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BIG IDEA

Cognitive Apps Help Drive the Future of Autonomous Enterprises

Why Every Enterprise Will Design for Self-Driving, Self-Learning, Self-Healing Sentience

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EXECUTIVE SUMMARY

Traditional transactional applications have run their course. The pressure to reduce margins, technical debt and investment in core systems creates tremendous incentives for the automated enterprise. Customers seek cognitive-based approaches in order to build the true foundation for automation and artificial intelligence–driven precision decisions. The benefits include less staffing, reduced errors, smarter decisions and security at scale. The quest for an autonomous enterprise starts with a desire to consider what decisions require intelligent automation versus human judgment.

Vendors from multiple fronts intend to deliver on this promise. Legacy enterprise resource planning providers, cloud vendors, business process management solutions, robotic process automation products, process-mining vendors and IT services firms with software solutions attempt to compete with pure-play vendors for both mindshare and market dominance in this market, which Constellation Research expects to hit $10.35 billion by 2030.

Constellation recommends that clients determine their business objectives before considering software solutions in this space. Buyers should expect to invest time in training these systems in order to reap both the benefits of augmenting machines with humanity and augmenting humans with machines. Successful deployments will gain an exponential advantage on competitors over time as data-driven digital networks will dominate value chains.

Business Themes

- New C-Suite
- Digital Marketing & Sales Effectiveness
- Matrix Commerce
- Technology Optimization
- Data to Decisions
- Future of Work
- Next-Generation Customer Experience
- Digital Safety and Privacy

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ORGANIZATIONS DEMAND INTELLIGENT AUTOMATION OF PROCESSES AND PRECISION DECISIONS

Almost all organizations have sought the ability to intelligently automate their processes as part of critical operational efficiency initiatives. From campaign to lead, order to cash, procure to pay, incident to resolution and hire to retire, no department is immune and no business process is exempt. While these efforts to automate often start with cost savings, they can evolve into something more. The advent of artificial intelligence (AI) components such as natural language processing, computer vision, machine learning (ML) and neural networks present opportunities to instrument fully autonomous capabilities that have strategic and long-ranging impacts. Seven forces drive the quest for autonomous capabilities in the enterprise:

1. Post-Pandemic Priorities Emphasize Agility and Business Continuity

The proliferation of business disruption and disruptive business models have shifted boardroom and organizational priorities for enterprises and brands. Organizations expect to increase their investment in agility and business continuity. They no longer seek to expand investments in legacy technologies and systems that do not support increased agility or business continuity. Key investment themes include self-driving, self-learning and self-healing systems. While the long-term goal is sentience, the short-term capabilities enable redundancy at scale as well as rapid development, testing, deployment, upgrades and refreshes.

2. EBITDA Pressures Drive the Autonomous Decade

The ongoing battle to address short-term, quarter-to-quarter profitability and the scarcity of top talent gives companies an incentive to invest in automation to augment the labor force. The good news: Enterprises have the technology to automate business processes at an unimaginable scale. Thus, every organizational leader must determine when to trust the judgment of a machine, augment a machine with a human, augment a human with a machine and trust human ingenuity (see Figure 1). In this autonomous future, machines will deliver services that are continuous, auto-compliant, self-driving, self-healing, self-learning and self-aware. Access to larger data sets and more engagements to refine algorithms will be needed to ensure precision decisions and ever-higher confidence levels.

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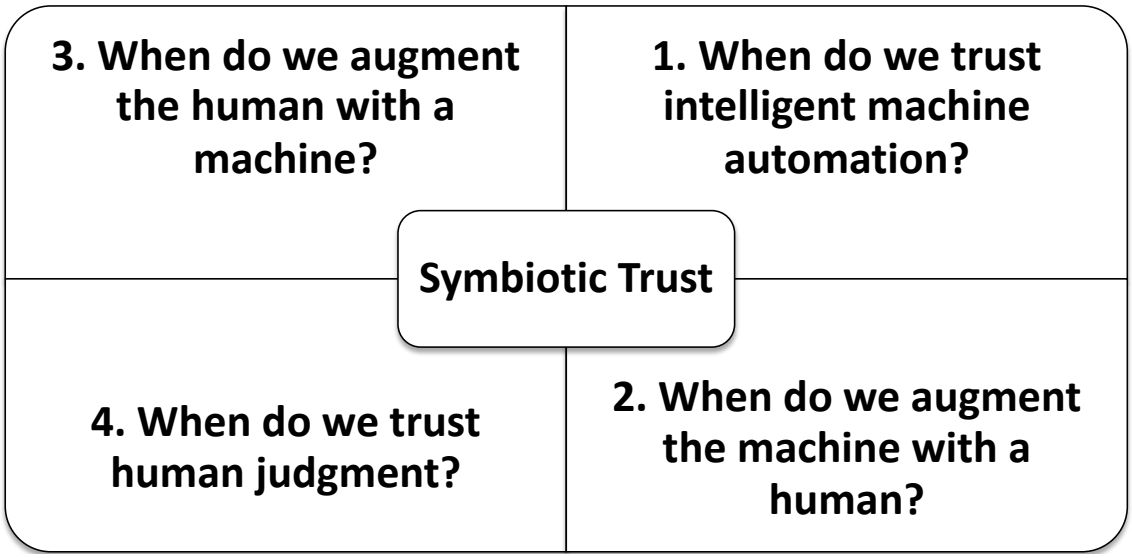
Figure 1. The Four Most Important Questions in the Autonomous Decade



