organization ("make it stick").



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