Source: Constellation Research

3. Declining Population Dynamics and Rising Labor Costs Lead the Automation Push

Many industrialized countries face a declining population dynamic. Japan faces a population decline of 16% from 127 million in 2014 to 107 million by 2040. Europe is projected to have 0.3% to 0.5% negative growth by 2040.[1] Furthermore, aging populations, declining birth rates and minimal immigration create systemic declines that hamper productivity gains, reduce the labor force and erode any economies of scale. Meanwhile, rising labor costs and regulations drive up labor inflation for both services and manufacturing. Leaders seek ways to drive down labor costs from recruiting, reskilling, retraining and—especially—replacement with automation.

4. Risk Mitigation and Compliance Move Leaders to AI-Based Solutions

Leaders seek efforts to mitigate compliance risk and reduce errors through the automation of manual tasks. With more than 70% of employee time focused on manual and repetitive tasks, many seek relief from the mundane. Manual entry and labor for transactional systems lead to higher risk of errors. Today's volume of transactions and the downstream implications of improperly entered data, bad data and late data create exponential issues in human-led errors that must be addressed.

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Consequently, every enterprise must automate at an unprecedented scale. One compliance fine or privacy breach caused by human error could lead to hundreds of millions to billions of dollars in losses.

5. Automation and AI Enable a Future of Precision Decisions

Successful AI projects seek a spectrum of outcomes. Automation and training models will improve with more data and more interactions. The disruptive nature of AI comes from the speed, precision and capacity of augmenting humanity and achieving autonomous enterprise status. Seven AI outcomes show the progression from perception to sentience on the spectrum (see Figure 2):

1. **Perception describes what's happening now.** The first set of outcomes describes surroundings as manually programmed. Perception provides a first-level report of activity.

2. **Notification tells you what you asked to know.** Notifications through alerts, workflows, reminders and other signals help deliver additional information through manual input and learning.

3. **Suggestion recommends action.** Suggestions build on past behaviors and modify over time based on weighted attributes, decision management and ML.

4. **Automation repeats what you always want.** Automation enables leverage as ML matures over time and tuning.

5. **Prediction informs you about what to expect.** Prediction starts to build on deep learning and neural networks to anticipate and test for behaviors.

6. **Prevention helps you avoid bad outcomes.** Prevention applies cognitive reckoning to identify potential threats and to augment human judgment.

7. **Situational awareness tells you what you need to know right now.** Situational awareness comes close to mimicking human capabilities in decision-making.

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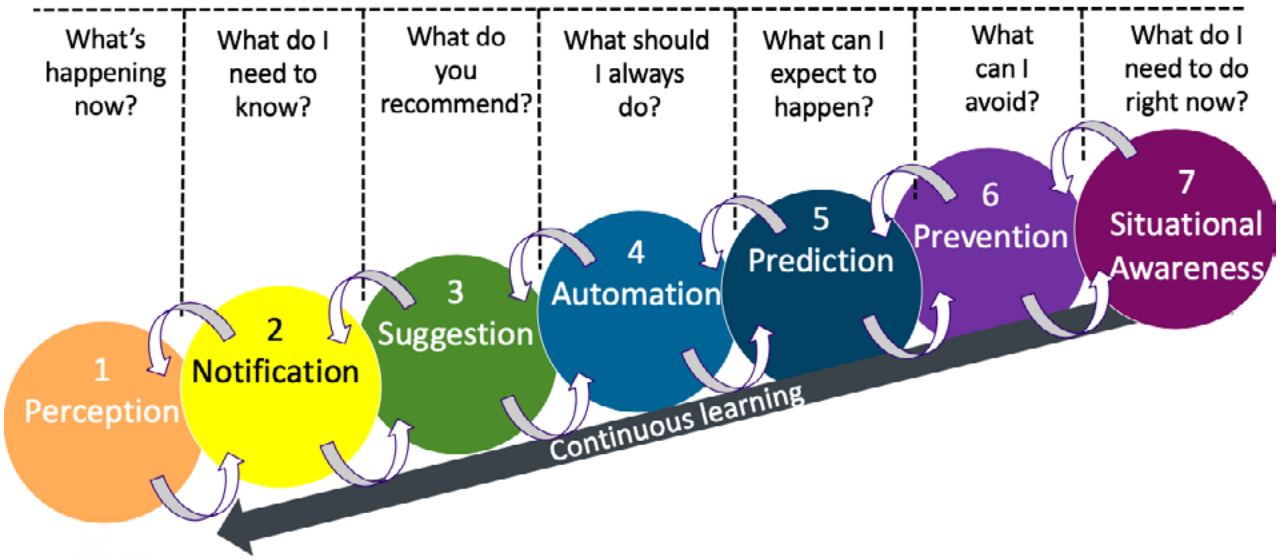
Figure 2. Spectrum of Seven Outcomes for AI



Source: Constellation Research

6. Autonomous Enterprises Combat Deepfakes and Deliver Cybersecurity at Scale

In this world of relativism and enhanced technologies, humans can no longer discern authenticity. The blurred line between reality and fiction creates issues that can cause riots, incite violence, sway public opinion and bilk others of value. The need for authenticity still remains, and those individuals, brands and enterprises that can deliver authenticity will win trust and significant business. AI and automation must quickly identify, notify, respond to and eradicate deepfakes and prevent them from intruding on existing systems. With an increasing number of systems networked to outside systems, customers can expect the greater attack surface to spawn high volumes of denial-of-service attacks, phishing scams, fake invoices and usage of stolen identities. Autonomous systems will effectively combat these at scale.

7. AI Preserves and Shares Institutional Knowledge

Despite massive efforts to grow and train talent, foster innovation and create institutional knowledge, regressive factors such as high turnover, agile project methodologies, mergers and acquisitions, and short-term thinking challenge the ability to retain and share institutional knowledge. Without easy

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and simple approaches, organizations quickly forget, facing a degradation of knowledge with each departure and each organizational restructuring. Autonomous enterprises capture the informal and people-centric institutional knowledge from processes, leading best practices on decisions and nuance in decision-making. This enables consistent planning, shared urban and institutional knowledge, and a permanent and living memory that can be called upon at any time.

MARKET DESCRIPTION

Market Definition

Cognitive applications run mission-critical business systems in a continuous, self-driving, self-learning, auto-compliant, self-securing and self-healing approach. These AI-driven systems intelligently automate transactional systems and processes such as campaign to lead, order to cash, procure to pay, incident to resolution, concept to market, and hire to retire. The goal of an autonomous enterprise is to continuously automate precision decisions at scale.

Market Trends

A convergence of solutions from robotic process automation, process mining, business process management (BPM), intelligent workflow, journey orchestration and microservices management attempt to address the growing need to automate and apply AI to enterprisewide capabilities. However, a new class of best-of-breed applications has emerged to address the market deficit. Constellation predicts that the total market for this autonomous enterprise market, including cognitive applications, will reach $10.35 billion by 2030.

Constellation sees the following trends emerging as enterprises approach cognitive automation:

- **Apply a design thinking approach to your future state.** Early adopters invest in upfront planning sessions. Sessions address the business goals through the lens of each stakeholder. Leaders take time to redesign outcomes and experiences with the goal of identifying new efficiencies or opportunities to improve quality of service. Future states are created imagining a spectrum of automation.

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- **Take lessons learned from business process outsourcing (BPO).** Solicit input from existing BPO providers for opportunities to optimize manual processes. Engage BPO operations to design future state processes with automation in mind. Map and instrument existing BPO capabilities to software-driven approaches.

- **Design for infinite ambient orchestration.** Enable headless intention-driven microservices in an event-driven architecture. Provide data sources to support contextual decisions to support next best action. Orchestrate across data, processes, systems and networks.

- **Identify areas for human-machine interaction.** Improving precision decisions in the cognitive app will require pairing with humans to understand why exceptions are made and what nuances may be factored in decisions. Conversely, humans will want to understand how the cognitive app provides contextual decisions and identify any potential errors. This paired training is key to long-term trust of the cognitive app and preserves human intuition.

- **Build for a future of data-driven digital networks.** Cognitive apps will be connected to larger data-driven digital networks to further improve precision. These data-driven digital networks will power the world's decision engines. As these systems ingest external data sources, self-securing and self-healing capabilities gain in importance in order to preserve the integrity of the existing system.

IMPORTANCE TO BUYERS

Buyer Challenges

Enterprises seeking cognitive applications face significant challenges in identifying a solution within their existing transactional systems for automation. Whether the topic is enterprise resource planning (ERP), customer relationship management or supply chain management, most buyers must make a strategic decision to augment existing transactional systems with a best-of-breed cognitive app solution. Why? Most existing transactional solution vendors have not made the required investment to enable self-driving apps.

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Selection Criteria

Constellation sees the following capabilities as part of the future of “cognitive apps”:

- Baseline ingestion at scale
- Model creation
- Skills and model workbenches
- Algorithmic libraries
- Machine learning libraries
- Neural nets
- Journey orchestration
- Human-machine training models
- Next best action, contextual recommendations
- AI ethics frameworks
- Business context

VENDOR LANDSCAPE

Differentiation

A convergence of solutions from robotic process automation, process mining, BPM, intelligent workflow, journey orchestration, and microservices (API) management attempt to address the growing need to automate and apply artificial intelligence to enterprisewide capabilities. The quest to deliver autonomous enterprises comes from pure-play cognitive app startups, existing transactional software players, professional services companies and software automation offerings.

Vendors & Offerings

At this early stage in the market, Constellation sees the following vendors providing cognitive apps that can lead to an autonomous enterprise.

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Aera Technology

Aera Technology is led by a group of enterprise software industry veterans and is based in Mountain View, California. In 2017, it pioneered the concept of the "self-driving enterprise." In June 2019, Aera received an $80 million Series C financing round led by DFJ Growth. The company has received $170 million in funding to date.

Aera uses proprietary data crawling, industry models, ML and AI to understand how businesses work, make real-time recommendations, predict business outcomes and take actions autonomously by writing instructions back into legacy transactional systems.

Early Fortune 100 customers such as Merck, Unilever, Johnson & Johnson and Reckitt Benckiser have adopted Aera's vision and created and automated self-driving supply-chain processes across multiple use cases ranging from demand forecasting to inventory management, control tower, logistics, procurement and revenue management.

Aera recently released its new software-as-a-service platform—the Aera Cognitive Operating System—which includes a new data modeling engine and data science capabilities and allows its customers to deploy Aera's prepackaged skills or build their own skills in order to drive autonomous decisions in real time and at scale.

Auditoria.AI

Silicon Valley's Auditoria.AI is one of the early pioneers in self-driving applications. The Auditoria platform provides self-driving financial back-office software. Auditoria helps customers in the $11 billion cloud ERP market become autonomous enterprises. Early adopters include customers from Oracle, NetSuite, Sage Intacct and Workday. The team includes many enterprise software veterans, and Neotribe and Engineering Capital have been the early venture capital investors.

Key business problems focus on resolving friction and the lack of visibility, accelerating key financial insights, reducing labor costs, eliminating task repetition and mitigating risk in financial audit readiness. Auditoria provides the SmartFlow platform, which provides the underlying technology of streamlined

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task automation, recommendation analytics, built-in natural language processing, natural language generation, optical character recognition, AI/ML for predictive analytics and integration adapters to enterprise apps and systems.

The Auditoria SmartFlow Skills provide application modules in areas such as procure to pay, order to cash, and record to report. Some examples include vendor onboarding/activation, vendor W-9 data refresh, vendor payment inquiry, invoice accruals, three-way matching, missing purchase order follow-up, dunning/customer collections, cash-flow forecasting and customer remittance forecast.

Celonis SE

Founded in 2011, Munich-based Celonis SE is a leader in enterprise performance acceleration. By applying process-mining technology, Celonis helps organizations remove operational friction and become a "superfluid enterprise." Customers such as Siemens, L'Oréal, Uber, Citi, Airbus and Vodafone use Celonis technology to guide action and drive change, turning business processes into extraordinary experiences and significant dollars saved. Celonis has 800 employees and has raised over $370 million in funding.

As creator and market leader in the process-mining category, Celonis uses process mining to deliver cognitive applications. Celonis works with more than 500 customers to deliver on Level 2 and Level 3 of the autonomous enterprise. In Level 2, Celonis analyzes the full context of all outcomes, decisions and deviations in all previous process journeys. Celonis Action Engine applies business rules and looks for process issues in a real time and engages with a person to help avoid downstream issues. Celonis Action Engine acts as an intelligent agent to help guide each individual process journey to a better outcome. An example of this would be alerting a customer service specialist that an order is likely to not be delivered on time unless it is expedited or shipped via a different route so the team can take action to improve the customer's experience.

As enterprises mature into Level 3, Celonis offers a ML capability that processes high volumes of data through prebuilt or custom-built predictive models and provides recommendations for next best actions for each step in the process. These next best actions can be either human-assisted actions or performed entirely by machine through Celonis workflow automation. Celonis has a road map

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for future products that will act as a completely new cognitive layer on top of existing operational systems (Level 3–4), allowing companies to achieve autonomous enterprise capabilities without ripping, replacing or even upgrading legacy systems.

Infosys Live Enterprise Suite

The global IT services giant, based out of Bengaluru, India, delivers cognitive apps through its flagship Live Enterprise Suite. The live enterprise suite delivers a continuously evolving, learning and innovative software platform for business. Principles of the live enterprise include reimagining experiences, reimagining business processes, assimilating AI, building a digital infrastructure, building a smart workplace, nurturing a smart workforce, enabling fluid operating models and driving organizational change.

The Infosys Live Enterprise Suite builds on six layers: interact, process, serve, intelligence, system of record and shared digital infrastructure. Many cognitive app components include sentient process, the Infosys Microservices Acceleration (MSA) platform, Infosys Digital Brain Solution, Infosys Knowledge Graph, Conversational AI, and Text and Video Analytics.

Early adopters seek the Infosys Live Enterprise Suite for continuously curating organizational knowledge and intelligence, delivering better visibility and insights by mapping information across organizational silos, and using the Knowledge Graph to deliver new contextual insights to users. Hyperpersonalized and cognitive user experiences can capture behavior and workforce sentiment using the Experience Configurator.

RECOMMENDATIONS

Early adopters have prioritized business processes using the Constellation business hierarchy of needs. Align candidates to the five categories of regulatory compliance, operational efficiency, revenue growth, strategic differentiation and brand. Keep in mind that AI enablement requires a strong data strategy, deep data governance, mature business process optimization and a data-driven design point.

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Know When to Automate

Seven factors play a significant role in identifying which AI-driven smart services deliver the greatest opportunities (see Figure 3). Constellation sees the following:

1. **Repetitiveness.** The greater the frequency that a process is repeated, the more likely the process should be AI-powered. One-offs and custom processes with minimal repetition are lower-priority candidates for AI.

2. **Volume.** When the volume of transactions and interactions exceed human capacity, the smart service should be AI-powered. Volumes within human capacity will remain human-powered.

3. **Time to complete.** High time-to-market requirements favor AI-powered approaches. Lower time-to-completion requirements will remain human-powered.

4. **Nodes of interaction.** Simple interaction nodes will lean toward the human-powered option. AI serves best in complex and high-volume nodes of interaction.

5. **Complexity.** Good candidates for AI-powered uses include complexity beyond human comprehension and simple tasks that can be optimized by AI.

6. **Creativity.** Today, the cognitive processes required for creativity mostly reside with humans, while higher creative powers are less likely to be AI-powered. However, with advancements in cognitive learning, one can expect creativity to improve with AI-powered approaches over the next decade.

7. **Physical presence.** Processes that require a heavy physical presence will most likely require human-powered capabilities. However, processes that put lives in jeopardy serve as great candidates for automated, AI-powered options. In general, low physical presence requirements play well to AI-powered approaches.

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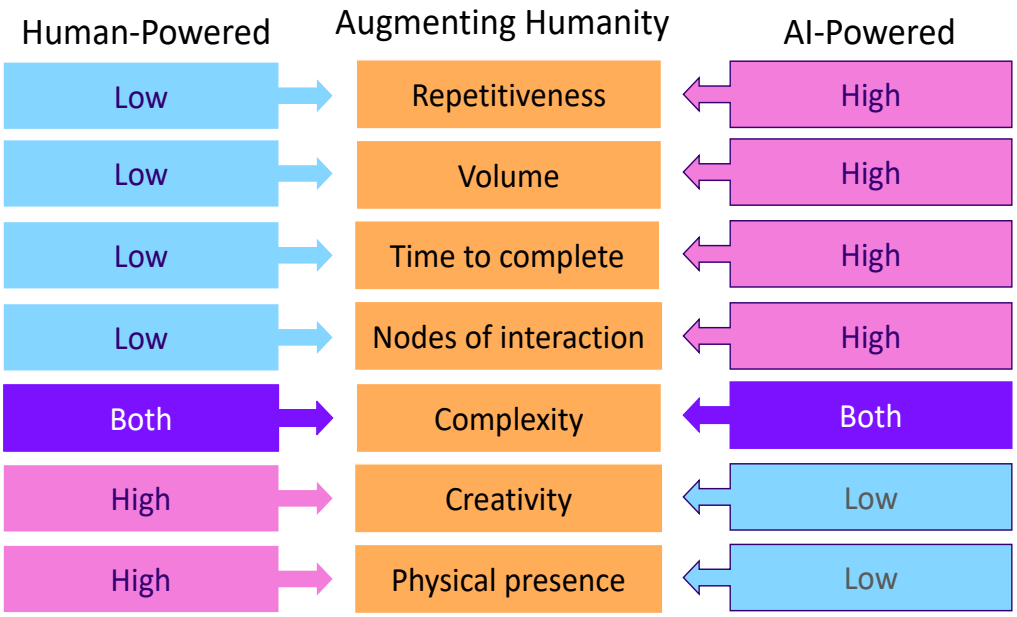
Figure 3. Candidates for AI-Driven Automation



Source: Constellation Research

Start with the Orchestration of Trust in Designing AI-Driven Smart Services for the Autonomous Enterprise

Crafting AI-driven smart services requires a shift in thinking to atomic-level smart services (see Figure 4). These new AI-driven smart services rely on these key components:

- **The application of data exhaust and digital footprints uses AI to build anonymous and explicit profiles.** Every individual, device or network provides some information. That digital footprint or exhaust could come from facial analysis, a network IP address or even one's walking gait. Using AI and cognitive reckoning, systems can start to analyze patterns and correlate identity. This means that AI services will recognize and know individuals across different contexts.

- **Immersive experiences enable a natural interaction.** Context, content, collaboration and channels come together to all AI-driven services to deliver immersive and unique experiences to each individual. The services will use context attributes such as

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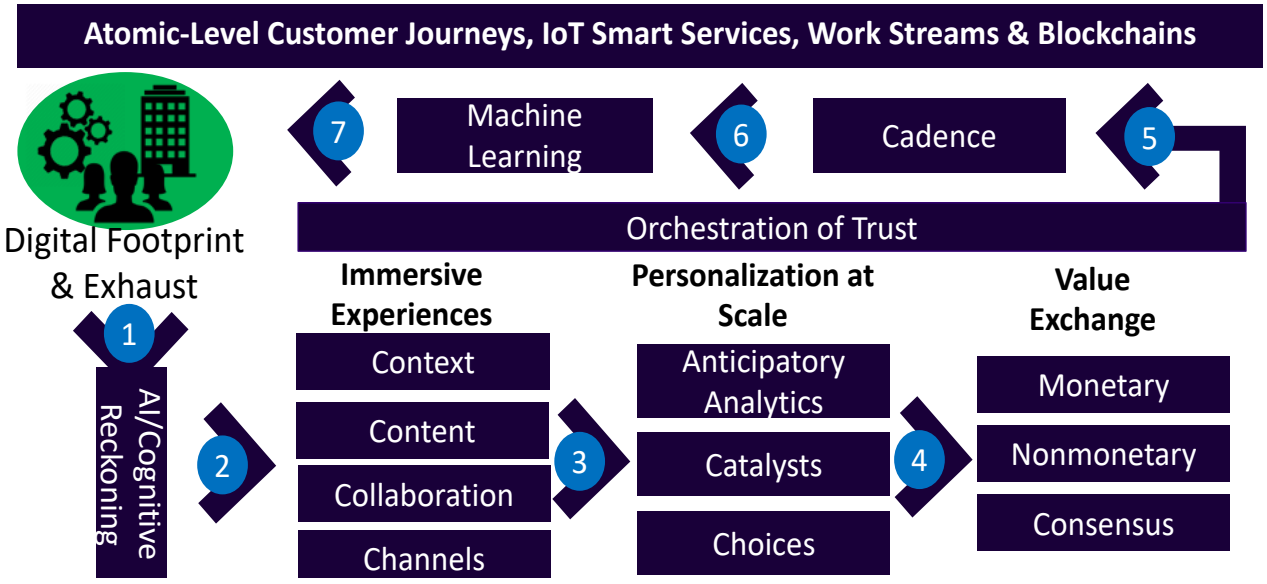
Figure 4. Orchestration of Trust—Inside AI-Driven Smart Services



Source: Constellation Research

geospatial location, time of day, weather, heart rate and even sentiment—combined with what the service knows of our identity and preferences—to improve relevance and deliver the appropriate content. Sense-and-respond mechanisms will enable collaboration among participants and machines through conversations and text dialogues. Channels include all interaction points, such as mobile, social media, kiosks and in person. The goal is the creation of natural user experiences based on identity.

- **Mass personalization at scale delivers digital services.** Anticipatory analytics, catalysts and choices interact to power mass personalization at scale. Anticipatory analytics allow customers to "skate where the puck will be." Catalysts provide offers or triggers for response. Choices allow customers to make their own decisions. Each individual or machine will have their own experience in contexts depending on identity, historical preferences and needs at the time. From choose-your-own-adventure journeys, context-driven offers and multivariable testing on available choices, the AI systems offer statistically driven choices to incite action.

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- **Value exchange completes the orchestration of trust.** Once an action is taken, value exchange cements the transaction. Monetary, nonmonetary and consensus are three common forms of value exchange. While monetary value exchange might be the most obvious, nonmonetary value exchange (including recognition, access and influence) often provides a compelling form of value. Meanwhile, a simple consensus or agreement can also deliver value exchange on the veracity of a land title or agreement on a patient treatment protocol.

- **Cadence and feedback continue an AI-powered learning cycle.** Powered by ML and other AI tools, smart services consider the cadence of delivery: one time, ad hoc, repetitive, subscription-based and threshold-driven. Using ML feedback techniques, the system studies how the smart services are delivered and applies this to future interactions.

- **Machine learning delivers digital feedback loops and enables the autonomous enterprise.** The system learns from every transaction to understand how to improve the model. Paired with generative adversarial networks (GANs), a method to create data to improve precision in training models, these neural networks start the self-learning process to reduce false positives and false negatives. As the systems improve, precision decisions take on autonomous characteristics such as continuous, auto-compliant, self-healing, autonomous and data-driven networks.

THE BOTTOM LINE: EXPECT LEVEL 4 AUTONOMOUS ENTERPRISES TO EMERGE IN 2023

Constellation identifies five levels of autonomous enterprises and predicts when these cognitive apps will deliver full autonomy (see Figure 5, p. 19):

Level 1 Autonomous Enterprise: Basic Automation

In this level, the system can provide basic task and workflow automation.

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- **When?** Today.
- **Includes:** Basic process automation tools such as BPM, manual instrumentation and control, and intelligent workflow automation.
- **Who's in control?** Humans are still in control and guide many manual steps.

Level 2 Autonomous Enterprise: Human-Directed

Level 2 enables human-directed automation of business processes.

- **When?** Current state of the art.
- **Includes:** Robotic process automation, process-mining tools, journey orchestration tools, ML algorithms, natural language processing.
- **Who's in control?** Humans direct major decisions; minor decisions automated over time with some effort in training.

Level 3 Autonomous Enterprise: Machine Intervention

Level 3 delivers automation with occasional machine intervention.

- **When?** The next big thing in 2020.
- **Includes:** Cognitive applications, neural networks, GANs models, contextual decisions and next best actions.
- **Who's driving?** Humans still on standby but can be hands-off for periods of time.

Level 4 Autonomous Enterprise: Fully Autonomous

Level 4 presumes that the machines can deliver full automation but not sentience.

- **When?** Sometime in 2023.
- **Includes:** AI-driven smart services, full automation, self-learning, self-healing and self-securing.
- **Who's driving?** Machines are fully automated.

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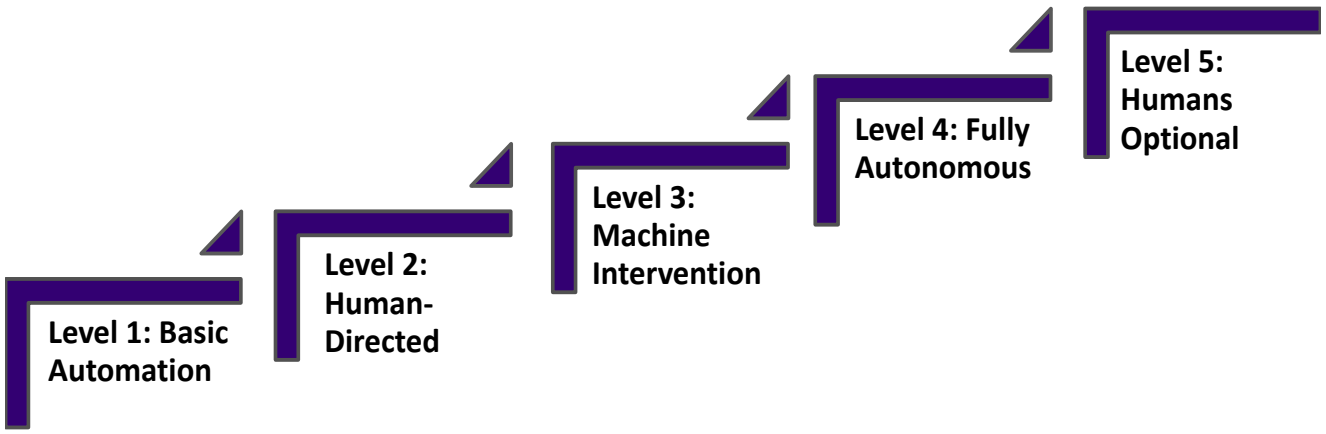
Level 5 Autonomous Enterprise: Humans Optional

Level 5 achieves full sentience and humans may no longer be needed.

- **When?** 2030.
- **Includes:** Fully autonomous sentience, empowering precision decisions at scale.
- **Who's driving?** Humans fully optional.

Figure 5. Understand the Five Levels of Autonomous Enterprises



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Infinite Computing Accelerates the Autonomous Enterprise

Holger Mueller, Vice President and Principal Analyst

The dawn of an era of Infinite Computing[2] has arrived simultaneously with the dawn of an era of profound uncertainty for best practices. These eras are interrelated—Infinite Computing capabilities on the technology side enable new best practices on the business side. The net effect is striking disruption of traditional enterprise activity, especially for companies that are incapable of innovating in both best practices and technology.

Enterprises have taken for granted and have gotten comfortable with the first layer of the Infinite Computing model, Infinite Communications. Actually, leaders take the internet for granted—even new value-added services such as video calling. On the next level of Infinite Computing, Infinite Questions & Answers, the world has progressed. Specifically, this level allows enterprises, based on the various implementations of Hadoop, to bring all their data together, regardless of from which system they stem. Storage is cheap, so advanced enterprises store both their digital artifacts (for example, information from their system of record) and digital exhaust (such system log files) in the same data lake. For the first time, this creates a repository of all enterprise and even extraprise information. By itself, it would be a once-in-a-lifetime storage opportunity solved; in combination with the next level of Infinite Computing, Infinite Compute, it becomes a powerful combination: People and—more importantly—software can address all reasonable (and, at first glance, unreasonable) questions to these Infinite Computing layers, and will get answers.

The next level of Infinite Computing is Infinite Machine Learning, the ability to combine information and processing into machine-directed processes. These are the enablers of the self-driving, autonomous applications described here. Autonomous applications will unleash their full power when the next and last level of Infinite Computing is reached: Infinite Deep Learning. This is an enterprise completely adopting and adapting to changes in data and knowing what to do with the data, with no human intervention and enabling first the Level 4 automation that this report explains, and ultimately the Level 5 automation, making humans optional. Infinite Computing platforms[3] are the key capabilities that CxOs are looking for.

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However, business processes still need to be automated, even if uncertainty exists about their validity, applicability and future readiness. This is why enterprise leaders look for Business Acceleration Clouds (BACs)[4] that allow enterprises to compose, operate and monitor next-generation business processes and best practices. At their core, BACs acknowledge that software is what is powering enterprises today, and it makes the transition and operation of a software-powered enterprise easier.

Practically, this means that BACs make it easier for enterprises to create, operate and monitor software environments, not only for traditional IT purposes but also for powering an enterprise's business operations across the whole value chain. Additionally, BACs enable a higher set of application components that can be used overall to enable modern business best practices. BACs enable the autonomous enterprise when it comes to the machine learning layer that powers the life cycle of a BAC's software environments.

The result is an enterprise that practices Enterprise Acceleration, something that enterprises must achieve to be able to keep up with market changes and challenges.

It is about time that enterprise software abandons the human operator model, which requires humans to show up so that good things in an enterprise can happen on a system level. The ultimate objective is freeing up human time, generating more possibilities for creative, out-of-the-box thinking and making the workplace more humane on the one hand and more resilient and agile on the other.

Automation and AI Are Best in Service of People

Nicole France, Vice President and Principal Analyst

Automation, particularly when it incorporates machine learning and AI, is here to stay. Given the demands most businesses face to increase the speed of their operations and be able to act rapidly on large volumes of data, there's simply no other option.

Automation of routine, repetitive tasks is rapidly becoming the norm. More and more companies are also experimenting with various forms of automation that can adapt based on incoming information and new patterns. All types of automation, from the most basic to the most sophisticated, increase

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information transparency. They shift the focus from tasks to analysis and decision-making. This improves everyone's ability to understand what's happening and make better decisions.

Even so, automation and AI deliver the greatest impact when they are designed to serve people, whether employees or customers. Getting to the right answers quickly—whether a customer service issue or a strategy decision—ultimately depends on humans to ask the questions. Automation and AI deliver the most impressive results when they have been applied to accurately anticipate what those questions might be. And when it works effectively, the technology, including some automated decisions, recedes to the background and lets interactions between people come to the fore. These are the interactions that drive meaning, value and relationships—the underpinnings of any business.

Where automation and AI are applied to specific, bounded problems or questions, they deliver tremendous value. They improve human productivity. But they also have significant limits. Automated systems cannot easily adapt to massive, large-scale changes to the context and parameters within which they operate. They can, however, help those working with them to adapt quickly, even making wholesale changes to organization's goals, objectives and purpose.

Could an autonomous enterprise that is "people optional" have adapted to the dramatic and rapid changes that have happened as a result of COVID-19? Absolutely not. Even the most sophisticated autonomous systems cannot adapt to a fundamental change in their very reason for existence.

Will "people-optional" autonomous enterprises ever work? Possibly. But the more important question to ask is: Why would we want them to?

Human-Free Enterprise or Mixed Reality? Where Will We (or Should We) Land?

Liz Miller, Vice President and Principal Analyst

Futurists have long predicted the dawn of an autonomous existence. The lure of a highly efficient, astonishingly effective world powered by machines can hold sway as business leaders picture AI-powered systems turning sales funnels and supply chains into perfectly orchestrated masterpieces timed at the customer's desire and context, simultaneously optimized for profit and return.

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When it comes to the evolutionary path of the autonomous enterprise, the question will never be "Can we achieve it?" The toughest questions to be asked will be around "Should we? And if we should, at what cost?"

For the chief marketing officer, having this dialogue, if not championing this dialogue, is critical. CMOs sit at the tipping point where customer intention and expression meet human action and direction. It is the CMO that is often called upon to understand the engagement balance that must be struck between delivering value at the customer's stated pace, cadence and context and leaving the door open for moments of delight, surprise and the unexpected.

It is the unexpected, the fallibility of chance and the reality that humans have the capacity to attempt the unexpected in the face of predictability that may never be recreated, no matter how sophisticated the cognitive engine becomes. Humans have the capacity to try the unexpected and unfathomable.

While permutations executed by AI will calculate into the billions, humans have the capacity to experiment in the face of impossible odds with an intuitive creativity that a billion calculations would urge never be attempted. Those are moments of unique human capacity and creativity.

In a post-digital age, these are increasingly the moments humans crave. This is why we see millennials and Generation Z responding to, of all things, printed communications delivered by traditional mail. Every calculation in the world would tell you that digital advertising and digital content delivery is most efficient and effective, less costly and less of a strain on any infrastructure. So, why are digitally native brands turning to curated print packs to introduce their brands to these digital citizens? Why are the digitally connected rejecting digital connections?

While the autonomous enterprise craves AI-powered efficiency, humans crave unexpected moments of delight, even if those moments are the result of error. In as much as creativity and the human capacity to create and be creative may never be replicated by machines, the human desire for the unexpected will never be satisfied by a fully autonomous enterprise.

Yes, leaders can achieve a fully autonomous enterprise, free of those pesky humans with their fallibility, inefficiency and errors. In some instances, the answer to the question "should we?" will likely

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be yes. But in others, and perhaps in the majority of instances, enterprises will need to spend more time in Level 4 of this autonomous enterprise—the phase in which the machines are fully automated and purposefully designed to enhance efficiency and effectiveness but without the elimination of the humans at the core of the business and the humanity at the core of our customers.

For the CMO leading debates around autonomous enterprise implementation, the advice remains the same as it does in today's state of Level 2 autonomy (in which humans still direct automation): Lead with a mindset of authentic marketing where data and creativity live in peaceful and intentional coexistence. Ask the hard questions regarding should versus can. Drive growth in partnership with customers and not despite them.

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ENDNOTES

[1] *Sources: Japan Ministry, European Union.*

[2] *For more details on Infinite Computing, see: Holger Mueller, "The Era of Infinite Computing Triggers Next-Generation Applications," Constellation Research, June 1, 2018. https://www.constellationr.com/research/era-infinite-computing-triggers-next-generation-applications*

[3] *For more details on Infinite Computing platforms, see: Holger Mueller, "Infinite Platforms Power Enterprise Acceleration," Constellation Research, October 11, 2019. https://www.constellationr.com/research/infinite-platforms-power-enterprise-acceleration*

[4] *For more details on Business Acceleration, see Holger Mueller, "Enterprise Acceleration Creates Imperative for Business Acceleration Clouds," Constellation Research, February 7. 2020. https://www.constellationr.com/research/enterprise-acceleration-creates-imperative-business-acceleration-clouds*

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